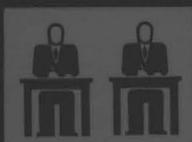
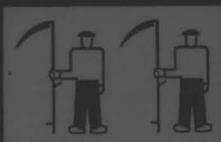


**ECONOMIC**



**AND**



**SOCIAL**

**HISTORY**



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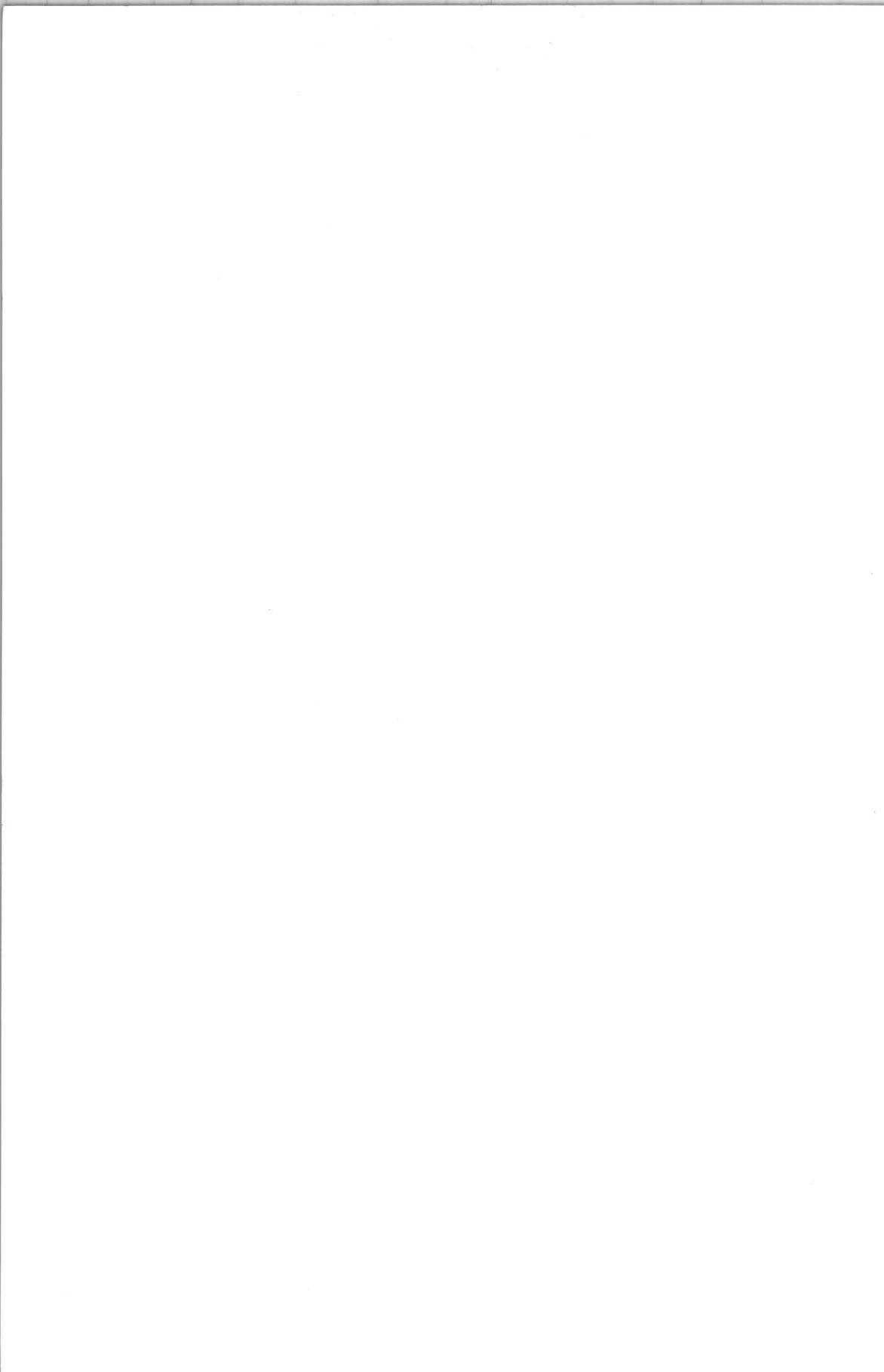
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HISTORICAL NATIONAL ACCOUNTS IN THE NETHERLANDS

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AND SOCIAL HISTORY  
IN THE NETHERLANDS

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INTRODUCTION: THE STUDY OF HISTORICAL NATIONAL  
ACCOUNTS IN THE NETHERLANDS

by

*Jan-Pieter Smits, Jan Luiten van Zanden and Bart van Ark*

In 1983 Richard Griffiths and Jan de Meere published a small but influential paper in the *Tijdschrift voor Geschiedenis* entitled 'The Growth of the Dutch Economy in the nineteenth century: back to basics?'.<sup>1</sup> In this paper they criticised the available national income estimates for the Netherlands in the period before 1920. They showed that the estimates were based on dubious assumptions and spurious data. Even the series published by Jan Teijl in 1971, which were the result of a larger research project to reconstruct the development of the Dutch economy in the nineteenth century, could in their view not serve as a guide to growth during this period. Among the many points raised against his methods were that he did not specify his deflator and that his two different estimates showed highly divergent trends during particular decades. As a result the authors concluded that 'the current national income estimates can tell us absolutely nothing about the timing of Dutch economic growth in the nineteenth century', and 'that we have to return right back to basics'.

This criticism of the state of quantitative economic history in the Netherlands -all the more devastating because the development of the Dutch economy during the nineteenth century and especially its slow industrialisation had been the main focus of research in economic history after 1945- cleared the ground for a gradual reorientation of this branch of research. Indeed, as is shown in a recent collection of papers on the reconstruction of historical national accounts in Europe published in the *Scandinavian Economic History Review*, in this respect the state of the art in the Netherlands (and also in Belgium) was much behind that of other European countries by the 1980s.<sup>2</sup>

In a number of publications Griffiths and De Meere themselves had already shown that the first half of the nineteenth century could be studied in detail on the basis of a large number of quantitative sources. Their books on economic growth and industrialisation in this period, published in 1979 and 1982 re-

spectively, gave a much more balanced picture of the development of the Dutch economy.<sup>3</sup> However, the final step, that is to apply the concepts of the National Accounts and reconstruct the growth of GDP, was not taken by them although plans to this effect had already been made. Their approach could therefore be criticised for being selective -for example by overemphasising the development of growth industries without paying due attention to stagnation and decline in other parts of the economy.

In his 1985 thesis on the economic development of Dutch agriculture in the nineteenth century, Van Zanden pointed out this weak point in their revaluation of economic performance in the first half of the nineteenth century<sup>4</sup>. Moreover, on the basis of a large-scale research effort in public archives, Van Zanden was able to reconstruct the quantitative development of Dutch agriculture within the framework of the system of national accounts. But as he restricted his research to a number of benchmark years (1810, 1850, 1880 and 1910), it was not possible to give a detailed analysis of the annual development of this sector of the economy. Van Zanden's view on the growth of the agricultural sector between 1810 and 1850 was on the whole rather pessimistic: the growth of agricultural output was unable to match population growth, and labour productivity in agriculture declined slightly, especially in the regions of specialised farming in the coastal provinces; in the land provinces agriculture fared much better. Between 1850 and 1880 'modern economic growth' started in agriculture with an increase in labour productivity, output and consumption per head.

In a paper written shortly after completion of his thesis, Van Zanden aimed to show that his method for the reconstruction of long-term growth in the agricultural sector could also be applied to the rest of the economy.<sup>5</sup> In this paper he argued that it was possible to reconstruct the long term evolution of the Dutch economy on the basis of the available data for a number of benchmark years, and he arrived at conclusions which were more or less similar to those of his thesis: during the first half of the nineteenth century GDP per capita hardly increased at all, but after 1850 growth accelerated and became more or less 'normal' by European standards.

Although the results have been criticised on a number of points, this paper formed the starting point of new research into the development of the Dutch economy in the nineteenth century, of which this volume is one of the products. In 1989 Van Zanden was asked by the Dutch Science Foundation (NWO) to develop a programme for the study of Dutch economic growth. The subsidy for the programme 'Reconstruction national accounts of the Netherlands and the analysis of the development of the Dutch economy in the period 1800-1940' was awarded in 1990. As early as 1989 three Ph.D. projects started at the Free University to quantify the development of industry, services and government in the second half of the nineteenth century. Already in 1988, the Central Bureau of Statistics published the first results of a major project to

revise the national accounts of the interwar period (1921-1939)<sup>6</sup>, which was included in the framework of the larger NWO programme. At the University of Groningen Rainer Fremdling started a research project on the development of capital formation in the nineteenth century, which fitted in very well with the programme of Van Zanden.

As a result of these impulses, much quantitative work on Dutch economic development in the nineteenth and twentieth century has been done in the last seven years. Since most of this work was done within the framework of the National Accounts, it has become possible to bring the results together and give a detailed account of economic growth in the Netherlands during the period 1800-1940. This work is done by Jan-Pieter Smits, the coordinator of the 'national accounts'-project.

The basic approach of the project was to estimate GDP from the output side: the estimates of growth of value added in agriculture, industry and services have been at the core of the whole programme. In order to accomplish this, a major research effort into archives of the government and private firms was undertaken to reconstruct the movement of output, prices and inputs of various sectors. Of equal importance has been the work on capital formation, which makes use of the same sources. Other categories of expenditure are estimated directly from the basic sources -as in the case of government expenditure- or indirectly by combining data on output and international trade (private consumer expenditure is estimated in this way, see the article from Horlings and Smits in this volume). Special attention has been paid to the development of prices which is, in our view, a neglected area of past research. The income side of the economy was the object of two separate projects, one on wages, salaries and income inequality and another on income from capital. Finally, separate studies were made of the Dutch economy during the First World War and during the interwar period.<sup>7</sup>

At present, most of the separate projects are finished or near completion, and work has now shifted to the consolidation of the results of the various projects as well as the construction of one system of national accounts for the period 1800-1940. New insights arise from the confrontation from comparing estimates of the income, the expenditure and the output side of the economy. Fairly crude estimates of the balance of payment are part of the work in progress. At the end of 1996 we will be able to present our final results, that is, series of GDP, its components, and its major 'inputs' (labour, capital and land) for the entire period. We believe that those will be the first reliable series of historical national accounts for the period until 1921.

In recent years a large database has been constructed, with different series covering the three sides of the system of national accounts (i.e. income, output and expenditure). On the basis of these data it will be possible to estimate

levels and rates of growth of the economy as a whole. Yet, the database also allows for a more detailed analysis of economic development because we gathered our data as much as possible on a disaggregate level. Some examples might illustrate the nature of the database:

- A large part of the data has been collected on a regional level. For example, wage and price data were processed on a provincial level. Afterwards, these figures have been aggregated to the national level. On the basis of such data as well as regional data on occupational structure and excise duties it is possible to quantify regional economic development. These series can deepen our understanding of the economic development of the Netherlands, all the more since in historiography it has always been maintained that large differences in economic structure are one of the strong features of the Dutch economy.
- Apart from a regional breakdown, also a disaggregation of our data on a sectoral level is given. Detailed information on domestic output, as well as the structure of imports and exports is available. These data allow us to examine processes of import substitution and export-led growth.
- Also estimates on labour input and capital formation by sector are made (see the contributions of Groote, Albers and Clemens in this volume), allowing us to calculate total factor productivity on a sectoral level.
- In the ‘national accounts’-project, estimates of the level and structure of capital income could be made for the period 1800-1913. Until now we only had rough data for the beginning of the twentieth century at our disposal. Extensive research has resulted in timeseries on the development of capital income in the nineteenth century (see Versteegen’s article in this volume). These series shed an interesting light on the character of economic development.

In the project ‘Reconstruction national accounts of the Netherlands’, the concept of ‘modern economic growth’ introduced by Simon Kuznets, will be one of the cornerstones of the analysis.<sup>8</sup> In this line of thinking processes of economic growth and structural change are closely interrelated. Because of the large and detailed database constructed for the national accounts project, it will be possible to perform such an analysis in great detail. The issue of ‘modernity’ could be interesting, because the Dutch economy was already at an early stage of economic development -i.e. in the seventeenth century- characterized by important ‘modern’ features. How does nineteenth-century economic development relate to the structure of economic development in the eighteenth and seventeenth century? On the basis of our new time series it will be possible to make a detailed study of long-term economic development. Such an analysis is not only of interest for Dutch economic historians. It should reveal important dynamics of economic transition, a process which occurred in most western economies during the nineteenth century.

Although the programme is not yet completely finished, new initiatives have already been developed to continue this line of research. In the coming years research will expand in the following fields. After completing the database on Dutch economic development in the period 1800-1940 in 1996, which contains a wealth of quantitative data on every aspect of the Dutch economy in this period, further work on the analysis can be undertaken. The theses published by the research group already contain major pieces of the puzzle in analysing the development of particular sectors in specific periods, which will be at the basis of the more encompassing studies that are to be undertaken. In this second phase of the programme, research will concentrate more on the relationships between the various sectors of the economy, on the impact of government policies (see Van Zanden's contribution in this issue), on the timing of economic growth and on international comparisons.

A second avenue of new research will be to link the 1800-1940 estimates to the present (post 1969) CBS series. The period 1939-1948 still constitutes a big gap in our knowledge of the development of the Dutch economy. The revision of the series for 1948-1969 is yet to be done by the CBS (for these revisions see the paper by Den Bakker et. al. in this volume). But the aim is that in 1999, when the CBS celebrates its centennial anniversary, a consistent set of estimates for GDP and its components for the period 1807-1999 can be presented. An even more ambitious line of new research is to try to apply the method of national accounts to the pre-1800 period. For the province of Holland this has been attempted by Van Zanden in a number of publications<sup>9</sup>, but it is clear that much more can still be done. For example, thanks to a research project of Wantje Fritschy a lot of quantitative information about the incomes and expenditures of the provincial governments for the period between 1600 and 1800 is being collected, which will be a major new source of information. Research into the history of prices, international trade, banking and agricultural production is creating new opportunities to study the long-term evolution of the Dutch economy before 1800 in more detail. Moreover, the recent synthesis of the available evidence, presented by De Vries and Van der Woude in their study of the Dutch economy between 1500 and 1800, offers a good starting point for new work in the field of quantitative economic historical research.<sup>10</sup>

Finally, and perhaps most importantly, the 'internationalisation' of the research on historical national accounts should be mentioned. Almost from the beginning of the project an intensive collaboration with a similar programme for Belgium, led by prof. Herman van der Wee and prof. Erik Buyst from the University of Leuven, has started. Since 1994 this collaboration continues on a more formal basis thanks to the support the Science Foundations of both countries, and it will result in a number of studies comparing the evolution of both countries, their relative levels of productivity and rates of economic

growth. One of the major contributions to the debate on the slow pace of industrialisation in the Netherlands was made by Joel Mokyr, who explicitly compared the 'industrial revolution' of the two countries.<sup>11</sup> His hypothesis is that the rapid industrialisation in Belgium was caused by its low level of wages and that high wages obstructed industrial growth in the Netherlands is still of major interest to the study of both countries.

Since 1993, one of the four major research programmes of the N.W. Posthumus Institute focuses specifically on the construction of comparative historical national accounts across Europe. As indicated above, the Dutch historical national accounts are still only in their first generations, but for other countries the reconstruction has already moved into their second (Denmark, France, Italy), third (United Kingdom) or even fourth generation (Sweden).

These new generations of national accounts are partly to correct for defects of the earlier vintages (which we have hopefully already in the first generation of our Dutch accounts), such as the use of better deflators, consistent weighting schemes with base year estimates for sub-periods and a greater amount of sectoral detail. However, a major purpose of the new research into European historical national accounts is to improve their comparability across Europe. One of the crucial elements to guarantee such comparability, is the development of benchmark estimates of comparative levels of income, output, expenditure and productivity using purchasing power parities expenditure categories and by industry of origin.

Within the Dutch national accounts project, work on international comparisons has been undertaken as is reflected in the papers by Burger on the structure of the Dutch economy in an international comparative perspective, and the paper by Burger and Vermaas on comparisons of industrial wage development, and the paper by Burger and Smits on relative levels of productivity in services for 1910.

In this respect, the national accounts project can also be linked to the work of the Groningen Growth and Development Centre at the University of Groningen. Under the supervision of Rainer Fremdling and Angus Maddison, the Groningen group had undertaken extensive international comparative work of growth and levels of economic performance across the world. The paper by Van Ark and De Jong places the Dutch economic performance since 1913 in a comparative framework including 11 countries in Northwest Europe. The authors also make use of growth accounting techniques, which are an important analytical tool for the study of long term economic growth.

A new generation of economic historians has answered to the call by Griffiths and De Meere to go 'back to basics' and to analyze the quantitative development of the Dutch economy in the nineteenth and twentieth centuries. This volume presents a selection of this new line of research.

## NOTES

1. R.T. Griffiths and J.M.M. de Meere, 'The growth of the Dutch economy in the nineteenth century: back to basics?', *Tijdschrift voor Geschiedenis* 96 (1983) 563-572.
2. E. Buyst, J.P.H. Smits and J.L. van Zanden, 'National accounts for the low countries', *Scandinavian Economic History Review* XLII (1995) no.1., 53-76.
3. R.T. Griffiths, *Industrial retardation in the Netherlands 1830-1850* (Den Haag, 1979); J.M.M. de Meere, *Economische groei en levensstandaard in Nederland gedurende de eerste helft van de negentiende eeuw. Aspecten en trends* (Den Haag, 1982).
4. J.L. van Zanden, *De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914* (Utrecht, 1985).
5. J.L. van Zanden, 'Economische groei in Nederland in de negentiende eeuw. Enkele nieuwe resultaten', *Economisch- en sociaal-historisch jaarboek* 50 (1987) 51-76.
6. C.B.S., G.P. den Bakker, Th. A. Huitker and C.A. van Bochove, *Macro-economische ontwikkelingen 1921-1939 en 1969-1985* (Den Haag, 1987).
7. All in all, the following people have worked or are still working on the programme:
  - Merijn Knibbe, agriculture 1851-1951, Ph.D. thesis 1993;
  - René van der Voort, government 1850-1913, Ph.D. thesis 1994;
  - Peter Groote, capital formation in infrastructure, Ph.D. thesis 1995;
  - Jan-Pieter Smits, services 1850-1913, Ph.D. thesis 1995;
  - Edwin Horlings, services 1800-1850, Ph.D. thesis 1995;
  - Ronald van der Bie, economy, 1913-1921, Ph.D. thesis 1995;
  - Annelies Vermaas, wages, salaries and income inequality 1800-1913;
  - Wybren Verstegen, income from capital 1800-1913;
  - Adrian Clemens, capital formation in buildings 1800-1913;
  - Ronald Albers, capital formation in machinery and equipment, 1800-1913;
  - Alain Callewaert, industry 1850-1913;
  - Michael Jansen, industry 1800-1850;
  - Arthur van Riel, prices, 1800-1913;
  - Ary Burger, international comparison of output and productivity, 1850-1913;
  - Gert den Bakker (together with other staff members of the CBS), economy, 1921-1939.

Moreover, research into the agricultural sector and the government in the first half of the nineteenth century has been carried out by the leader of the programme, Van Zanden. Important work on the population censuses and the structure of the working population has been done by Oomens and Den Bakker. Finally, Joost Jonker has conducted related research into the development of banking in the nineteenth century and Gert Pons analysed the development of fisheries. Almost all books and theses will be published in a special series by the NEHA (Netherlands Economic History Archives) in Amsterdam.

8. Cf. S. Kuznets, *Modern economic growth. Rate, structure and spread* (New Haven/ London, 1966).

9. J.L. van Zanden, 'De economie van Holland in de periode 1650-1805: groei of achteruitgang? Een overzicht van bronnen, problemen en resultaten', *Bijdragen en mededelingen tot de geschiedenis der Nederlanden* 102 (1987) 562-609; J.L. van Zanden, 'The Dutch economy in the very long run. Growth in production, energy consumption, and capital in Holland (1500-1805) and the Netherlands (1805-1910)', in A. Szirmai, B. van Ark and D. Pilat, *Explaining economic growth. Essays in honour of Angus Maddison* (Amsterdam, 1993) 267-283.
10. J. de Vries and A. van der Woude, *Nederland 1500-1815. De eerste ronde van moderne economische groei* (Amsterdam, 1995).
11. J. Mokyr, *Industrialization in the Low Countries 1795-1850* (New Haven, 1976).

## II

### PRIVATE CONSUMER EXPENDITURE IN THE NETHERLANDS, 1800-1913<sup>1</sup>

by

*Edwin Hurlings and Jan-Pieter Smits*

#### *1. Introduction*

The project 'Reconstruction of the National Accounts of the Netherlands, 1800-1940' intends to construct time series relating to the three basic approaches of the system of national accounts, namely product, income and expenditure. As such, estimates of private consumer expenditure are a necessary element of these constructions. Yet, the significance of the research presented in this article goes beyond mere calculation. Data on consumption are of vital importance to an analysis of the pattern of economic growth and development.

In recent years the centre of Dutch historiography has shifted towards the analysis rather than description of economic development. However, the attention has mainly been focussed on supply-side influences, such as wage levels (Mokyr) or the costs of production factors (Bos, Griffiths).<sup>2</sup> Capital supply, the quality of entrepreneurship, and technology are key issues in this discussion. Although these studies have improved our understanding of the process of economic development in the Netherlands, they only concern one side of the picture. We still know very little about patterns of consumption, the level and growth of purchasing power, or the role of the domestic market. In Great Britain economic historians have recognized the role of demand in the process of economic growth and analyse the 'pressure of demand relative to supply'.<sup>3</sup> It is too early to apply a similar analysis to the economic development of the Netherlands. Specific estimates have yet to be made or refined - most notably those relating to the balance of payments. It is nevertheless important to note that 'a consideration of the sources of the growth of demand is a necessary counterpart of the sources of the growth of supply'.<sup>4</sup>

A thorough examination of the relationship between factors of demand and supply requires information on such elementary building blocks as the level of consumer expenditure. Research into the development of purchasing power has so far centred on real wages and the budgets of working-class families. However, these lines of approach are not suitable for a macroeconomic analysis of the influence of domestic consumer demand on economic growth. Real wages may provide an indication of changes in the standard of living, but they do not show to what extent average income could be used for non-essential items of consumption. Working-class budgets can shed some light on the latter question, but they cannot be used to construct an aggregate picture of consumer expenditure. We have therefore applied an alternative method. By calculating the total value of household expenditure on goods and services the composition and growth of the aggregate budget can be examined.

In the following sections we will attempt to chart the development of private consumer expenditure in the Netherlands during the long nineteenth century (1800-1913). The second section will discuss the methods and sources used to estimate expenditure. Subsequently, the level of consumer expenditure is analyzed in the third section. This level went through a remarkable development. In this edition Burger observes that around 1850 the Dutch ratio of private consumer expenditure to gross national product was lower than could be expected on basis of per capita income; by 1913 this lag had been turned into a lead as Dutch private consumption was at a relatively high level.<sup>5</sup> The fourth section focusses on structural changes in private consumer expenditure. In addition to a test for Engel's Law, this concerns an examination of the effect of incomes, relative prices, and excise taxes on the structure of consumption. In the fifth section we will try to examine the contribution of aggregate demand to the process of modern economic growth. This has been done by analyzing the pattern of industrial development in relation to changes in demand.

## *2. Estimating consumer expenditure*

An estimate of private consumer expenditure should ideally be constructed independent of the two other approaches of the system of national accounts. The outcome can then be crosschecked with the estimates of national income and product. However, this requires information on the budget of consumers at varying levels of income, ranging from subsistence minimum to extreme wealth. Such information is unavailable for the nineteenth-century Netherlands. The only budgets concern working-class families.<sup>6</sup> This can probably be attributed to their comparatively low level of purchasing power; the vulnerability of this income group to exogenous economic shocks prompted investi-

gations into the nature of its pattern of consumption. Yet, even then the number of budgets is rather small until the end of the nineteenth century.

There is nevertheless an alternative approach. The total value of private consumer expenditure can be defined as the sum of domestic output, net imports of goods, and the output of services geared towards household consumption. This does present the problem of estimating the share of households in the total supply of goods and services. However, in his quantitative study of British economic development Feinstein has demonstrated that this method is quite practicable.<sup>7</sup>

The commodities and services that are included in our estimates are:

- (1) *Foodstuffs*: potatoes, beer, butter, bread (rye and wheat), brandy, cheese, coffee, milk, rice, sugar, tobacco, tea, horticultural goods, meat (beef, veal, mutton, pork), wine, salt, and other foodstuffs.
- (2) *Industrial goods*: fuel (peat and coal), clothing, soap, and other industrial goods.
- (3) *Services*: rent, domestic servants, education, communication, passenger transport, and other final consumer services.

The reliability of the outcome of this indirect method can be tested by comparing the results with the CBS estimates of consumer expenditure in the interbellum period of the twentieth century. The Central Bureau of Statistics has constructed series of private consumer expenditure for the period 1921-1939.<sup>8</sup> The most recent estimate for 1921 was compared to a similar estimate based on our indirect approach. The results of this comparison are quite encouraging: our estimate is only 3 percent higher than that of the CBS. The structure of private consumer expenditure also compares favourably with CBS statistics on consumer budgets that include working-class families as well as higher income groups.<sup>9</sup> In spite of the indirect nature of these calculations, our method produces a reliable picture.

The various components of private consumer expenditure have been calculated as follows:

– *Physical output in the Netherlands*: The volume and value of output in agriculture has been estimated by J.L. van Zanden (1800-1850) and M. Knibbe (1850-1913).<sup>10</sup> Industrial output estimates for the first half of the nineteenth century have been constructed by M. Jansen; similar series have been constructed for the second half of the century on basis of unpublished research data of A. Callewaert.<sup>11</sup> Information on the share of products for household consumption as opposed to industrial inputs, cattle fodder, and other intermediate and capital goods can be obtained from the *Statistiek van Voortbrenging en Verbruik* [Statistics of Production and Consumption] of 1913 -the first real

industrial census- and the reports of the *Commissie Ebels* on Dutch agriculture.<sup>12</sup>

– *Imports and exports*: Data on the foreign trade in selected products have been taken from the studies of Horlings (1800-1850) and Smits (1850-1913).<sup>13</sup> The *Statistiek van de In-, Uit- en Doorvoer* provides annual series of imports and exports from 1846 on. The trade statistics of the first half of the nineteenth century are fragmentary and often inconsistent. Annual series of the imports and exports of 24 selected groups of products have been constructed by combining these statistics with additional information taken from government reports, price lists of merchant companies, foreign trade returns, and a host of other sources.

– *Prices*: Price data have always been one of the main bottlenecks in the economic historiography of the Netherlands. Until recently most series were completely insufficient for an economy-wide application: price data usually concerned a single city or a crude regional average, and more often than not prices were taken from the purchase records of hospitals and charitable institutions.<sup>14</sup> Research by A. van Riel has solved most of the old problems.<sup>15</sup> His database of Dutch prices covers the entire nineteenth century, it includes foodstuffs and non-food products, and Van Riel has adequately weighted the various regional prices into a national average per product. He generally presents wholesale prices, although for some commodities specified prices (of hospitals and other institutions) had to suffice. The absolute level of Van Riel's prices has not always been adopted. Whenever the specific quality of the product in question does not adequately reflect the output of the entire industry, the price level (a unit-value ratio) is derived from the *Statistiek van Voortbrenging en Verbruik*. This level is then projected onto an index of Van Riel's prices.

– *Trade margins*: On basis of the various price series and the *Statistiek van Voortbrenging en Verbruik* producer prices and wholesale prices can be calculated. The next step concerns the price that was actually paid by the consumer. Retail prices are not available until after 1890, and even then they did not cover the entire range of products. Instead, the margin between producer and wholesale prices on the one hand and retail prices on the other hand is estimated for every group of products. These margins are taken from the work of Smits; a detailed description of this calculation and the results can be found in his thesis.<sup>16</sup>

– *Services*: Two types of service are included in these calculations. The first type concerns domestic servants, education, and the remaining services. The consumption of these services is defined as the product of total employment

and an average annual income per worker; no assumptions could be made on any possible 'consumer surcharge' over and above the value of incomes earned. The second type involves communication, passenger transport, and rent. Gross revenues are given for the first two industries; the gross rental value of residential buildings is calculated by combining series on the total stock of houses and on average annual rents.<sup>17</sup>

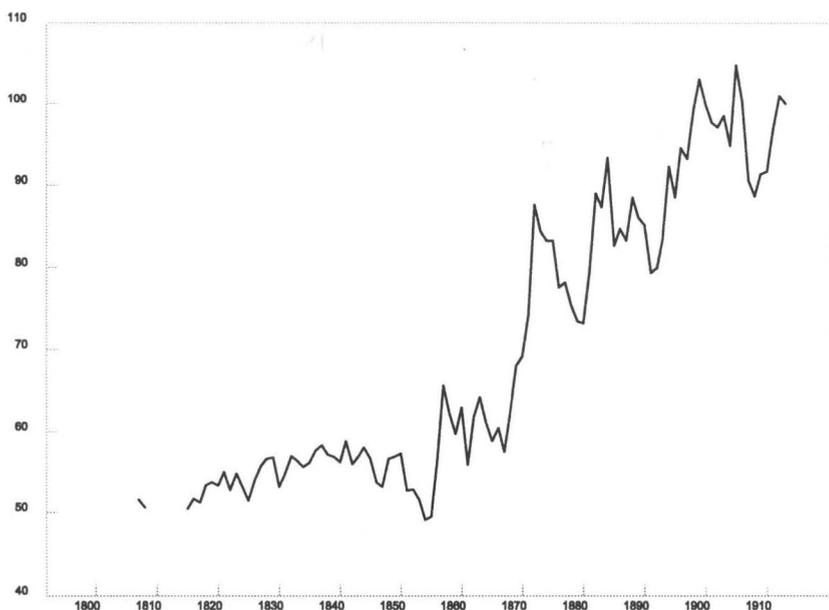
– *Excise taxes*: The gross revenues of state taxes can be found in several publications. Van der Voort has collected these revenues for the second half of the nineteenth century. Similar data for the period 1800-1850 can be found in a wide variety of sources.<sup>18</sup> However, the most interesting aspect of indirect taxation was that of local excises. The total income of municipalities can be found for 1814, 1827, 1840, 1849 and for the period 1850-1913.<sup>19</sup> Much less is known about the revenues of the various kinds of municipal excise. In order to assess the burden of indirect taxation on the consumption of a number of taxed commodities, series of these revenues have been constructed. For the period 1814-1849 municipal excise revenues are estimated as follows. First, an index of the total outlay of local government is used as an indicator for the development of total income; the share of indirect taxes in 1840 is used to convert this total income into a series of indirect tax revenues; and the share of the various excises in total indirect tax revenues in 1849 is then projected onto this series. More information is available for the years between 1849 and 1865. The debate on the abolition of local and national excises prompted the publication of a comparatively large amount of quantitative data, that can be used to construct series of tax revenues distinguished by type of excise. The total yield of local indirect taxes is given. In benchmark years the share of each of the various excises can be calculated. This share is assumed constant as long as there were no changes in tax laws; when excises were abolished, the shares of the remaining commodities were adjusted.

– *Value of consumer expenditure*: The total value of expenditure on goods is calculated by combining all data on volumes of domestic consumption and retail prices for the various products. The total value of Dutch private consumer expenditure is calculated by adding incomes and gross revenues earned in the (consumptive) service industries. The final step in these estimates is the construction of a comprehensive cost-of-living index with which the value of consumer expenditure can be expressed in real terms. To this end series of volumes of consumption and retail prices are weighted into an average Paasche-type deflator. The weights are changed periodically in order to account for changes in relative prices and the structure of expenditure.<sup>20</sup>

### 3. Levels of consumption

In this section we will examine the development of the level of aggregate consumer expenditure. Graph 1 displays the final outcome of the estimates presented in the previous section.

Graph 1. *Private consumer expenditure per capita at constant prices of 1913 (index = 100)*

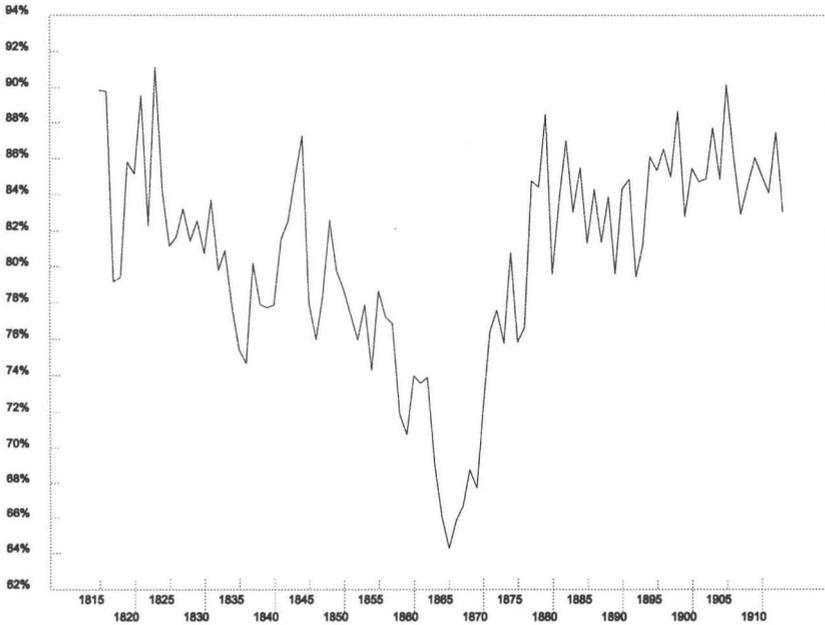


This graph shows that the first half of the nineteenth century was characterized by a near stagnation of consumption; between 1807 and 1845 real consumer expenditure per capita increased at a rate of 0.2 percent per year. The slight increase after 1815 can be attributed to a short-lived surge in demand after the Napoleonic Wars in combination with a sudden fall in agricultural prices after 1819. After 1850 the rate of growth of private consumer expenditure accelerated (1850-1865 0.5 percent). The growth of per capita consumer expenditure accelerated in the 1850s and reached an astounding rate after 1865; during the entire period 1850-1913 the growth rate amounted to 0.9 percent per year. There was obviously a fairly sharp break in the development of private consumer expenditure around the middle of the nineteenth century.

However interesting the growth of private consumer expenditure may be, it reveals little about the importance of consumption to the economy at large. A thorough analysis of the role of consumer demand in the economic develop-

ment of the Netherlands requires a comparison of the effect of domestic versus foreign demand and of consumption versus investment, or a Keynesian decomposition of the sources of demand.<sup>21</sup> The ratio between private consumer expenditure and gross national product (at current prices) gives the most comprehensive view of the relationship between consumer demand and the growth of the Dutch economy. Graph 2 shows the development of this ratio in the period 1815-1913.

Graph 2. *The ratio between private consumer expenditure and gross national product at current prices, 1815-1913 (%)*



The relative importance of consumer expenditure declined gradually during the first half of the nineteenth century from 85 to 90 percent in the late 1810s to about 80 percent around 1850. In the years between 1850 and 1865 this ratio collapsed to less than 65 percent. Yet, its subsequent recovery was at least as impressive: during the period 1865-1880 the ratio returned to a level of c. 85 percent at which it stayed for the remainder of the century. How can this peculiar pattern of development be explained?

*1815-1845:* Private consumer expenditure was virtually stagnant. Real per capita consumption increased at an annual rate of as little as 0.3 percent. The share of consumer expenditure in GNP also remained fairly stable and in an

international perspective this ratio was low relative to the level of Dutch per capita income.<sup>22</sup> The other components of national expenditure were equally unchanging.

*1845-1865:* After 1845 the structure of gross national product changed dramatically. Real per capita consumer expenditure declined until 1855 (-0.8 percent), but accelerated between 1855 and 1865 (1.5 percent). However, as aggregate economic growth far exceeded the increase in consumption, the ratio of private consumer expenditure to gross national product fell from about 80 percent in the mid-forties to 64 percent in 1865. In these years international transactions functioned as the main engine of growth: the government managed to step up the production of colonial export crops, and, above all, the liberalization of international trade and the opening up of the British market led to a rapid expansion of Dutch livestock exports.<sup>23</sup> On the other hand, the benefits of this growth appear to have been divided unequally: real and nominal wages, the rate of poverty, and the per capita consumption of bread, meat, and luxury goods remained unchanged.<sup>24</sup>

*1865-1880:* In every respect this was a highly dynamic period, combining a strong growth of consumption with a rapid increase in the share of private consumer expenditure in gross national product. Real per capita consumption increased at an average annual rate of 1.5 percent as against 0.3 percent in 1845-1865 and 0.9 percent in 1880-1913. The share of private consumer expenditure in gross national product reached a level of 80 to 85 percent; in the 1880s the Netherlands had surpassed the level that could be expected on basis of its level of income.<sup>25</sup> The growth of consumer expenditure was accompanied by a decline in exports and an increase in imports. As real incomes increased, goods that would otherwise have been exported were diverted towards the domestic market; there was an inverse relation between the share of exports in physical production and the ratio of private consumer expenditure to gross national product.<sup>26</sup> Judging by the development of private consumer expenditure Dutch economic growth was no longer driven by international transactions but by the growth of the domestic market.

*1880-1913:* This pattern of development was consolidated during the final decades of the nineteenth century. While the growth of consumer expenditure slowed down (0.9 percent in 1880-1913), its ratio to gross national product stabilized at a relatively high level (c. 85 percent of gross national product). On the other hand, the balance of trade gradually deteriorated. Imports became increasingly important to Dutch economic growth; imports of fodder grains, raw materials and industrial semi-manufactures grew vigorously. Conversely, investments underwent a strong relative increase after 1890.<sup>27</sup>

In short, the pattern of development of private consumer expenditure corresponds to the current picture of the economic development of the Netherlands, which places the start of a process of modern economic growth in the period 1850-1880. During the first half of the nineteenth century an increase in per capita income did not result in a significant growth of consumer expenditure. The nature of growth changed in the second half of the century. A period of sustained growth began after 1855, and the increase in private consumer expenditure as well as its ratio to gross national product was especially strong between 1865 and 1880. After 1890 this increase slowed down and investments became the main force behind economic growth.

#### *4. The structure of private consumer expenditure*

The aggregate development of consumption can only provide a superficial picture of the role of demand in the process of economic growth. Changes in incomes and prices will not only have affected the *level* of consumer expenditure but also (and more importantly) its *composition*. This section examines the structure of private consumer expenditure. Graph 3 presents a graphic overview of the percentage shares of the various groups of goods and services in the total value of consumption at current prices.

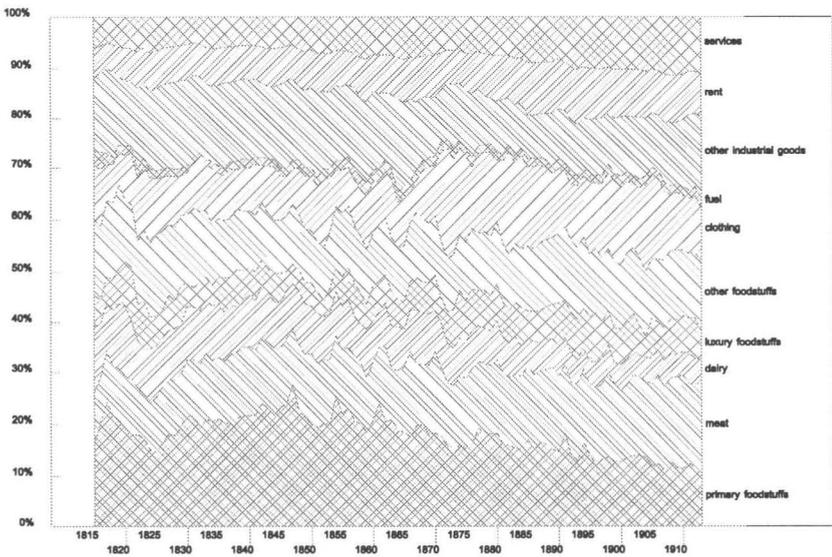
In the long run the share of primary foodstuffs underwent a strong decline, which was offset by an increase in the share of meat, other foodstuffs, clothing, rent, and services. This pattern of development conforms to Engel's Law of changes in the structure of consumption. As real incomes increased across the board the centre of consumer expenditure shifted in the direction of goods and services with a higher income elasticity; basic necessities occupied a decreasing proportion of total expenditure.

Two components of consumer expenditure deserve separate examination, namely primary foodstuffs and services: these represent the two extreme ends of consumption. Bread and potatoes were the most basic of all needs and were particularly burdensome for low-income working-class families. On the other hand, services (such as education, passenger transport, and medical, and other social and personal services) were typical of the upper-income groups and usually beyond the reach of the ordinary Dutchman. Graph 4 displays the development of the share of these two categories in the total value of private consumer expenditure at current prices.

During the first half of the nineteenth century the share of primary foodstuffs experienced a mild increase, which was mainly due to a rise in food prices from a very low level in the 1820s to a very high level around 1850. After the middle of the nineteenth century this share followed a sustained downward

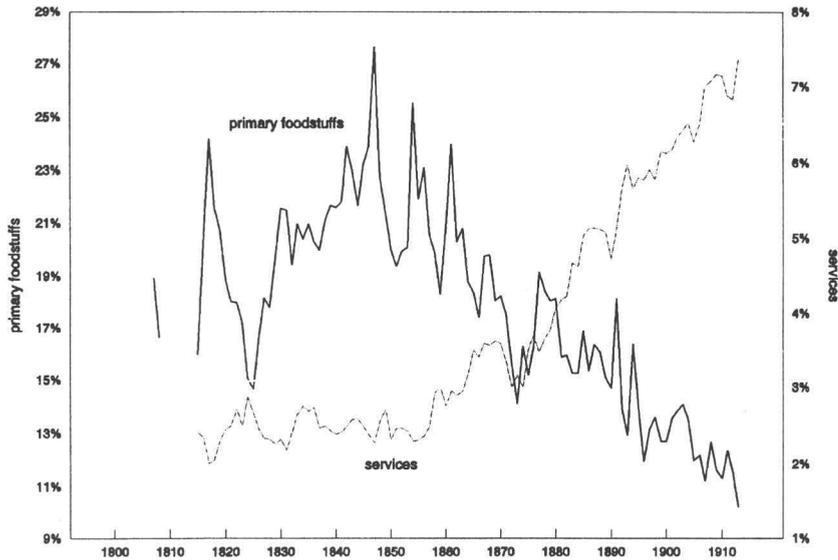
trend. The contribution of services did not change during the first half of the century, but between 1850 and 1870 their share increased from c. 2 percent to 3 percent. After a short relapse this strong upward trend continued; by 1913 services accounted for about 7 percent of private consumer expenditure. Thus, the relative development of primary foodstuffs and services seems to confirm Engel's Law for the Netherlands. It is also worth mentioning that the trends of structural change during the second half of the nineteenth century were set in the 1850s and accelerated in the 1870s.

Graph 3. *The composition of private consumer expenditure at current prices, 1807-1913 (%)*



Note: Primary foodstuffs: bread (rye and wheat) and potatoes. Dairy: cheese, butter, and milk. Luxury foodstuffs: coffee, tea, sugar, and wine. Other foodstuffs: beer, spirits, rice, tobacco, horticultural goods, salt, and a residual group of foodstuffs. Fuel: peat and coal. Other industrial goods: soap, furniture, household effects, etcetera. Services: domestic servants, education, communication, passenger transport, medical services, and professions.

Graph 4. *The share of primary foodstuffs and services in private consumer expenditure at current prices 1807-1913 (%)*



Note: domestic servants were not included because the literature suggests that the development of this category was determined by changes in the distribution of incomes rather than the development of the standard of living.

The development of the structure of consumer expenditure was dependent on three influences, namely (i) nominal incomes, (ii) relative prices, and (iii) indirect taxes.

*Nominal income:* The development of real incomes corresponded with shifts in the structure of private consumer expenditure. Until the 1860s real wages stagnated. In addition, a recent study of income distribution in the Netherlands by Vermaas, Verstegen and Van Zanden has found that during the first half of the nineteenth century the distribution of incomes and wealth may have become more unequal and that sectoral wage differences increased.<sup>28</sup> Consumer expenditure reflects these trends. The share of primary foodstuffs increased from an average of 17 percent around 1820 to more than 21 percent in the 1840s. For specific products a shift towards cheaper varieties can be perceived (e.g. the substitution of beef and veal for mutton and pork, and the strong growth of rye bread consumption).<sup>29</sup> The relative gains of luxury products,

rent, and services provide further evidence of the unequal distribution of the benefits of economic growth in the first half of the nineteenth century.

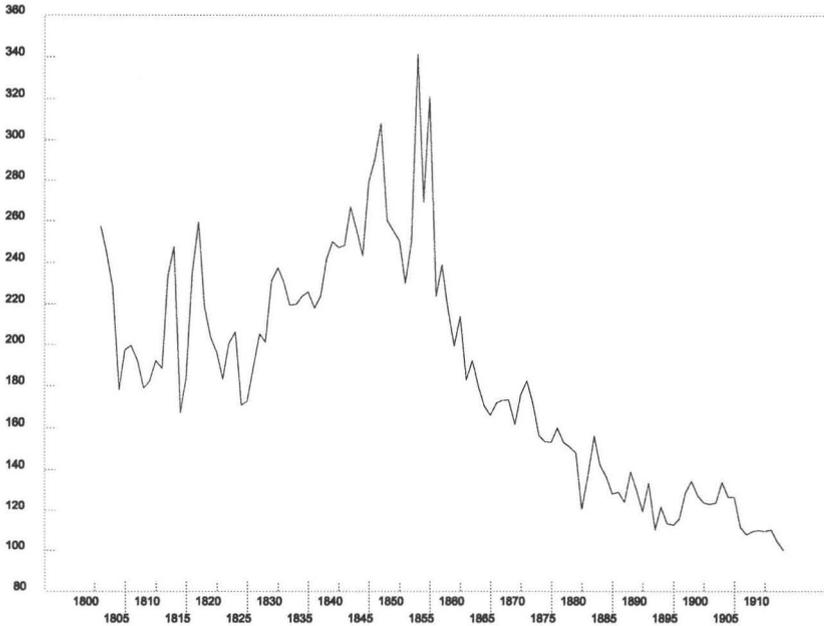
After 1865 nominal and real wages began to increase after two centuries of near stagnation.<sup>30</sup> The rate of poverty fell after a number of extreme peaks in the forties and fifties; by 1875 this rate was about a third lower than in 1850.<sup>31</sup> The break in the development of incomes is also visible in the composition of private consumer expenditure: during the second half of the nineteenth century and especially after 1865 there was a gradual shift towards more expensive goods and services at the expense of primary foodstuffs. However, since it was already noticed that certain trends in the structure of consumption began in the 1850s whereas wages only began to increase after 1865, it appears that prices may have had considerable influence on this pattern of change. An examination of relative prices may provide an answer.

*Relative prices:* The most significant shift in relative prices concerned primary foodstuffs. Around the middle of the nineteenth century this was the single largest component of private consumer expenditure (c. 22 percent); the share of bread and potatoes in working-class budgets was even more impressive. This was undoubtedly the most burdensome basic necessity. Graph 5 shows the development of the price index of primary foodstuffs relative to the weighted aggregate index of total consumer expenditure.

Between 1825 and the 1850s the relative price of bread and potatoes increased, which helps to explain the relative gain of primary foodstuffs during this period. Shortly after the Crimean War (1853-1855) the relative price fell sharply. This decline continued after 1865 although the rate of descent was less pronounced. In this respect the main improvement was achieved between 1855 and 1865: the above index of relative prices went from about 250 in the 1850s to 170 around 1865 and 100 in 1913. The rate at which the price of primary foodstuffs declined had a considerable effect on the purchasing power of large segments of the population. We can thus conclude that the growth of per capita consumption was set in motion by a fall in the relative price of basic foodstuffs and was reinforced by a rise in nominal wage rates after about 1865.

*Indirect taxes:* The third influence deserves special attention for a number of reasons. First of all, it has always been stated that Dutch taxes, and excises in particular, were very high in comparison to other countries.<sup>32</sup> Since excises have a direct impact on the level of prices, these taxes are directly linked to the level of net disposable income. A more interesting remark concerns a hypothesis put forward by Griffiths. He observes a correlation between the level of excises and regional differences in nominal wages. Wages in the western provinces may have been as high as they were in order to compensate for the heavy

Graph 5. *The price index of primary foodstuffs relative to the weighted aggregate price index of private consumer expenditure, 1800-1913 (aggregate index = 100)*



burden of indirect taxes on the income of urban workers. Griffiths estimates that the average worker spent 9.1 percent of his income on indirect taxes in the inland provinces, 13.4 percent in the coastal provinces, 18.2 percent in Noord-Holland, and as much as 21.6 percent in Amsterdam.<sup>33</sup> Clearly excises put considerable strain on the level of purchasing power of the ordinary Dutchman.

The decline in the relative price of primary foodstuffs was closely related to the tax reforms of the 1850s and 1860s, when most of the excises on primary necessities were abolished. These reforms were the outcome of a long political debate. During the first half of the nineteenth century the tax structure became more regressive. Between 1807 and 1850 the total burden of taxation increased only slightly, but the share of indirect taxes in the total sum of wages grew at a higher rate than the burden of direct taxes on non-wage income.<sup>34</sup> The reasons for this expansion of indirect taxation can mainly be found at a national level. The tax laws of 1816-1821 were dominated by the struggle between the interests of the northern Netherlands (trade) and the southern Netherlands (industry). The latter region -future Belgium- favoured excises on consumption, especially on sugar and coffee, in order to relieve industry.

The northern provinces, on the other hand, supported a system of taxes on production, which would lower the burden on (international) trade. In 1821 the latter proposal was definitely accepted and new excises on primary items of consumption were introduced (notably bread and meat). In the end these burdensome excises were one of the reasons why Belgium seceded from the Kingdom in 1830, even though the tax on grain milling had been abolished in 1829.<sup>35</sup>

The Belgian Secession dramatically increased the financial needs of the central government. This event not only caused a long and exhausting war, it also meant the end of the transfer of public funds from the Belgian provinces to the northern Netherlands, and hence, placed the burden of a large public debt on the shoulders of a much smaller number of inhabitants.<sup>36</sup> Aside from the introduction of the *Cultuurstelsel* -a system designed to forcefully expand the production of export crops in the Dutch East Indies and sluice the revenues into the treasury- the excise law of 1831 almost doubled the level of excises on primary necessities. After the liberal ideology had gained the upper hand these regressive measures were overturned in the 1850s and 1860s as excises were increasingly seen as a major impediment to economic growth.<sup>37</sup> In 1852 the excise on mutton and pork was abolished; the assize of bread and the excise on grain milling were ended in 1854 and 1855 respectively; in 1863 the tax on fuel was repealed; and in 1865 all remaining local excises were abolished.

The order of magnitude of these tax reforms can be observed in table 1. Between 1815/17 and 1849/51 the share of indirect taxes in the consumption of taxed commodities increased from 9 to 13 percent. Around 1850 excises amounted to 5 percent of expenditure on meat and 8 percent of the consumption of bread, shares that appear to be small but were probably highly oppressive for those on the edge of subsistence. The remaining products were taxed heavily; in the case of wine, fuel and brandy approximately 40 percent of the value of consumer expenditure consisted of excises. The effect of the tax reforms can be established by comparing 1849/51 with 1869/71. By 1870 the taxes on bread and fuel had disappeared and excises accounted for only 2 percent of the consumption of meat. Instead, the tax burden was increasingly shifted towards sugar and brandy, whose tax rates were raised to compensate for the decline in the revenues of the other excises. When these goods are excluded the share of excises dropped from 10 percent of the consumption of taxed commodities in 1850 to only 2 percent in 1870.

Table 1. *The share of excises in the value of consumer expenditure on products that were subject to these taxes, 1815-1913 (%)*

	1815/17	1834/36	1849/51	1869/71	1889/91	1911/13
meat	3	5	5	2	2	2
bread	9	8	8	-	-	-
beer	1	21	19	9	9	12
soap	7	18	20	30	39	-
fuel	19	35	38	-	-	-
wine	51	32	39	26	21	25
sugar <sup>a</sup>	-	4	13	25	31	35
brandy	14	28	45	61	67	61
total	9	11	13	9	10	9
excl. sugar and brandy	8	9	10	2	2	2

<sup>a</sup> These percentages underestimate the share of excises in the consumption of sugar: the export premium for refined sugar was paid by means of the excise on the domestic consumption of sugar and the amounts involved are not included in the revenues that were used to construct this table.

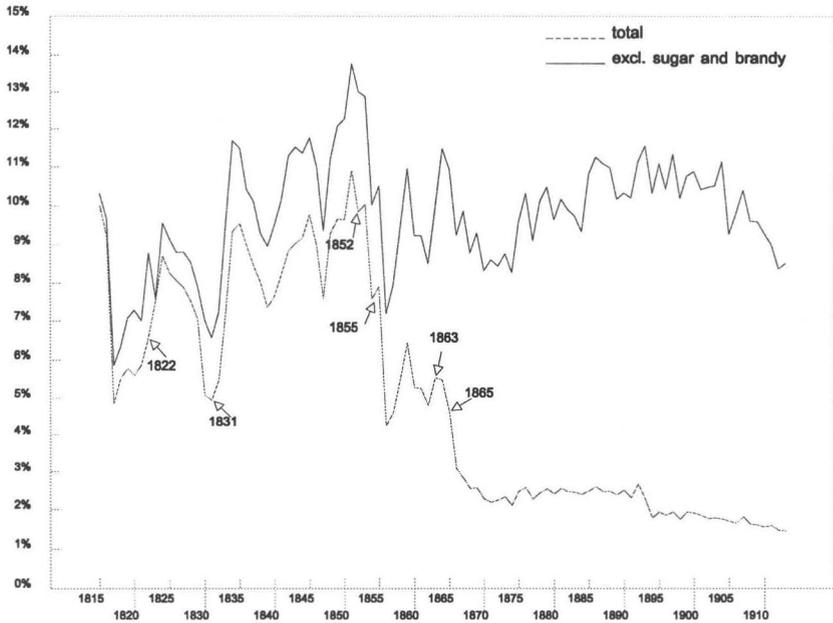
Sources: *Handelingen van de Staten-Generaal 1814/15-1850/51. Staatkundig en Staathuishoudkundig Jaarboekje* (1853) 309-314. Van der Voort, *Overheidsbeleid*, appendix III.

The development of the burden of indirect taxation was determined by five major tax revisions. The tax laws of 1822 and 1831 were responsible for the relative growth of excises in the first half of the nineteenth century. Graph 6 demonstrates that these laws had a tremendous effect on consumer expenditure. After 1850 the abolition of the excises on mutton and pork (1852) and on grain milling (1855) achieved a similar change in the opposite direction; by 1860 the burden of indirect taxation was lower than during the first half of the century. The end of local excise taxation was the coup de grâce: the share of excises in expenditure on this group of commodities was halved.<sup>38</sup>

In short, changes in incomes, relative prices and taxation brought about structural shifts in private consumer expenditure. It could, however, be argued that the very nature of consumption was fundamentally different before and after the middle of the nineteenth century.

Until about 1865 Dutch economic life was in the grasp of a 'pre-industrial rhythm of life' in which fluctuations in food prices determined the develop-

Graph 6. *The share of excises in the value of expenditure on taxed commodities 1807-1913 (%)*



Note: Arrows indicate major tax revisions.

ment of purchasing power.<sup>39</sup> High prices put direct downward pressure on the consumption of other products with a higher elasticity; a rise in agricultural prices led to a stagnation in the demand for textiles, colonial goods, and other luxury products. This was especially true for working-class families, who spent a very large part of their income on primary foodstuffs. There was economic growth during the first half of the nineteenth century, but this growth occurred in selected industries only -the international services and related export industries- and its benefits were divided unequally. The greater part of the population remained on or near a subsistence minimum.

However, the effect of high or low prices was not the same for every economic group. While low food prices raised the purchasing power of urban families, they undermined the income of agrarian producers. In the absence of a universal increase in real per capita income, this resulted in considerable regional differences in the development of the standard of living.<sup>40</sup> In Holland and Utrecht the rate of urbanization was very high and consumers were fully dependent on the market. Contrary to the inland provinces there was very little

auto-consumption (or small-scale landownership) by labourers and cottagers. And poor relief -the only social mechanism that could provide for those at the bottom end of the income pyramid- was insufficient for long-term survival.<sup>41</sup> These differences are also reflected in the growth of retail trade: in urbanized regions with a high burden of excise taxation the turnover of shopkeepers increased at a slow rate, whereas this turnover increased vigorously in predominantly agricultural regions.<sup>42</sup> After about 1860 regional variations in growth rates diminished.

In addition to the levelling off of regional differences, the divergence of patterns of consumption between the various social groups also became less pronounced (table 2).

Table 2. *The share of primary foodstuffs in consumer expenditure according to working-class budgets and the present estimates, 1850-1900 (%)*

	A	B	C
1850-1870	42	19	2.21
1870-1900	21	13	1.68

A *Working-class* budgets in Amsterdam (Van Zanden)

B Macro-economic estimates of *total* private consumer expenditure in the Netherlands

C Ratio between A and B

Sources: Van Zanden, *De industrialisatie*, 136.

After 1865 the growth process was reinforced by a rise in nominal and real wages. Together with the continuous decline in the relative price of bread and potatoes, this development resulted in a gradual and sustained increase in the net disposable income of wage earners. A comparison of the structure of total private consumer expenditure with the share of primary foodstuffs in the budgets of working-class families in Amsterdam shows that this process led to a convergence of consumption patterns (table 2).<sup>43</sup> Around the middle of the nineteenth century there was a considerable gap between the two budgets, mainly as a consequence of the unequal distribution of incomes. The breakdown of the 'pre-industrial' system implied that food prices could no longer significantly influence consumer expenditure.

Thus, in contrast to the 'premodern' period when growth was intermittent and unequal, after about 1860 the growth of private consumer expenditure was not merely sustained but also more equally distributed among regions and social groups. This pattern of development corresponds with the overall growth

of the Dutch economy. There could be no sustained growth of aggregate demand as long as income inequality was high and wages were rigid. This system was broken through in the 1850s and 1860s when a sustained increase in aggregate demand began. After 1860 the growth of private consumer expenditure was both balanced and comprehensive.

### *5. Industrial growth and changes of demand*

In the preceding sections we have analyzed changes in demand more or less as a consequence of economic growth. It is, however, quite possible that an increase in aggregate demand was instrumental in bringing about a process of modernization and industrialization. In this section we will try to analyze the growth pattern of the Dutch industrial sector in the light of changes in demand. We believe that this line of approach can improve our understanding of the (alleged) slow process of industrial growth, particularly since the greater part of the industrial sector was geared towards the production of consumer goods.

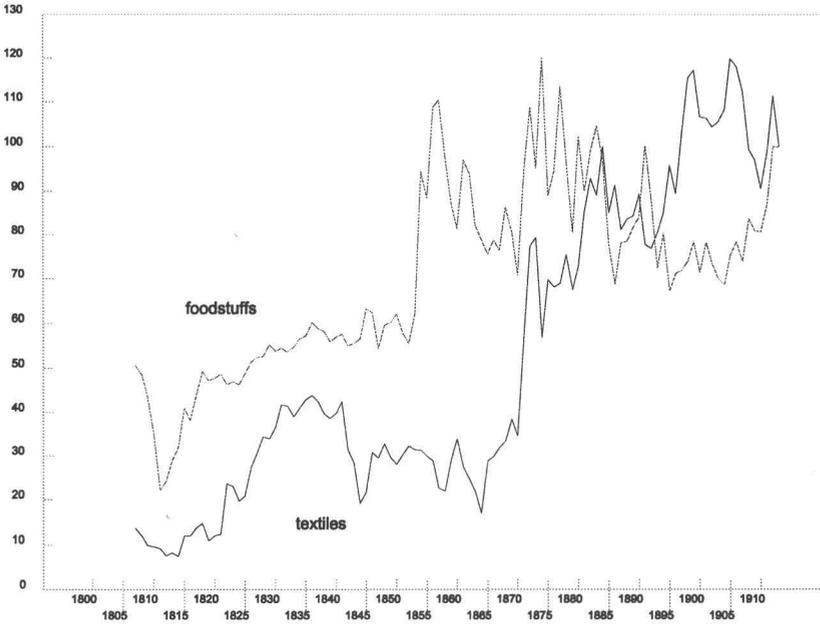
In Dutch historiography the growth of product and productivity has mainly been examined in terms of supply-side influences. However, these have been proven to be inadequate. There was a sufficient supply of capital, innovative entrepreneurship, and technological knowledge.<sup>44</sup> In our opinion the pattern of industrial growth or economic development can best be explained by incorporating demand or -in general phrases- the extent of the market into the analysis.<sup>45</sup> There is sufficient evidence to suggest that, with an ample supply of technology and capital, a lack of effective demand hindered investments in new methods of production and the introduction of productivity-raising innovations.

This hypothesis can be tested on the basis of an analysis of relative output prices. In general, relative prices can be used to determine if supply or demand was responsible for the pattern of economic development. Van Zanden argues that a rise in the relative price of industrial products points towards the influence of demand: an increase in demand for non-essential goods resulted in a relative increase in the price of these goods, which in turn encouraged producers to expand their supply. Conversely, a decline in the relative price of industrial commodities suggests that improvements in the production process were at the heart of structural changes in the economy; consumers then responded by raising their demand for industrial and other non-primary goods as well as services.<sup>46</sup> This hypothesis will be tested for the nineteenth century.

We have first charted the development of product and productivity in the foodstuffs industry and textile manufacturing. Graph 7 shows indices of real value added per worker in these two industries. In order to test the above

hypothesis, we have compared the growth of productivity with changes in relative prices.<sup>47</sup>

Graph 7. *Productivity in the foodstuffs and textile industry, 1807-1913 (value added per worker at constant prices; index 1913 = 100%)*



*Foodstuffs:* In the first half of the nineteenth century the growth of productivity in the foodstuff industries was fairly modest and was accompanied by rather stable relative prices of foodstuffs. The second half of the century was a period of sustained growth of production at a higher level of productivity. Between 1850 and 1856 output per worker boomed, which was coupled with a sharp decrease in relative food prices. This decrease can be explained from institutional factors related to the tax reforms. In the period 1870-1890 the growth of productivity accelerated slightly, which went along with a comparatively strong increase in relative food prices. After 1890 the combination of continued growth in output per worker and the decline in relative prices indicates that supply-side factors prevailed.

Table 3. *Productivity and relative prices in the foodstuffs industry, 1807-1913 (average annual growth, %)*

	<i>productivity</i>	<i>relative price</i>
1807-1850	0.5	0.2
1850-1870	0.7	-0.6
1870-1890	0.9	1.2
1890-1913	0.7	-0.5

*Textiles:* The growth pattern of textile manufacturing seems to correspond rather well with the development of relative prices.<sup>48</sup> The growth rates in table 4 show that the period 1865-1885 was the era of mechanization in the Dutch textile industries. The gains in productivity were accompanied by an increase in relative prices, which provides a strong indication that an expansion in demand gave an incentive to technological innovation. It is striking that during the 1880s -a period of depression- demand does not seem to have played an important role in the growth process of this industry. However, the strong increase in relative textile prices after 1900 points towards a new phase of demand-induced growth in the period 1900-1913.<sup>49</sup>

Table 4. *Productivity and relative prices in textile manufacturing, 1807-1913 (average annual growth, %)*

	<i>productivity</i>	<i>relative price</i>
1807-1850	1.7	-1.6
1850-1865	0.2	0.0
1865-1885	5.6	0.5
1885-1895	1.2	-0.1
1895-1913	0.2	1.2

We can conclude that demand was one of the principal variables in the timing of industrial growth. Periods of mechanization in the foodstuffs and textiles industries were characterized by rising levels of relative prices. In the case of foodstuffs the initial and most important impulse was provided by the abolition of excises on primary necessities, which resulted in a decline in the consumer price of foodstuffs and consequently brought about a rise in the level of purchasing power. Productivity jumped to a significantly higher level; in the 1870s and 1880s rising producer prices went along with modest gains in productivity, even though it is difficult to discern a clear trend. Textile manufac-

turing grew in response to a comprehensive increase in demand due to rising nominal wages and declining food prices.

### *6. Conclusion*

In the course of the nineteenth century the structure of the Dutch economy was fundamentally transformed. A process of modern economic growth began during the second half of the century.<sup>50</sup> This type of growth combined a sustained increase in per capita income with far-reaching structural changes (such as a relative decline of agriculture as against the growth of industry and services, a downward trend in the long-term development of income inequality, and so on).

An analysis of private consumer expenditure also demonstrates the fundamental difference between the process of economic growth in the first and second halves of the nineteenth century. Until 1855 consumer expenditure remained more or less stable. Moreover, it is remarkable that after 1830 the structure of consumption became even more 'traditional' (the share of primary foodstuffs increased!) in spite of the revival of the 'colonial sector' and the enormous inflow of capital it generated. This may be explained from the high degree of income inequality in a 'premodern' economy. In the second half of the century the structure of the Dutch economy was fundamentally transformed, so that private consumer expenditure not only achieved sustained growth but was more evenly distributed.

- An explanation for the pattern of growth of private consumer expenditure -stagnation until 1855, considerable growth thereafter- was mainly found in the development of relative prices. Incomes did not begin to increase significantly until after 1865; real wages remained stagnant during the preceding sixty years (leaving aside the short-lived boom after the Napoleonic Wars). Yet, structural changes in consumption already began between 1850 and 1865 and can be explained from the decrease in consumer prices in this period. After 1865 a growth in incomes reinforced this process. The relative price changes were caused primarily by the tax reforms of the fifties and sixties. Between 1852 and 1865 the burden of indirect taxation on the price level of basic necessities was reduced. Ironically, these reforms as well as the infrastructural investments of the 1860s were largely financed by means of large colonial remittances, which can be seen as a typical exponent of the merchant capitalist structures of the first half of the century.<sup>51</sup>

- Even though consumption began to grow in the late 1850s, this did not yet have a real impact on the process of economic development in the Nether-

lands as the growth of international transactions far exceeded that of private consumer expenditure. After 1865 the tables were turned. The analysis presented in this article unequivocally shows that economic modernization was accompanied by an expansion of aggregate domestic demand: between 1865 and 1880 the ratio of private consumer expenditure to gross national product rose from less than 65 percent to about 85 percent. This conclusion seems rather odd as the Netherlands is commonly considered a small and open economy on the crossroads of international trade flows. However, apart from the fairly modest size of exports relative to the value of physical output, Smits has demonstrated that when the economy was booming the export coefficient of agriculture and industry declined.<sup>52</sup>

- A 'Keynesian decomposition' of demand indicates that during the first phase of modern economic growth (1865-1880) the domestic market was the driving force. Private consumer expenditure increased considerably due to rising standards of living. This development coincided with an extension of the market due to improvements in infrastructure and transport technology. After 1890 a second growth phase began, which was characterized by an increase in investments rather than private consumption.

The pattern of industrial growth is in keeping with this periodization. Callewaert has established that the growth of Dutch industry began during the 1870s and was mainly concentrated in the foodstuffs and textile industries.<sup>53</sup> We have demonstrated that this growth was mainly induced by an increase in demand. After 1890 the centre of expansion shifted towards the production of capital goods (machinery, metal processing, shipbuilding, etcetera).<sup>54</sup> An important part of this growth might have been export-led.<sup>55</sup>

- In general, the process of modern economic growth in the Netherlands was set in motion by a significant increase in the extent of the domestic market. Government made a vital contribution to this process. The abolition of burdensome excises and the construction of railways and canals in the inland provinces in the sixties removed the 'physical impediments for economic growth'.<sup>56</sup> This marked the beginning of a process of growth through size effects, encouraged by an increase in demand and -in a wider sense- the expansion of markets.<sup>57</sup> The centralization of political power and the reformulation of public policies on economic development in the middle of the nineteenth century can be considered as one of the prerequisites for this growth process. After the 1860s the economic development of the Netherlands can be typified as a classic example of modern economic growth in which supply and demand had a mutual influence. In short, an expansion of aggregate demand was a necessary first step; only then did an increase in productive capacity be-

come an interesting option; wage rises added an additional incentive, especially because they encouraged the introduction of labour-saving technologies.<sup>58</sup>

The analysis of private consumer expenditure sheds new light on the economic development of the Netherlands. There was a stark contrast between the years before and after 1865, with respect to the relative importance of consumption (as a percentage of gross national product) as well as the development of its absolute level and composition. It seems worthwhile to include the role of aggregate demand in the analysis of macroeconomic developments. Supply cannot be regarded as an isolated factor. Similarly, new technologies were not 'manna from heaven'; in recent economic theory technological development is seen as highly endogenous.<sup>59</sup> Our analysis demonstrates that by incorporating demand we can improve our understanding of the pattern of economic development. Only a coherent examination of supply and demand can provide a comprehensive view of the dynamics of economic growth.

## NOTES

1. We would like to thank Alain Callewaert, Michael Jansen, Arthur van Riel, Annelies Vermaas, René van der Voort and Jan Luiten van Zanden for their invaluable help in obtaining the required data.
2. J. Mokyr, *Industrialization in the low countries, 1795-1850* (New Haven/London, 1976); R.W.J.M. Bos, 'Factorprijzen, technologie en marktstructuur: de groei van de Nederlandse volkshuishouding 1815-1914', *A.A.G. Bijdragen* 22 (1979) 109-137; R.T. Griffiths, *Industrial retardation in the Netherlands 1830-1850* (den Haag, 1979); A recent addition to this discussion is *Geschiedenis van de techniek in Nederland*, a series on technological developments in the Netherlands during the nineteenth century: H.W. Lintsen, M.S.C. Bakker, E. Homburg, D. van Lente, J.W. Schot and G.P.J. Verbong, eds., *Geschiedenis van de techniek in Nederland*, 6 vols. (Zutphen, 1995).
3. R.C.O. Matthews, C.H. Feinstein and J.C. Odling-Smee, *British economic growth 1856-1973* (Oxford, 1983), chapter 10. There is no consensus on the matter, see J. Mokyr, 'Demand vs. Supply in the Industrial Revolution', in: J. Mokyr, ed., *The economics of the industrial revolution* (London, 1985) 97-118. See also G. Clark, M. Huberman and P.H. Lindert, 'A British food puzzle, 1770-1850', *Economic History Review* 48 (1995) 215-237.
4. Matthews, Feinstein and Odling-Smee, *British economic growth*, 291.
5. See A. Burger, 'Dutch patterns of development: economic growth and structural change in the Netherlands 1800-1910' in this issue.
6. Cf I.J. Brugmans, *De arbeidende klasse in Nederland in de 19de eeuw (1813-1870)* (Utrecht/Antwerpen, 19583); J.L. van Zanden, *De industrialisatie in Amsterdam 1825-1914* (Bergen, 1987), 136.

7. C.H. Feinstein, *National income, expenditure and output of the United Kingdom 1855-1965* (Cambridge, 1972).
8. Latest results of (as yet unpublished) research by G.P. den Bakker.
9. CBS, *Maandschrift* (1921) 1140-1148.
10. 1800-1850 unpublished results of 'Reconstruction National Accounts'. 1850-1913: M. Knibbe, *Agriculture in the Netherlands 1851-1950. Production and institutional change* (Amsterdam, 1993).
11. See M. Jansen, 'The development of Dutch industry' [paper for the ESTER conference on 'Economic Growth in the Long Run'] (Utrecht, 1993).
12. *Statistiek van Voortbrenging en Verbruik 1913. Verslag van de staatscommissie 1927*. Excises statistics in *De economist* (1853).
13. E. Horlings, *The economic development of the Dutch service sector 1800-1850. Trade and transport in a premodern economy* (Amsterdam, 1995), appendix III. J.P. Smits, *Economic growth and structural change in the Dutch service sector 1850-1913. The role of trade and transport in the process of 'modern economic growth'* (Amsterdam, forthcoming 1996), appendix 6.
14. For example, the notorious *Meerenberg*-index (see J.H. van Stuijvenberg and J.E.J. de Vrijer, 'Prices, population and national income in the Netherlands 1620-1978', *Journal of European Economic History* 11 (1982) 699-711).
15. Van Riel, *Prices and economic development in the Netherlands 1800-1913. A growth-analytical approach to price history* (Ph.D. thesis, Utrecht University, forthcoming).
16. Smits, *Economic growth*, appendix 7.
17. 1800-1850: Horlings, *The economic development*. 1850-1913: Smits, *Economic growth*.
18. I.J.A. Gogel, *Memoriën en correspondentiën betreffelijk den staat van 's Rijks geldmiddelen in den jare 1820* (Amsterdam, 1844), 510-511. *Handelingen van de Staten-Generaal 1814/15-1850/51. Bescheiden betreffende de geldmiddelen 1846/59. Staatkundig en Staathuishoudkundig Jaarboekje* (1853) 309-314. R.H. van der Voort, *Overheidsbeleid en overheidsfinanciën in Nederland, 1850-1913* (Amsterdam, 1994), 261-265.
19. ARA, Staatssecretarie, no. 6482; R.T. Griffiths, 'The role of taxation in wage formulation in the Dutch economy in the first half of the nineteenth century', in: *Ondernemende geschiedenis, 22 opstellen geschreven bij het afscheid van Mr. H. van Riel* (Den Haag, 1977), 265. Van der Voort, *Overheidsbeleid*, 265.
20. The various price series are weighted on 1830 (1800-1830), 1850 (1830-1850), 1870 (1850-1870), 1890 (1870-1890), and 1913 (1890-1913). The partial indices are then chained on these benchmark years, and were converted into 1913 prices.
21. This type of analysis was performed by Matthews, Feinstein and Odling-Smee, *British economic growth*, 291-292.
22. Burger, 'Dutch patterns'.
23. Horlings, *The economic development*, chapter 4.
24. All information on nominal and real wages is derived from the work of A. Vermaas (Vermaas, *Wages, salaries and income inequality in the Netherlands, 1850-1913* (Ph.D. thesis; forthcoming). Information on the per capita consumption of bread and meat has been supplied by M. Jansen (*cf* Jansen, 'The development of Dutch

- industry'). Data on the rate of poverty have been taken from Horlings, *The economic development*, chapters 6.
25. Burger, 'Dutch patterns'. The international comparison of various indicators for the level of development was pioneered by H. Chenery and M. Syrquin, *Patterns of development, 1950-1970* (Oxford, 1975).
  26. Smits, *Economic growth*, chapter 4.
  27. R. Albers, A. Clemens and P. Groote, 'The contribution of physical and human capital to economic growth. The Netherlands, 1850-1913', in this issue.
  28. A. Vermaas, S.W. Verstegen, and J.L. van Zanden, 'Income inequality in the nineteenth century', in: J.L. van Zanden and L. Soltow, eds., *Income and wealth inequality in the Netherlands 16th-20th centuries* (forthcoming), 115-136. Income inequality only declined in Friesland and Zeeland.
  29. Jansen, 'The development of Dutch industry'.
  30. Vermaas, *Wages*; L. Noordegraaf, *Daglonen in Alkmaar 1500-1850* (Amsterdam, 1980); J. de Vries and A. van der Woude, *Nederland 1500-1815. De eerste ronde van moderne economische groei* (Amsterdam, 1995), 705-720.
  31. *Handelingen van de Staten-Generaal 1818/19-1850/51. Staatkundig en Staathuishoudkundig Jaarboekje (1857-1874). Jaarcijfers van het Koninkrijk der Nederlanden*, 1881, 1886, 1895, 1914.
  32. J.M.F. Fritschy, 'Taxation in Britain, France and the Netherlands in the eighteenth century', *Economic and social history in the Netherlands 2* (1990) 64-66.
  33. Griffiths, 'The role of taxation', 266-267.
  34. Horlings, *The economic growth*, chapter 6.
  35. I.J. Brugmans, *Paardenkracht en mensenmacht. Sociaal-economische geschiedenis van Nederland 1795-1940* (Den Haag, 1960), 180-181.
  36. These transfers amounted to about 1.4 percent of average Dutch GDP in the period 1816-1830 (Horlings, *The economic growth*, chapter 4).
  37. J. Brugmans, *Paardenkracht*, 223-225.
  38. By comparison the abolition of the excise on fuel hardly produced an effect. One result of the abolition of the excise on fuel was the substitution of coal for peat: in 1863 24 percent of the value of fuel consumption consisted of coal; in 1864 this percentage had leaped to 40 percent. Net imports of coal increased by about 50 percent.
  39. A. Knotter en H. Muskee, 'Conjunctuur en levensstandaard in Amsterdam 1815-1855. Een onderzoek op basis van plaatselijke accijnzen', *Tijdschrift voor sociale geschiedenis* 12 (1986) 153-181.
  40. Horlings, *The economic development*, chapter 6.
  41. M.H.D. van Leeuwen, *Bijstand in Amsterdam ca. 1800-1850. Armeenzorg als beheersings- en overlevingsstrategie* (Zwolle, 1992) 200-205.
  42. Smits, *Economic growth*, chapter 6.
  43. Smits, *Economic growth*, chapter 3.
  44. Bos, 'Factorprijzen'.
  45. J.P. Smits and A. Vermaas, 'The process of modern economic growth and changes in income distribution: the Netherlands 1800-1913' [paper for the meetings of the Economic History Association, Cincinnati, -9 October 1994] (Utrecht, 1994). Horlings, *The economic development*.

46. J.L. van Zanden, 'Premodern economic growth' [unpublished manuscript] (Utrecht, 1995).
47. The relative prices in the foodstuffs and textile industries is defined as an index of output prices divided by the aggregate price index for the economy at large (GDP-deflator).
48. During the first half of the nineteenth century the decline in relative prices was due especially to a fall in input prices on the world market (cotton, yarn). The increase in productivity until the late 1830s was caused by a shift from proto-industrial household production to factory-based manufacturing *without* significant technological improvements in the production process. Government support was a crucial factor in these productivity gains. After 1840 the East Indian market -the main source of demand- became saturated and government support was reduced. Yet, the constraints to a growth of productivity were not lifted: high excises on fuel and the absence of infrastructural improvements were major obstacles. In the 1860s these impediments were removed (*cf* R.T. Griffiths, 'The creation of a national Dutch economy: 1795-1909', *Tijdschrift voor geschiedenis* 95 (1982) 513-537).
49. As for many foodstuffs, also for textiles domestic demand did grow relatively fast, while exports only increased significantly in times of 'depression', i.e. when domestic demand decreased. *Cf.* J.A. de Jonge, *De industrialisatie in Nederland tussen 1850 en 1914* (Nijmegen, 1976) 119-122.
50. E. Horlings, J.P. Smits and J.L. van Zanden, 'Structural change in the Dutch economy 1800-1913', in: A. Maddison and H. van der Wee, eds., *Economic growth and structural change. Comparative approaches over the long run on the basis of reconstructed national accounts* [Eleventh International Economic Congress Milan 1994, session B 13] (Milan, 1994).
51. Van Zanden, *The rise and decline of Holland's economy* (Manchester, 1993).
52. Smits, *Economic growth*, chapter 4.
53. Callewaert, 'Estimating Dutch industrial growth, 1850-1913' [paper presented at workshop National Accounts] (Utrecht, 1992).
54. This can be denoted as the second wave of industrialization. See also De Jonge, *De industrialisatie*.
55. Smits, *Economic growth*, chapter 4.
56. Griffiths, 'The creation'.
57. Smits and Vermaas, 'The process of modern economic growth'.
58. See also Smits, *Economic growth*. He demonstrates that innovations in transport (steamshipping and railways) came rather late in the Netherlands despite the availability of technological knowledge, capital and entrepreneurial creativity. Market demand for these innovations was simply inadequate until about 1870, and as this was translated into low expectations of future rates of return, the logical response of investors was to disregard these new technologies. In international transport, on the other hand, demand did not impose such a constraint and innovations -at least in Rhine shipping- could easily be introduced (Horlings, *The economic development*, chapter 5).
59. *Cf.* X. Sala-i-Martin, *Lecture notes on economic growth (II): five prototype models of endogenous growth* (Barcelona, 1994).

### III

#### DUTCH RAIL- AND TRAMWAYS IN A COMPARATIVE PERSPECTIVE, 1838-1913<sup>1</sup>

by

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#### *Introduction*

Transport plays a key role in many discussions on modern economic growth. In the nineteenth century railways came to the forefront within the transport sector. For this reason, railways have been a primary focus of economic research on the nineteenth century. Economic historians have adopted various measures to assess the importance of railways for the national economy. Of these, the calculation of value added is most often used, but the size of railway investment, the number of railway employees as a proportion of the total workforce, and the importance of linkage effects also shed light on the role and importance of railways in the economy.

Research on railway history in The Netherlands has traditionally been institutionally-oriented.<sup>2</sup> An ever returning question has been whether or not The Netherlands were late in constructing their railways compared with their neighbouring countries. Since this question was usually answered in the affirmative attention subsequently shifted to the factors and persons responsible for this 'backwardness'. In this article we do not want to repeat this discussion. We are of the opinion that this discussion is not particularly relevant as long as Dutch railway history has not been thoroughly quantified. Only then can international comparisons be fruitfully made. In this article, we focus on the quantification of investment and the capital stock in rail- and tramways.

We will begin with a brief explanation of the sources and methods used to construct annual time series of capital formation and capital stocks in rail- and tramways. We will then highlight some of our results by putting the figures in a comparative perspective. In order to relate capital formation figures to other macro-economic data in a systematic way, we use the definitions of the *United*

*Nations System of National Accounts, revision 3 (1968)*. Our series refer to domestic fixed capital formation. Changes in stocks, work in progress, and intangible assets, as well as capital financing are excluded.

Because of the ongoing character of this research, comprehensive investment figures on other modes of transport in The Netherlands in the nineteenth century are not yet available. Therefore we cannot give an intermodal perspective. We can, however, make an international comparison with Great Britain, France, and Germany, concentrating on two aspects. In the first place, by comparing railway investment with aggregate investment. In the second place, by studying the ratio of rail- and tramway investment to national income.

### *Definitions, sources, and methods*

#### *The perpetual inventory method*

There is widespread agreement on two related concepts of capital formation: gross and net. Gross capital formation is defined as total outlays on productive assets which yield services lasting beyond the period in which they are acquired, usually a year. Net capital formation measures the additions to the existing capital stock over and above the investment needed to compensate for depreciation. Depreciation is the loss of value of a capital good due to physical damage or economic obsolescence. The rate of depreciation depends on the average lifetime of the asset concerned.

The perpetual inventory method is no more than a set of accounting rules, which specify the relations between the stock of capital and the flows of investment, scrapping of capital goods, and depreciation.<sup>3</sup> It defines the total capital stock as the weighted sum of former investment. Combining investment flows for different years requires a standard of comparison, which is provided by measurement in constant prices.

#### *The construction of historical time series of capital formation*

We adopted a 'bottom-up' approach to construct time series of capital formation in rail- and tramways. Annual investment data on a micro-level, e.g. individual companies or municipalities, were aggregated to build time series of capital formation on the macro-level. Since the macro-series had to cover all companies and public bodies active in any year of the period 1838-1913, we had to make separate estimates for companies or years for which no source material was available.

A distinction must be made between railway construction by the central government and by private companies. For the government, detailed investment figures, subdivided by line and by category, are given in the Parliamentary Papers (*Bijlagen bij het Verslag van de Handelingen der Staten-Generaal*).

This enabled us to exclude expenses which are not part of capital formation, such as land purchase, and the purchase of private railway lines. The proportion of expenditure on land fell rapidly, from an initial level of about 50% to a relatively constant 12.5%. Some of the investment booked under the heading of railways was in fact geared towards the construction of shipping canals and harbours. Examples of these are the 'Zuid-Beveland Canal' and the Flushing harbour works, which were booked under 'expenses of an extraordinary nature' for the railway line Roosendaal-Flushing. After deduction of these outlays we obtained a time series of cumulated expenditure on government railway construction in historical prices. The annual changes in this series constitute gross capital formation in current prices.

We used capital accounts and balance sheets to reconstruct capital formation by private companies. Gross investment can be derived by comparing consecutive balance sheets, provided railway companies put the cumulated value of their fixed assets on their balance sheets. In the nineteenth century, a fierce debate took place about how to properly value railway companies' fixed assets. Two factors played a role in triggering this debate: the unclear, but rather long lifetime of the railway track, and the system of government granted concessions, with the possibility of future nationalisation.

As a transport system, railways were unprecedented in their size and durability. The lifetime of the track was unknown. It was even doubtful whether the concept of lifetime was at all applicable to the railway system. Thus, it was unclear whether it would make sense to depreciate the permanent way of railways, and, if so, what the rate of depreciation ought to be.

Railway companies had to obtain government concessions. These concessions were valid for a specified period, and the government had the explicit right to take over the railway line for a 'fair' price after expiration of the concession. What would constitute a 'fair' price for a non-tradable capital good understandably was a matter of debate. The one thing both sides agreed on was that the price would have to be based on the capital value of the railway line, as given by the balance sheet. In nearly all concessions granted, the government had refrained from giving guidelines on how to draw up the balance sheet. Thus, it was not only possible, but also profitable for railway companies to keep on cumulating new investment on their balance sheets, without deducting depreciation or even retirements. In the 1920s, when the government planned to take over the two remaining large railway companies, it became clear that these companies had indeed been administrating in such a manner. After eight years of discussion in Parliament, the government concluded that the companies' valuation of their fixed assets had long ceased to have any relationship with reality, as no deductions for retirements or depreciation had been made for decades.

Although in general private companies do not specifically aim at pleasing historians, they sometimes do so unintentionally. Present-day accountants may shake their heads at the manner of bookkeeping practised by nineteenth century railway companies, but for our purposes their method was a blessing in disguise. In order to derive annual figures on capital formation, we could simply deduct consecutive balance sheet valuations of the fixed assets. We followed this procedure for nearly all rail- and tramway companies. When it was clear, e.g. from the amplification of the balance sheets or from the capital accounts, that companies had depreciated their assets we added cumulated depreciation.

In order to derive capital formation on permanent way and works we tracked down balance sheets for 148 rail- and tramway companies, out of a total of 175. The main sources were the companies' annual reports, *Van Nierop & Baak's Naamloze Vennootschappen*, and *Van Oss' Effectenboek*. The latter two are serial publications, which contain key financial information on limited liability companies. Belgian joint stock companies published their balance sheets in the *Annexes au Moniteur Belge*. The 27 companies for which we had no financial data owned only 191 kilometres of rail- or tramway track, out of a total of 6028 kilometres in 1913. Annual investment for these companies was estimated by multiplying the length of their newly built track with the unit costs of construction derived from data on the other companies. In 1913 the relevant unit costs were *f* 237,000 per kilometre for main railways, *f* 58,000 per kilometre for light railways, and *f* 34,000 per kilometre for tramways.

Capital outlays on stations were estimated as a percentage of total expenditure on permanent way and works. The figures on the expenditure of the central government on railways, which comprised 39% of total accumulated investment in 1913, enabled us to estimate the share of railway stations as 12% of capital formation in total 'non-rolling stock'. For tramways we had at our disposal detailed balance sheets of 35 companies. These companies were responsible for 27% of total cumulated investment in 1913. Outlays on tramway stations were 7% of the total costs of permanent way and works.

For all railway companies active in exploitation, we derived figures on capital formation in rolling stock, again on the basis of balance sheets. The same procedure proved possible for 39 tramway companies, accounting for three quarters of the total rolling stock. Expenditure on tramway horses was included. Investment of the remaining tramway companies was estimated using data on the number of locomotives, passenger carriages, freight wagons, and horses.

We then calculated gross and net capital stocks by means of the perpetual inventory method. For this purpose we had to choose suitable depreciation and retirement models, and to determine the lifetimes of the various assets. We applied ordinary linear depreciation. For the permanent way, including

sleepers, we employed a rectangular retirement model. A delayed linear retirement model was used for stations, with discards occurring at a constant rate over a period of 10 years around the average service life. The average service life of railway stations could be deducted from data on construction, alterations and demolition of a large number of Dutch stations. For iron and steel rails, and for rolling stock we managed to derive logistic retirement curves from detailed data in the companies' accounts. Average lifetimes were 10 years for sleepers, 14 years for iron rails, 30 years for steel rails, 40 years for rolling stock, 40 years for tramway stations, 60 years for railway stations, and 100 years for the permanent way.

#### *Deflation procedures*

In order to cumulate capital flows over time, they must be measured in constant prices. For rolling stock, which was regularly traded on the market, we found enough price quotations to build separate deflators for railway and tramway rolling stock. These deflators combine information on prices of locomotives, passenger wagons, and goods wagons. The prices of railway locomotives were corrected for quality changes. In the same way we derived separate price indices for electrical tramway equipment and draught-horses.

For the permanent way and for station buildings we had to rely on weighted price index series, which combine series on labour and material costs. We applied seven separate weighting schemes as shown in table 1. In the choice of weights we relied mainly on the detailed information on the structure of construction costs supplied by the Parliamentary Papers.

Table 1. *Weighting schemes for deflators*

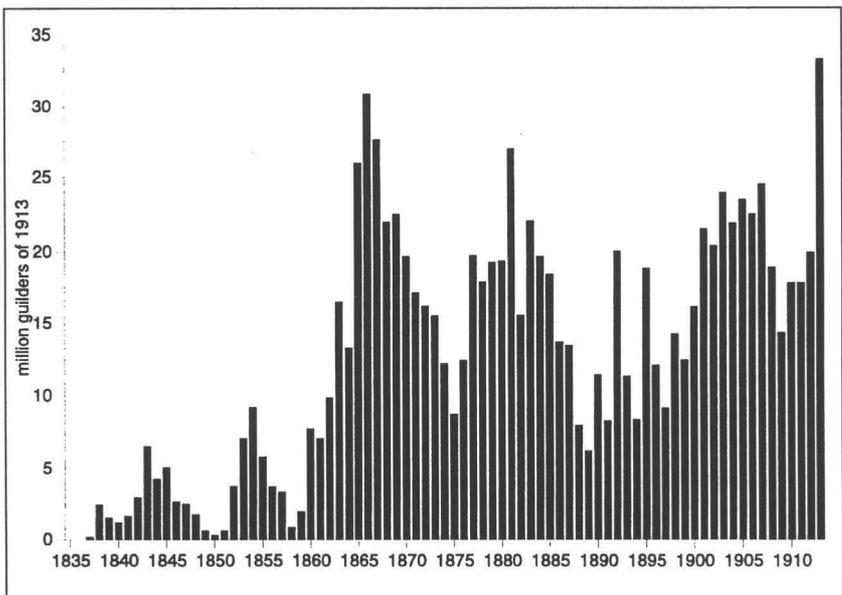
	Infrastructure			Stations			
	main railways	main railways	light railways	tramways	tramways	railways	tramways
	1838-1877	1878-1913	1879-1913	1864-1877	1878-1913	1838-1913	1864-1913
labour	0.55	0.50	0.35	0.35	0.30	0.40	0.40
iron	0.25			0.45		0.12	0.09
steel		0.30	0.45		0.50		
wood	0.10	0.10	0.10	0.15	0.15	0.18	0.195
bricks	0.10	0.10	0.10	0.05	0.05	0.18	0.195
lead						0.03	0.03
zinc						0.03	0.03
glass						0.04	0.04
paint						0.02	0.02

Figures on capital formation in current prices were subsequently converted to constant prices. This enabled us to apply the perpetual inventory relations to obtain the gross and net capital stocks, gross and net capital formation, retirements, and depreciation. All our series are in constant as well as in current prices. Since we distinguished not only railways and tramways, but also infrastructure, rolling stock, and stations, this resulted in no less than 72 annual time series. Graph 1 and tables 2 and 3 summarize the main results.

### *The resulting picture*

The development of capital formation and capital stocks in main railways is characterized by two institutional milestones: the 1860 Railway Act (*Spoorwegwet*), and the 1890 Railway Agreements (*Spoorwegovereenkomsten*). In 1860 the central government decided to take the construction of a national railway network into its own hands. In 1890 the government reorganized the exploitation of this network by dividing it between the two remaining large railway companies (the 'Dutch Iron Railway Company' or *HSM*, and the 'Company for the Exploitation of State Railways' or *SS*). Concentration of the ex-

Graph 1. *Gross fixed capital formation in rail- and tramways (infrastructure, rolling stock, and stations), 1838-1913, constant prices (million guilders of 1913)*



ploitation had to increase efficiency, while competition between the two companies was to preclude monopoly rents.

The 1860 Railway Act resulted in a large increase in investment in railway infrastructure. Capital formation rose from an average of about three million guilders in the period 1851-1860 to nearly fifteen million guilders in the following decade.<sup>4</sup> The government was debited with approximately two-thirds of this amount. Capital formation in rolling stock amounted to nearly three million guilders annually during the first wave of railway construction (1861-1870). Solely private companies were responsible for investment in rolling stock, since the government only participated in the construction of the network, and not in its exploitation. The peaks in the years 1877-1881 are due to another wave of government investment, related to the 1873 and 1875 Railway Acts. The lines built in this period were to link the 'Northern' and 'Southern' networks, which had not been connected during the first stages of government activity. To do so, expensive bridges had to be built to cross the rivers Rhine, Waal, and Meuse.

Table 2. *Average annual gross fixed capital formation in rail- and tramways: infrastructure, rolling stock and stations, 1938-1913, constant prices (in millions of guilders of 1913)*

	Infrastructure		Rolling stock		Stations	
	railways	tramways	railways	tramways	railways	tramways
1838-1850	1.003	-	0.573	-	0.263	-
1851-1860	2.739	-	1.201	-	0.494	-
1861-1870	14.334	0.104	2.790	0.033	2.324	0.010
1871-1880	10.057	0.580	3.313	0.137	1.741	0.045
1881-1890	7.742	1.783	3.191	0.660	2.063	0.140
1891-1900	4.942	1.824	4.770	0.555	0.918	0.132
1901-1913	8.236	4.628	5.595	1.466	1.337	0.340

The 1890 Railway Agreements initially had the opposite effect on railway capital formation. Investment in infrastructure stabilized on a fairly low level after 1889, when private investment decisions were postponed due to negotiations between the government and the railway companies on the Agreements. Investment in rolling stock grew after 1890, however. This may be interpreted as the result of the proper functioning of the Railway Agreements: the existing network was used more intensively. In 1892 capital formation in rolling stock reached an interim peak of more than eleven million guilders. This was a reaction on investment decisions postponed in the preceding years, as much as it

was the result of the replacement of obsolete material of the former 'Dutch Rhenish Railway Company' (or *NRS*) by the *HSM* and *SS*.

After 1900 a higher level of investment was again achieved, both in infrastructure and rolling stock. On average annual gross fixed capital formation in infrastructure amounted to thirteen million guilders in this period, compared to seven million for rolling stock. It is often thought that light railways played the major role in this, but in fact the rapid development of tramways was more important. Both light railways and tramways served to complement the existing main-line railway network (see figure 1). Replacement investment was also gaining in importance after 1900. In the years 1900-1913 replacements accounted for 18% of total capital formation. The peak in rolling stock investment in 1913 (13.5 million guilders) was mainly due to renewal of equipment. By then, the rolling stock which had come into service during the first boom-period (1860-1880) had reached the end of its life-cycle.

With respect to investment in tramways three waves of investment can be discerned. In the first, from 1880 to 1883, local horse-drawn tramways and a number of regional horse and steam tramway lines were built. This phase may be related to the 1878 'Light Railways and Tramways Act'. The second wave, which started in the 1890s, was characterized by the large scale construction of regional tramway networks. These served as a substitute for railway networks, in particular in rural areas. The third wave occurred after 1900, when urban electric tramways were built.

Table 3. *Gross fixed capital stocks in rail- and tramways: infrastructure, rolling stock and stations, 1850-1913, constant prices (million guilders of 1913)*

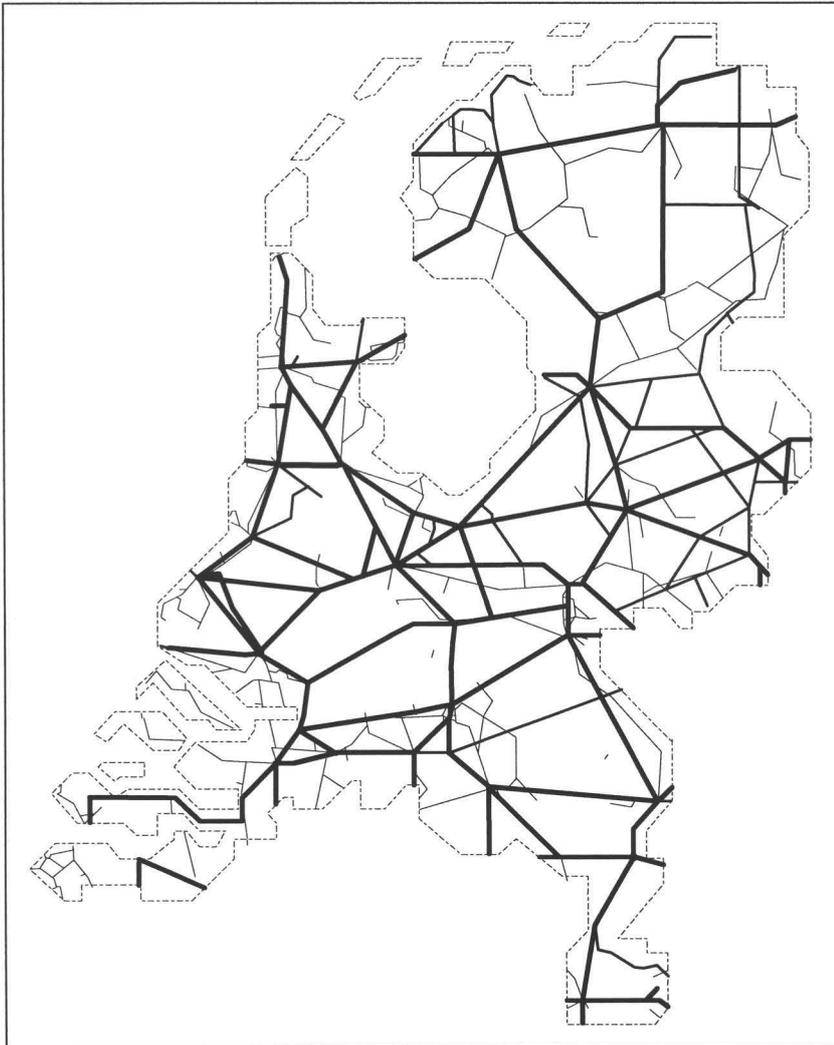
	Infrastructure		Rolling stock		Stations	
	railways	tramways	railways	tramways	railways	tramways
1850	21.5	-	6.9	-	3.6	
1860	42.3	-	18.8	-	8.6	
1870	172.3	0.7	46.2	0.2	31.8	0.1
1880	230.9	6.1	77.5	1.4	49.2	0.5
1890	274.1	22.6	103.9	7.0	69.9	1.9
1900	304.2	37.4	137.9	10.5	78.2	3.2
1910	373.5	79.2	169.7	22.0	88.5	6.6
1913	388.8	87.9	188.5	26.9	91.3	7.6

#### *Public and private investment*

Until the Railway Act of 1860 the state had not directly invested in railways. In the following decades, however, the government played a predominant role

in the creation of a national network of main-lines. The central government was responsible for the largest part of capital outlays in the period 1861-1889, regularly contributing more than 60% of total expenditure on railway construction (graph 2). As described above, government investment took place in two waves, the construction of several main lines in the 1860s, and the linking of the northern and southern networks in the late 1870s. The two periods of

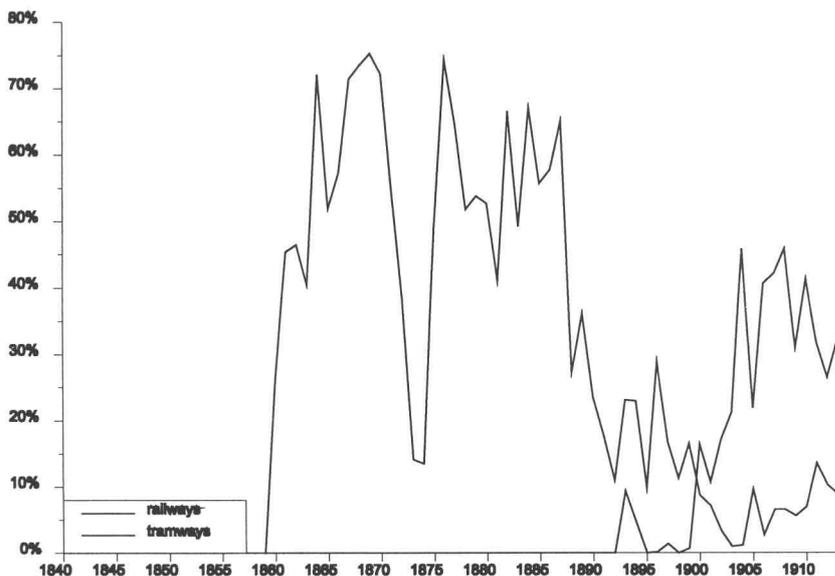
Figure 1. *The networks of main railways, light railways, and tramways in the Netherlands in 1913*



large-scale government activity can easily be distinguished. Once the national network had been completed the government's involvement was considerably reduced. This was a logical decision since the government had stepped in only to complement the activities (or rather lack of them) of private investors, who were reluctant to undertake the construction of a national network of questionable profitability. In the same period the government undertook the construction of large shipping canals improving the accessibility of the Rotterdam and Amsterdam ports. State intervention in infrastructural works was undertaken to further the public interest, without the explicit aim to draw revenues from it. After 1890 public capital formation in railways stabilized at a much lower level.

The second phase of large-scale public investment in rail transport began shortly after the turn of the century. This occurred primarily at the local level, at a time when local authorities increasingly took into their own hands services formerly supplied by the private sector, e.g. gasworks, waterworks and electricity. Several large and medium-sized municipalities decided to modernise their local horse-drawn tramways. In many cases (e.g. Amsterdam 1904, The Hague 1906) the modernisation of the tramway system and the establishment of electricity stations went hand in hand. The potential linkages between municipal power stations and electrical tramways were of decisive importance

Graph 2. *The public share in total rail- and tramway capital formation, 1840-1913*



in this respect. Tramways were by far the largest consumers of electric current in the early stages of public electricity supply. Moreover, they provided the opportunity to spread demand for electricity more evenly over the day. The motives of the municipalities for investing in electrical trams were not altruistic, however. Local governments successfully seized the opportunity to establish regional monopolies. Since the municipalities had the exclusive right to grant concessions they could easily exclude private competitors. They chose to benefit themselves, rather than let the private sector reap the benefits from the development of electrical tramway technology. From 1904 to 1913 the public share of total capital outlays on tramways amounted to 36%.

#### *International comparisons*

We compared railway investment for The Netherlands, Great Britain, Germany, and France, by calculating the ratio to total investment, and to national income (the investment ratio). We distinguished three periods representing the major phases of railway development in The Netherlands. The periods concerned are 1850-1860, 1861-1890, and 1891-1913. The 1850s exemplify the modest starting phase, the subsequent phase represents the zenith of main-line construction, while after 1890 replacement investment of main-line railways and new construction of tramways dominate the picture.

#### *The share of rail- and tramways in total capital formation*

To examine the importance of rail and tramways to the total economy we first considered the share of rail and tramway investment in total gross capital formation. For Great Britain, France, and Germany we used the standard sources for capital formation figures.<sup>5</sup> The data on total gross domestic fixed capital formation in the Netherlands are the outcome of our own research.<sup>6</sup> The rail- and tramway shares are summarized in table 4.

Table 4. *Share of rail- and tramways in total gross domestic fixed capital formation, 1850-1913 (in %)*

	Netherlands	United Kingdom	France	Germany
1850-1860	4.1%	17.0%	13.0%	17.1%
1861-1890	10.3%	13.9%	10.3%	14.7%
1891-1913	5.7%	9.3%	8.5%	7.5%
peak	24.8%	30.4%	19.2%	40.6%
reached in:	1866	1850	1855	1879

Until the 1860s investment in railways in The Netherlands was relatively unimportant compared to the other countries. In the second phase however, The Netherlands caught up to a considerable extent and were on par with France. For a brief period railways accounted for a large share of total capital formation, without, however, quite reaching British or German levels. After 1890 the share of rail- and tramway capital formation declined for all countries examined. In The Netherlands the decline was most pronounced. The share was just slightly higher than it had been in the 1850s, and was quite low compared to the other countries.

*The investment ratio*

For the national income of The Netherlands we used preliminary estimates from the research project 'Historical National Accounts of The Netherlands, 1800-1913'.<sup>7</sup> For Great Britain, France, and Germany we relied on the standard sources.<sup>8</sup> Table 5 displays the results of this exercise. The figures refer to weighted averages.

Between 1850 and 1860 capital formation in railways in The Netherlands constituted only 0.3% of national income. The subsequent phase of large-scale railway construction resulted in a more than three-fold increase in the investment ratio. In the years after 1890 the investment ratio fell again, mainly due to the rise in national income.

Table 5 also highlights the apex of railway construction for the various countries. In fact, in Great Britain the maximum was reached already in the period 1840-46, when railway capital formation accounted for approximately 3% of national income. Germany experienced a first peak in the late 1840s and a second - even higher - one in the 1870s.

Table 5. *Investment ratio of rail- and tramways (infrastructure, rolling stock and stations), 1850-1913, current prices*

	Netherlands	United Kingdom	France	Germany
1850-1860	0.34%	1.21%	1.68%	1.50%
1861-1890	1.11%	1.23%	1.35%	1.68%
1891-1913	0.85%	0.83%	1.23%	1.08%
peak	2.12%	2.54%	2.51%	3.54%
reached in:	1866	1850	1855	1875

In the Netherlands the maximum share of national income spent on railway construction amounted to slightly more than 2%. It is striking that the summit of the investment ratio for The Netherlands, which was achieved in what seemed

to be a short period of frantic activity, was still lower than the highest ratios in the other countries. It was also reached at a relatively late stage. Only Germany's second railway boom occurred still later. Although around 1910 the relative importance of rail- and tramway capital formation in The Netherlands was slightly larger than in Great Britain, no real catching up process is visible.

#### *Backward linkages*

A lower level of investment generally also means weaker backward linkages. We estimated the demand for labour and for iron induced by railway construction in The Netherlands. The number of labourers employed in railway building could be calculated indirectly by dividing the total wage sum by the average wage for each year.<sup>9</sup> The wage sum was derived from total capital formation by taking the share of wages in railway construction costs (table 1). In the late 1870s, at the height of the railway boom, some 12,500 people, or around 1% of the total workforce, were engaged in railway construction. About the same number was involved in exploitation of the network. In 1910 still some 11,500 people were building rail- and tramways. The number of people employed by railway companies had risen to nearly 30,000. These numbers are dwarfed by the number of labourers working on German railway construction: in 1850 already 80,000, rising to a peak of 540,000, or nearly 3% of the total workforce, in 1875.<sup>10</sup>

Backward linkages to the iron industry were also relatively weak. As no primary iron industry of any importance existed in The Netherlands, rails had to be imported. In the period 1861-1892 42% of all rails supplied were from Germany, 20% came from Belgium, 18% from Great Britain, and 20% were of unknown origin.<sup>11</sup> The demand for rails, and iron and steel for the building of railway bridges and stations, resulted in a maximum volume share of 58% of total Dutch imports of iron and steel reached in the period 1865-1869.<sup>12</sup> This is considerably more than the 25% of total demand for pig iron exerted by the German railways in the 1870s.<sup>13</sup> At first sight there were promising backward linkages of rail- and tramway investment to the iron industry. However, the high share of railways in the import of iron in this period was mainly due to the low demand for iron in the rest of the Dutch economy. Net Dutch imports of iron in the period 1865-1869 equalled a mere 6% of the German pig iron production.<sup>14</sup>

#### *Conclusions*

The time series on capital formation in rail- and tramways in The Netherlands in the period 1838-1913 were constructed by following modern guidelines from the *System of National Accounts*. The consistency, comparability, and

divisibility of the series proved a promising step forward. For the first time, light railways and tramways have been included in the estimates, and has a division been made between infrastructural components, rolling stock, and station buildings. Since the time series were constructed bottom-up, starting from data on individual companies and on outlays by central and local government, it was possible to assess the importance of private and public investment in rail- and tramways.

The new series generally support the existing view on railway development in the Netherlands, but not without amendments. The boom-period of government-led large scale construction in the period 1860-1880 still dominates the picture. A phenomenon not mentioned by older studies, however, is the increasing importance of rolling stock towards the end of the period under study. This tendency towards a higher relative level of investment in rolling stock was reinforced by increasing replacement investment, and by heavy investment in electrical tramways.

When put into an international perspective, the new series generally support the existing picture as well. In The Netherlands railways never dominated the national economy to the same degree as in Great Britain or Germany. Large-scale construction started later, and was relatively less important, both in comparison with national income, and as a percentage of total capital formation. Therefore, backward linkages were also weaker.

The plain fact that railways were relatively less important to the Dutch economy does not necessarily mean that more resources should have been allocated towards it. Instead, it can be argued that resource allocation was rational. Precisely because railways were late in The Netherlands it was possible to profit from catch-up opportunities, such as increased competition on the world market for rails and rolling stock.

## NOTES

1. University of Groningen, Faculty of Spatial Sciences (Groote), and Faculty of Economics (Albers), P.O. Box 800, 9700 AV Groningen, The Netherlands, E-mail: r.m.albers@eco.rug.nl, or p.d.groote@frw.rug.nl. This article is partly based on research that was sponsored by the Foundation for Economic, Social, and Spatial Sciences (ESR), which is part of the Netherlands Organization for Scientific Research (NWO).
2. J.H. Jonckers Nieboer, *Geschiedenis der Nederlandsche spoorwegen 1832-1938* (Rotterdam, 1938); J.A. Faber, (ed.), *Het spoor, 150 jaar spoorwegen in Nederland* (Amsterdam, 1989); W. van den Broeke, *Financiën en financiers van de Nederlandse spoorwegen 1837-1890* (Zwolle, 1985).

3. For a description of the perpetual inventory method, see: C.H. Feinstein, 'National statistics', in: C.H. Feinstein and S. Pollard, eds., *Studies in capital formation in the United Kingdom, 1750-1920* (Oxford, 1988) 259-264 or A. Maddison, *Dynamic forces of capitalist development* (Oxford, 1989) 279-284.
4. All cost statements are given in real terms, *i.e.* in constant guilders of 1913.
5. Great Britain: Feinstein, 'National statistics', 429-430. Germany: R. Fremdling, *Eisenbahnen und deutsches Wirtschaftswachstum 1840-1879* (Dortmund, 1985) 31; W.G. Hoffmann, *Das Wachstum der deutschen Wirtschaft seit des 19. Jahrhunderts* (Berlin, 1965) 259-260. France: M. Lévy-Leboyer and F. Bourguignon, *The French economy in the nineteenth century, an essay in economic history* (Cambridge, 1990) 317-321. Both Hoffmann and Lévy-Leboyer and Bourguignon only give net capital formation. For the countries mentioned here, it is not entirely clear whether the figures include tramway investment. Since for Germany and France tramways are not included in any other category, they are either grouped with railways or excluded from the series. For Great Britain Feinstein probably included tramways in the category 'other transport and communications.'
6. For infrastructure a detailed description of sources and methods is given by Peter Groote, *Kapitaalvorming in infrastructuur in Nederland, 1800-1913* (Capelle aan den IJssel, 1995). For buildings, and machinery and equipment the data used are preliminary results of research carried out by Adrian Clemens and Ronald Albers.
7. We would like to thank our colleagues of the project, E. Horlings, J.P. Smits and J.L. van Zanden for kindly providing us with their GDP-series.
8. For sources on railway capital formation: see note 5. National income: Great Britain: C.H. Feinstein, *National income, output and expenditure of the United Kingdom 1855-1965* (Cambridge, 1972) T18-T20. Germany: Hoffmann, *Wachstum*, 451-452. France: Lévy-Leboyer and Bourguignon, *French economy*, 312-316. As for Germany and France only net capital formation was available, we divided by net national income.
9. See R. Fremdling, *Eisenbahnen*, 94-100. Wage series kindly supplied by Annelies Vermaas. See also: A. Vermaas, *Wages, salaries and income inequality in the Netherlands, 1850-1913* (Ph.D.thesis; forthcoming)
10. Fremdling, *Eisenbahnen*, 98.
11. R.M. Albers and P. Groote, 'Kapitaalvorming in spoor- en tramwegen in Nederland, 1838-1913', *NEHA-jaarboek voor economische, bedrijfs- en techniekgeschiedenis* 57 (1994) 367.
12. The available information in the trade statistics does not allow us to calculate the value share.
13. Fremdling, *Eisenbahnen*, 81, 83. For the United States and Great Britain demand from the railways probably did not exceed 15% of pig iron output, *ibidem*, 79-80.
14. Dutch trade statistics (*Statistieken van den in-, uit- en doorvoer*); R. Fremdling, *Technologischer Wandel und internationaler Handel im 18. und 19. Jahrhundert; die Eisenindustrien in Grossbritannien, Belgien, Frankreich und Deutschland* (Berlin, 1986) 324.



## IV

### THE DEVELOPMENT OF GOVERNMENT FINANCES IN A CHAOTIC PERIOD, 1807-1850

by

*Jan Luiten van Zanden*

The wave of interest into the historical development of Dutch government finances that emerged in the 1980s paid little attention to the first half of the nineteenth century. Between the excellent study of Wantje Fritschy on the financial policies of the Revolutionaries between 1795 and 1806 and the thorough reconstruction of government finances in the second half of the nineteenth century by René van der Voort there still exists a major gap in our knowledge.<sup>1</sup> Wantje Fritschy has also done some work on the period of the First Benelux - 1815-1830 - but she had to conclude that she was unable to reconstruct the development of government income and expenditure in this period.<sup>2</sup> In fact, the only thorough study on the subject, H. Riemens' thesis on the *Amortisatiesyndicaat* (1935) also lacks these basic data, and as a result it is a largely descriptive account of the financial policies of King William I.<sup>3</sup> In this book Riemens restates the opinion of contemporary authors that is impossible to make a detailed reconstruction of government finances in this period. This idea, repeated by Fritschy and others, has effectively blocked the further study of this fascinating period of Dutch public finances.

In this paper I will show that, after a number of major problems are solved, it is possible to reconstruct the development of public income and expenditure and of public debt in detail. These problems are the result of:

- (1) discontinuities in the political system, with breaks in 1810/11 (inclusion in French Empire), 1813 (independence), 1815 (union with Belgium) and 1830 (secession of Belgium);
- (2) the many changes in the tax regime and in the way taxes and expenditures were reported in the sources;
- (3) attempts by the King and his ministers to conceal deficits and to increase his discretionary power vis à vis Parliament.

The most famous example of the latter is the *Amortisatiesyndicaat*, set up in 1822 by King William I as a semi official body to redeem the public debt, but used by him to expand subsidies to industry and infrastructure and to finance other expenses (loans to the Indies, subsidies for the victims of a major flood etc.). This syndicate ended up creating a lot of extra government debt and could do so almost completely outside the control of Parliament.

For that matter, the *Amortisatiesyndicaat* was one of the many ploys the King played to deceive the public. All these tricks -separate funds, the inclusion of dubious sources of income in the budget, moving around money between years and between different funds and budgets- make it difficult to reconstruct in detail what was actually going on. We do, however, have one major advantage over the contemporary observer: detailed accounts of the regular budget and of nearly all the special funds -including the notorious *Amortisatiesyndicaat*- are available in the archives.<sup>4</sup> This allows us to penetrate as far as the details of obscure expenses and revenues, and, after the reconstruction of the activities of these special funds, to consolidate the government's bookkeeping. In this paper I will explain the methods used to estimate the major macroeconomic figures for the central government between 1807 and 1850, and give a brief analysis of some of the results of this study. Special attention is given to the period of the union with Belgium, between 1816 and 1830, when all data on government income and expenditure included this nation. In order to determine the shares of the Netherlands and Belgium in government finances, I have tried to make separate estimates for both parts of the Kingdom.

#### *Sources and method of reconstruction*

At first sight the data published by the King and his ministers of the financial development of the Kingdom give a very chaotic picture of actual income and expenditure. But after a careful study of the published data, it appears that a lot can be used for historical analysis. For the years before 1814 this study has been restricted to the year 1807 - the last more or less normal years of the Batavian-French period - for which a detailed account of income and expenditure has been published.<sup>5</sup> Starting in 1814 the *Handelingen der Staten Generaal* (HSG) contain summary statements of income and expenditure on a yearly basis, classified according to the major categories of the budget and according to the year to which the sums relate (for example, tax income relating to the financial year (*dienst*) 1814 that was actually received in 1816 is included as such in the statement of 1816). The major drawback of these tables is that as a result of their summary nature it is sometimes difficult to interpret the status of the sums involved. In addition, it is impossible to classify these statistics ac-

ording to economic criteria (wages and salaries, government consumption and investment, etcetera). Moreover, these tables do not include the activities of the three special Funds, the *Amortisatiekas* (1814-1822), the *Syndicaat der Nederlanden* (1816-1822), and the *Amortisatiesyndicaat* (1823-1840). It is therefore impossible to reconstruct in detail the development of government finances on basis of the statements in the *HSG*.

The additional information that was collected to interpret and supplement the statements of the *HSG* consists of the detailed accounts of expenditure per financial year (per *dienst*), which have been published for 1841-50 and are available in the archives of the *Algemene Rekenkamer* [General Auditor] for 1823-1840. In this archive I have also found the detailed accounts of the three special funds, which enables us to reconstruct their activities.<sup>6</sup> For example, a part of tax income (the so-called 'opcenten voor het Amortisatiesyndicaat') and part of the income from the Domains went directly to these funds and was not accounted for in the general statements of income and expenditure in the *HSG*. As a consequence authors who have tried to reconstruct income and expenditure for this period - especially the papers by Betz on government finances between 1814 and 1822<sup>7</sup> - have underestimated income and overestimated the size of deficits. Moreover, information from the archives is essential to interpret the meaning of many of the entries in the statements of the *HSG*.

This information and a study of the literature -Riemens's thesis and contemporary studies by Hoogendorp, Gogel and Betz<sup>8</sup> - made it possible to interpret virtually all of the obscure entries in the summary statements. It proved to be possible to consolidate the accounts of the three funds and the regular accounts of the government by adding the extra income and expenditure of these funds to the general income and expenditure of the central government.

In general, the figures of government budgets were not used because there were large discrepancies between budgets and actual incomes and expenses. As a result, all figures relate to *actual* income and expenditure. Another feature of these results should also be noted: they pertain to financial years (*dienstjaren*) and not to actual years. For example, about 80 to 95 percent of the taxes and outlay of the *dienstjaar* 1820 were received and spent during that year; the rest was booked separately in 1821, 1822 and onwards as a tax or expense of the year 1820. With the exception of the 1807 data, the consolidated figures all relate to financial years, and as a result they are not completely identical with actual expenses and incomes during the relevant years. The administration of the Colonies, which was the exclusive privilege of the King until 1848, was not included in this study. Only its net results -the net income or *batig slot* and the net contribution to its administration- was entered in the financial administration.<sup>9</sup>

The development of the following variables was reconstructed:

- income from direct, indirect and other taxes;
- other government income: postal services, domains, fisheries and hunting rights, lotteries, income from the colonies (the *batig slot*) etc. (excluded is the income from tolls, which was decentralised to the provinces in the 1820s and was used to finance the maintenance of roads);
- total means of government: income from taxes, from other sources and from loans;
- total expenditure according to economic criteria: wages and salaries, government consumption, investment; these results are not yet analysed in this paper;
- total expenditure according to department: defence (war and navy), justice, home affairs (including education and public works), finance (including interest payments), foreign affairs, etc;
- budget deficit as well as the loans to finance this deficit;
- income (1816-1830) and expenditure (1823-1830) of the Southern Netherlands; it was not possible to extricate the expenditure of this part of the Kingdom before 1823.

For the period 1816-1830 all data relate to the Kingdom of the Low Countries and, hence, include Belgium and Luxemburg, unless otherwise stated. The pre-1816 data, which pertain to the Netherlands without Limburg (which was added officially in 1839) are corrected for this 'omission' so as to make them comparable with the post-1830 figures and with the estimates of Dutch GDP for this period.

#### *Total income and expenditure*

In a number of tables and in figure 1 the most important results of this reconstruction are presented. In order to make these results comparable in time I have related the estimated figures to the most recent estimates of total GDP for this period, which are available for the Netherlands from 1807 onwards. In a very crude way I have also estimated Belgian GDP between 1816 and 1830 to make comparable estimates for these years.<sup>10</sup>

Tax income as a share of GDP shows a slightly declining trend in the period until 1826/30 - the rather low estimate of 1816/20 is mainly the result of the somewhat inflated GDP figures for these years - and a modest rise in the 1830s and first half of the 1840s. In the long run this relationship is almost stable: the tax burden of 1807 is almost identical to its level at the middle of the nineteenth century. Until 1830 total means (excluding loans) are about 1 to 1.5 percent of GDP higher than tax income; after 1830 the difference between the

Table 1. *The development of taxes, expenditure and the deficit as a percentage of GDP, 1807-1846/50*

	taxes	total income	expenditure	deficit	GDP <sup>a</sup>
1807 <sup>b</sup>	9.02	10.63	15.33	4.71	517
1814/15	9.22	12.13	19.04	7.07	408
1816/20	6.28	7.11	7.91	0.80	510/1020
1821/25	8.72	9.75	10.35	0.59	418/836
1826/30	7.90	8.94	9.70	0.76	478/956
1831/35	8.40	9.78	16.60	6.82	509
1836/40	8.23	11.20	13.49	2.29	561
1841/45	9.71	13.29	14.13	0.84	538
1846/50	9.08	12.50	12.65	0.15	581

<sup>a</sup> Between 1816-30 GDP of the United Netherlands is estimated as twice the Dutch GDP; all GDP estimates are of a provisional nature.

<sup>b</sup> Less detailed estimates for 1805/09 put the share of total expenditure in GDP at 14.8%, of total income at 8.4% and total deficit at 6.4% (source: unpublished research data kindly provided by T. Pfeil).

Source: data base project Reconstruction National Accounts; see also the text of this paper.

two moves up to about 3.5 percent of GDP in the 1840s, which is the result of the increase in income from the Dutch East Indies.

Government expenditure as a share of GDP is much more volatile. The very high levels of 1807 and 1814/15 are mainly the result of war expenditure and, in 1807, very large interest payments on the government debt (see table 2). In the 1820s the level of expenditure reached a low of about 10 percent of GDP, to rise again to a very high level of almost 20 percent during the quasi-war of the Belgian Secession, when William I refused to accept the independence of the new nation. After 1833 expenditure once again declined to a 'normal' level, but its share in GDP remained higher than it was during the 1820s.

The deficit moves very close to the changes in expenditure. After the very high levels of 1807 (which probably continued until the inclusion in the French Empire in 1811) and 1814/15 a long period of relatively low deficits commenced in 1816, when the fiscal union with Belgium took place. Deficits be-

Table 2. *The development of public debt and the share of interest payments on the public debt in GDP of the Netherlands, 1807-1850*

	public debt as % of GDP	interest as % of GDP
1807	225	6.9
1814	147 <sup>a</sup>	3.7
1820	159 <sup>a</sup>	4.3
1830	181 <sup>a</sup>	5.0
1839	204 <sup>a</sup>	6.5
1844	248	7.9
1845	209	6.1
1850	217	6.3

<sup>a</sup> Exclusive of deferred debt.

Source: see table 1.

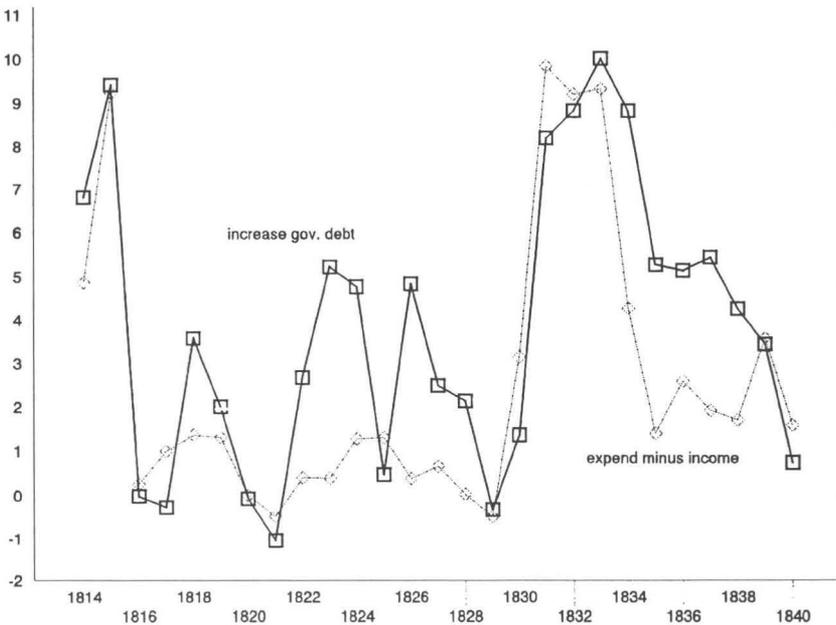
tween 1816 and 1830 were on average less than 1 percent of GDP, which is quite low from a late 20th century point of view. To calculate it in another way: 92 percent of government expenditure was covered by taxes or other forms of regular income in these years, but it should be noted that part of this other income consisted of the sale of domains and other government properties. During the early 1830s deficits exploded to a record level of more than 9 percent of GDP in three successive years (1831-33); during the rest of the 1830s deficits remained relatively high in spite of the enormous expansion of other income from the *batig slot* of Indonesia. After 1840, when William I abdicated and Parliament regained control over government finances - and, for example, the *Amortiesatiesyndicaat* was abolished - a gradual reorganization of these finances was carried out, which ended with the famous conversion of government debt by Van Hall in 1844/45. The result was a rapid decline in the deficit.

It is possible to test the accuracy of these estimates of government income and expenditure in a very broad way by comparing estimated deficits with the actual increase in government debt. Thanks to a number of studies into the

development of government debt in the first half of the nineteenth century by Van Hall, Weeveringh and Buys it is possible to reconstruct its growth in detail.<sup>11</sup> In theory, the increase in total debt should be identical to the difference between expenditure and income (and the change in cash reserves). Figure 1, which shows the fluctuations in both figures, confirms this relationship: in the 'war years' 1814/15 and 1831-33, for example, both figures show enormous peaks, and in the 1840s the level of both is extremely low. But in a number of years the growth of government debt is larger than the actual deficit; especially in 1818-19 and between 1822 and 1829 differences between the two are significant. It should be stressed that the largely negative assessment of the financial policies of William I by contemporaries was heavily influenced by this continued rise of government debt during his reign, a rise that occurred even in the years of peace between 1816 and 1830. Between those years total government debt increased by about 254 million guilders (or more than 50 percent of GDP); in the same years the total deficit amounted to 106 million guilders, or 'only' 42 percent of this increase. What accounts for the remainder of the increase?

To explain this discrepancy we have to take another look at the debt policy of the government. In 1814 William I was confronted with a total debt of

Figure 1. *The share of the public deficit in GDP, 1814-1850 (%)*



about 1,222 million guilders, consisting of more than 20 different types of debt with interest rates ranging from 1.25 to 7 percent.<sup>12</sup> In 1810, with the inclusion of the Netherlands into the French Empire, Napoleon cut the payment of interest on this huge debt by two third, the so called *tiërccering* of the public debt. The King had to decide whether he would accept this *tiërccering*. In May 1814 he ordered that all debt should be converted into new 2.5 percent bonds (the *Nederlandsche Werkelijke Schuld* [Real Debt of the Netherlands] or *NWS*) according to a formula that was based on the relative interest rates of the outstanding bonds. The newly formed Kingdom would begin to pay interest on one third of this new debt; the other two thirds were denoted as the deferred debt, which would be converted into 'real' debt according to a detailed timetable encompassing the next three hundred years or so. Moreover, in order to raise money for the financial needs of the new Kingdom, bondholders had to pay a certain amount of money when they changed their old bonds into *NWS*. As a result of this conversion total government debt rose to 1,726 million guilders, of which two third, 1,151 million, was deferred debt, and the government was able to cash in about 27 million guilders.<sup>13</sup>

The 2.5 per cent paid on the *NWS* was far below interest rates on the capital market; the yields of *NWS* were consistently below 60 percent and sometimes even below 50 percent. To borrow money the government could either create new bonds with higher interest rates -as it did in 1816 (5 percent), 1818 (5 percent) and 1823 (4.5 percent)- or sell its *NWS* at the much lower market price. This is one cause for the difference between the actual deficit and the increase in nominal government debt: when the minister of finance sold *NWS* at, for example at 50 percent of its nominal value, the increase in nominal government debt was twice as high as the deficit he could finance with this operation. The second cause of the difference between deficits and the change in public debt relates to deferred debt. The obligation to convert deferred debt into real *NWS* meant that until 1830 -when conversion almost ceased- government debt tended to increase without a corresponding increase in income. The big discrepancies between both figures in 1823-25 are largely explained by operations of the *Amortisatiesyndicaat* in this field. Originally the syndicate was set up to finally solve the problem of the deferred debt by buying it all on the market, but this proved to be impossible as the price of deferred debt started to increase rapidly as a result. Yet, it purchased sizeable quantities, and sold them again, sometimes as normal *NWS*, when it was in need of extra money.<sup>14</sup> Finally, the peak in the increase in government debt in 1826-27 has to do with a number of loans that were made to finance the deficit of the colonial treasury, which was partly due to the Java War (1825-1830).<sup>15</sup> As I explained before, these expenses were not included in the budget of the Dutch government.

During the 1840s the opposite phenomenon can be observed: the increase in public debt is much lower than the size of the deficits (figure 1). This is largely caused by the liquidation of the *Amortisatiesyndicaat* in 1841 and the reorganization of public finances in 1844-45. Van Hall, the architect of this complex operation, was able simultaneously to convert high yielding debt into bonds with low interest rates, to lower the total value of the public debt, and to raise money to pay for the deficits of 1843 and 1844!<sup>16</sup> This explains why the deficits in these years do not result in an increase in total debt. As a result of this reform total payment of interest on the public debt declined by almost 4 million guilders (see also table 2).

In table 2 the estimates of the total value of the public debt (excluding the deferred debt) are compared with the development of GDP. Because almost all debt was owned by residents of the Northern part of the Kingdom - the share of the Belgians in total debt can be estimated to be about 4.4 percent in 1818 and 1.8 percent in 1830 <sup>17</sup> - I did not correct these calculations for the inclusion of Belgium between 1816 and 1830. These figures show a staggering level of public indebtedness. During the French period the ratio between debt and GDP climbed to more than 200 percent. The *tiercering* by Napoleon and the financial 'reform' of William I in 1814 resulted in a modest decline to about 150%, after which there began a consistent rise to almost 250 percent in 1844. Note that the huge deficits of the 1830s did not cause an explosion of this ratio because total GDP also grew rather rapidly during this decade. The healthy effects of the reforms of Van Hall in 1843/44 are also clear from this table; after these reforms the debt ratio stabilized at around 200 percent, still an incredibly high level, which could only be financed by means of the large colonial surpluses.

The continuous rise of the ratio between public debt and GDP between 1814 and 1840 cannot be attributed solely to the financial policies of William I. It was a period of slow growth of GDP, in spite of a relatively rapid increase in population. Moreover, after peaks in the price level in 1807/13 and again in 1816/18, a long period of low prices began, which led to a reduction in the nominal level of GDP. The declining trend in prices after 1818 contributed to the sharpening of the debt burden on the economy. On the other hand, in view of the already enormous debt burden the best financial policy would have been to create a surplus on the budget, for example by cutting the ever large expenses on defence. This was exactly what the King refused to do; the many tricks he played to conceal from the public the true development of state finances were meant to forestall drastic cuts in the budget and to continue the special projects he had set up to stimulate economic prosperity.<sup>18</sup>

*The structure of income and expenditure*

The structure of taxation was one of the hot topics of public debate during the first half of the nineteenth century. This debate centred around the question how to finance a huge public debt without introducing taxes that were too regressive, inefficient, and potentially damaging to economic development. Especially during the years of the United Kingdom, this debate was very intense because industrial and rural interest groups from the Southern Netherlands favoured a much more protective system of taxation than the commercial bourgeoisie which used to dominate the Dutch state. The King, who had gone a long way in meeting the demands of these Southern interest groups in 1816, was forced in 1820-21 to change sides and introduce a new system of taxation which was much more in line with Dutch traditions in this field.<sup>19</sup> This move contributed to opposition against his rule in the Southern Netherlands and finally to the secession of 1830. After 1830 a further switch in taxation policy was necessary in order to pay for the costly quasi-war with the Belgians.<sup>20</sup>

In view of the major changes in taxation policy during the first half of the 19th century it is surprising to find that in the end not much changed in the structure of taxation between 1807 and the 1840s (table 3). The share of direct taxes in total tax income declined from about 45 percent to 35 percent, but this was mainly caused by a rise in 'other taxes'. The latter consisted largely of taxes on inheritances and stamps (*zegelrechten*), which were also paid for by the rich. The share of indirect taxes only dropped during the experiment with

Table 3. *The structure of public income, 1807-1841/50 (taxes and other sources of income as a percentage of total tax income)*

	direct taxes	indirect taxes	customs revenue	other taxes	total taxes	other income	loans
1807	45.3	37.7	9.2	7.8	100	17.8	68.8
1814/15	40.9	32.0	13.8	13.3	100	29.8	88.2
1816/18	48.8	23.1	9.5	18.6	100	13.7	7.8
1819/22	46.6	36.4		17.0	100	11.2	15.4
1823/30	38.2	34.7	9.0	18.1	100	13.1	11.4
1831/40	38.0	34.9	8.9	18.2	100	25.7	44.1
1841/50	35.3	36.8	9.6	18.3	100	37.4	1.1

Source: see table 1.

a less regressive system with reduced indirect taxes between 1816 and 1821. Other sources of income -domains, income from the colonies, from fisheries and hunting rights, etcetera- provided a sharply fluctuating share of total income until the 1830s, when the big increase in the *batig slot* started. As a matter of fact, the actual income received from Indonesia is underestimated by these figures as (a) a large part of it was used to directly subsidize shipping, international trade, textile industries, and other sectors of the economy -sums that were not recorded in the official budgets- and (b) the expenses for the administration of the colonies were paid for directly out of the *batig slot*, as a result of which this part of expenditure almost disappeared from the official budgets (see table 4).<sup>21</sup>

Table 4 presents the results of the distribution of expenditure among the various categories. The data from 1825 onwards are based on detailed accounts of actual expenditure, corrected for changes in classification; moreover, the figures for 1825/29 are adjusted for expenditure in Belgium and relate to the northern part of the Kingdom only (as do the figures for the years before 1816). The estimates for the 1816-25 period are taken from the statements in the *HSG*, are not consolidated for the operations of the various Funds, and not corrected for changes between departments. These estimates give a rough picture of the changes in the pattern of expenditure, keeping in mind the different quality of the figures for 1816-1825.

During the first decade of the nineteenth century war and debt management together comprised about 90 percent of total expenditure, while the share of debt management rose to more than 50 percent during the second half of the decade. The *tiërcering* of 1811 and the conversion of 1814 reduced the share of finance to about a third in 1814/20, but the financial policies of William I caused it to rise again to more than 55 percent in the second half of the 1830s, after which it stabilized. The share of expenditure on army and navy shows declining trend in the long run, with hicks during 1814/15 and again during the first half of the 1830s. The declining importance of expenditure on debt financing and war after 1815 made it possible to increase the share of other departments. The expenditure on internal affairs -with large amounts going to education and public works- rose rapidly, as did expenditure on justice, religion (almost non-existent before 1814), and the colonies. But the growing importance of interest payments after 1820 - its share more than doubled between 1816/20 and 1840/43 - crowded out 'other', less traditional categories of expenditure. For example, investments on infrastructure were already on the decline after 1825 and almost ceased to exist after 1830, and the secession of Belgium in 1830 led to various rounds of budget cuts which hit these new expenditures relatively hard.

For the years 1823-1830 we have been able to reconstruct in detail the share of the Southern Netherlands in total expenditure. The accounts for these years

Table 4. *The structure of public expenditure, 1799/1804-1841/50*  
(in percentages)

	99/04	05/09	14/15	16/20	21/24	25/29	31/34	35/39	41/50
<i>'New' expenditures</i>									
King	-	-	2.9	3.2	3.1	2.1	1.6	1.9	1.6
General Administration	1.2	2.1	0.9	1.6	1.4	1.0	0.6	0.7	0.8
Foreign Affairs	0.8	0.7	1.0	1.0	0.8	0.7	0.8	1.1	0.7
Justice	<sup>a</sup>	<sup>a</sup>	0.2	4.3	4.0	1.7	1.2	1.7	3.1
Home Affairs <sup>b</sup>	5.1	7.4	8.8	9.6	7.8	9.9	5.2	6.2	5.7
Protestant religion	<sup>a</sup>	<sup>a</sup>	0.1	1.6	1.7	1.8	1.5	1.8	2.1
Catholic religion	<sup>a</sup>	<sup>a</sup>	0.0	1.9	2.2	0.5	0.3	0.4	0.6
Colonies	<sup>a</sup>	<sup>a</sup>	2.7	1.6	0.2	2.2	1.2	0.1	0.1
<i>subtotal</i>	7.1	10.2	16.6	24.8	21.2	19.9	12.4	13.9	14.7
<i>Defense</i>									
Navy	19.5	12.5	7.6	7.0	6.7	8.7	8.4	6.7	7.2
Army	26.0	21.4	39.4	36.1	23.6	20.5	37.6	22.3	16.2
<i>subtotal</i>	45.5	33.9	47.0	43.1	30.3	29.2	46.0	29.0	23.4
<i>Finance</i>									
Finance	45.9	53.2	35.4	32.0	43.8	50.9	41.6	57.0	57.8
Of which interest	43.0	48.3	26.1	21.8	24.4	28.7	30.8	46.9	47.3
<i>Other expenditure</i>	1.5	2.8	0.8	-	4.7	-	-	-	3.9
<i>Total</i>	100	100.1	99.8	99.9	100	100	100	99.9	99.8
<i>In millions of guilders</i>	73.2	76.0	59.0	81.6	83.0	71.7	89.7	73.9	74.1

<sup>a</sup> Included in item 2.

<sup>b</sup> Including education and public works.

Note: Estimates for 1799/1804 and 1805/09 are based on unpublished research material kindly provided by T. Pfeil

1816/20 and 1821/24: Southern Netherlands included; other years Northern Netherlands only.

Source: see table 1

contain information of the budgets of the various provinces, universities, courts, navy establishments etc. which makes it possible to locate a large part of expenditure directly. Moreover, a detailed scheme for the budget cuts of 1831 is

available, which states the reduction of the number of officials as a result of the Belgian secession and other cutbacks in expenditure that were inherent in the smaller size of the Kingdom. The reduction in the income of the King in the same years was also taken as an estimate of the Belgian share of this part of expenditure. Because the share of the Southern Netherlands in the total public debt was very small, its citizens received a very tiny proportion of the large expenses of debt management; this share was estimated at 3 percent. Finally, for other expenses the share of the Southern Netherlands had to be estimated indirectly; these indirect estimates ranged from 0 percent for colonial administration to 70 percent for industrial subsidies (through the *Fonds voor de nijverheid* [Industrial Fund]).<sup>22</sup>

The share of the Southern Netherlands in total expenditure is surprisingly low - between 20 and 23 percent. Moreover, it declines slowly, mainly as a result of the growing share of interest payments in total expenditure. Very rough estimates of the share of total expenditure going to the southern part of the Kingdom for the years 1816-1822 are also included in table 5. There are reasons to believe that especially in the first years, when large sums were

Table 5. *Share of the Southern Netherlands in the income and expenditure of the United Netherlands, 1816-1830*

	share in income %	share in expenditure %	estimated net loss (fl. million)
1816	40	20-30	6.6-14.6
1817	45	20-30	5.9-13.5
1818	45	20-30	5.4-13.4
1819	46	20-30	7.3-15.3
1820	46	20-30	13.0-21.1
1821	45	20-30	12.6-20.2
1822	43	20-30	8.9-16.8
1823	47	23	23.0
1824	48	22	20.2
1825	48	22	21.5
1826	49	20	22.6
1827	48	22	22.4
1828	48	21	22.9
1829	50	20	29.0
1830	38	15	18.3

Source: see text and table 1.

spent on the fortification of the border with France, the Belgian share was higher than in the second half of the 1820s. This is included in the estimates for the years before 1823.

The calculation of the share of the Southern Netherlands in total government income is much more simple. For each year between 1816 and 1830 the *HSG* contain a detailed breakdown of tax income by province, which can be used to estimate this share on a yearly basis. The results show a slowly rising share of the Southern Netherlands, from 40 percent (1816) and 45 percent (1817) to parity in 1829. The better economic performance of this part of the Kingdom is the most obvious explanation of this relative rise in tax income.

As a result the net loss of the Southern Netherlands due to the United Kingdom -the difference between tax income and expenditure in that part of the kingdom- increased dramatically between 1816 and 1829. During the first years after 1815 this net loss was probably about 10 million guilders (or approximately 2 percent of 'regional' GDP), but the relative rise of its share in taxes and the decrease in its share in expenditure led to a strong rise in the transfer of income between both parts of the Kingdom. In 1829 this transfer amounted to 29 million guilders, probably between 5 and 6 percent of regional income! On average, between 1816 and 1830 the transfer from south to north can be estimated at about 18 million guilders per year, or between 3 and 4 percent of regional GDP. Against this background the strong criticism against the financial policies of the King from the liberal bourgeoisie of the Southern Netherlands is all the better understandable. The debate on those policies flared up again in 1829/30 and resistance against the heavy taxes imposed by the King was one of the main motives behind the secession of 1830.<sup>23</sup>

For the Northern part of the Kingdom the union with the Southern Netherlands was highly profitable; net income from Belgium was probably even higher than the famous incomes from the Dutch East Indies after 1830, the *batig slot*. As we estimated the level of GDP of the Northern part of the Kingdom at about the same size as that of the southern part, the former gained an average of about 3 to 4 percent of Dutch GDP as a result of the union.

### *Conclusion*

This paper has shown that it is possible to reconstruct the evolution of government finances during the first half of the nineteenth century. In this respect the pessimism of most economic historians is not warranted. A first analysis of the most important developments in public finance in this period shows that the structure of government income did not change very much, in spite of some experiments with a less regressive tax system after 1816. Like in the 18th century the government was able to finance huge deficits on its budget

thanks to the relatively elastic supply of capital on the Holland capital market. The major innovation in the field of government income was the rise of the *batig slot* after 1830. The structure of expenditure shows a long-term decline of defence expenditure, from about 45 percent at about 1800 to less than 24 percent in the 1840s. This was made possible by the absence of major wars after 1815 and by the general notion that the Netherlands had become a small state, which was not really able to compete militarily with its major neighbours. Nonetheless, defence expenditure during the 1820s and 1830s was still relatively high, which contributed to the financial problems of these years.<sup>24</sup> The ambitious policies of William I to create a well-integrated state, led to a surge in 'new expenditures' - on infrastructure, industrial subsidies, education, justice and religion - which increased the financial problems of his reign. As a result, after the *tiërcering* by Napoleon had led to a sharp decrease in the debt burden on the economy, it rose again rapidly after 1816. The estimates show that during the 1830s and 1840s about 6 to 8 per cent of GDP consisted of interest payments on the public debt, and that the ratio between public debt and GDP was higher than 200 percent. On the one hand, this is proof of the enormous ability of the nineteenth-century economy to sustain such a high level of public debt. On the other hand, it shows the large extent of the problems in public finance during those days. These estimates suggest that it is impossible to understand the development of the Dutch economy in this period without paying due attention to the relationship between state and economy. This paper has attempted to present the basic facts for such an endeavour.

## NOTES

1. J.M.F. Fritschy, *De Patriotten en de financiën van de Bataafse Republiek* (Stichting Hollandse Historische Reeks 1988); R.H. van der Voort, *Overheidsbeleid en overheidsfinanciën in Nederland 1850-1913* (Amsterdam 1994).
2. W. Fritschy, 'Staatsvorming en financieel beleid onder Willem I', in: C.A. Tamse en E. Witte (eds.) *Staats- en Natievorming in Willem I's Koninkrijk* (Brussel 1992) 215-36.
3. H. Riemens, *Het Amortisatie-Syndicaat* (Amsterdam 1935); by the same author: 'De finantieele politiek onder Willem I', *De Gids*, 101, 3 (1937) 144-67.
4. The accounts used in this study can be found in *Algemeen Rijksarchief Den Haag*, 2.02.09.08, Archief Rekenkamer, Comptabel Beheer, and 2.08.01.01, Ministerie van Financiën.
5. A detailed review of these sources is given by J.M.F. Fritschy and R.H. van der Voort, 'De Nederlandse staatsbegrotingen, 1798-1914', *Broncommentaren I* (Den Haag, 1994), 1-117.
6. *ARA*, 2.02.09.08, Archief Rekenkamer, Comptabel Beheer, no. 252 ff. (general accounts) and 629-42 (special accounts of various funds).

7. The most valuable analysis of financial policies in the years 1814-1821 is still presented in the studies published by G.H. Betz, 'Finantiële beschouwingen I', *Bijdragen tot de kennis van het Staats-, Provinciaal- en Gemeentebestuur in Nederland*, 4 (1860) 212-49; 'Finantiële beschouwingen II', *Bijdragen tot de kennis van het Staats-, Provinciaal- en Gemeentebestuur in Nederland*, 5 (1861) 1-47; 'Finantiële beschouwingen III', *Bijdragen tot de kennis van het Staats-, Provinciaal- en Gemeentebestuur in Nederland*, 5 (1861) 269-94; 'Finantiële beschouwingen IV', *Bijdragen tot de kennis van het Staats-, Provinciaal- en Gemeentebestuur in Nederland*, 6 (1862) 27-61; 'Finantiële beschouwingen V', *Bijdragen tot de kennis van het Staats-, Provinciaal- en Gemeentebestuur in Nederland*, 6 (1862) 237-284; 'Finantiële beschouwingen VI', *Bijdragen tot de kennis van het Staats-, Provinciaal- en Gemeentebestuur in Nederland*, 7 (1863) 89-146.
8. See notes 3 and 7 and I.J.A. Gogel, *Memoriën en correspondentiën betreffende de staat van 's Rijks geldmiddelen in den jare 1820* (Amsterdam 1844); G.K. van Hogendorp, *Bijdragen tot de huishouding van staat in het Koninkrijk der Nederlanden* (Amsterdam 1864).
9. A separate study of the finances of the colonial administration and of the actual size and composition of the *batig slot* is in progress; this will result in some minor adjustments to the estimates of total income and expenditure made in this paper.
10. Belgian's GDP was estimated at roughly the same as Dutch GDP, which was the result of a GDP per capita which was about 20% lower than the Dutch level and a population which was almost 40% larger; see A. Maddison, *Dynamic Forces in capitalist development* (Oxford/New York 1991).
11. J.T. Buys, *De Nederlandsche staatsschuld sedert 1814* (Haarlem 1857); F.A. van Hall, *Proeve van een onderzoek omtrent de schuld van het Koninkrijk der Nederlanden* (Amsterdam 1840); J.J. Weeveringh, *Handleiding tot de geschiedenis der staatsschulden. Eerste deel. Nederlandsche staatsschuld* (Haarlem 1852); the growth of the debt of the government to the NHM during the 1830s can be estimated on the basis of W.M.F. Mansvelt, *Geschiedenis van de Nederlandsche Handel-Maatschappij*, I (Haarlem 1925) 376-418.
12. Buys, *De Nederlandsche staatsschuld*, 21.
13. Betz, 'Finantiële beschouwingen II', 12.
14. Riemens, *Amortisatiesyndicaat*, 98 ff.
15. Riemens, *Amortisatiesyndicaat*, 147-55.
16. I.J. Brugmans, *Paardenkracht en mensenmacht* ('s-Gravenhage 1969) 187.
17. Van Hall, *Proeve*, 12.
18. For an analysis of this part of his policies see J.L. van Zanden, 'The price of secrecy', working paper project national accounts 1995; and Fritschy, 'Staatsvorming'.
19. H.R.C. Wright, *Free trade and protection in the Netherlands 1816-1830* (Cambridge 1955).
20. R.T. Griffiths, *Industrial Retardation in the Netherlands 1830-1850* (Den Haag 1979) 47-54.
21. See note 9.
22. I would like to thank René van der Voort who did this part of the research.
23. Riemens, *Amortisatiesyndicaat*, 174ff.
24. Fritschy, 'Staatsvorming', 228-9.

# V

## NATIONAL WEALTH AND INCOME FROM CAPITAL IN THE NETHERLANDS, C. 1805-1910<sup>1</sup>

by

*Wybren Versteegen*

### *Introduction*

Income from capital is of great importance to the economic history of the Netherlands in the nineteenth century, since it made up between a third and two fifths of national income. This category concerns income derived not from labour but from the ownership of immovable and movable property, such as land, houses, stocks, and claims. A description of the manner in which this income was earned can help to improve our understanding of the structural changes that occurred in the Dutch economy during the nineteenth century. For example, it is possible to determine the share in total income of real estate, foreign securities, or interest payments on the public debt.

The extent of and income from capital holdings have received very little attention in Dutch historiography, especially with regard to the first half of the nineteenth century. Capital invested in other countries is the only component for which many estimates exist.

The earliest calculation of the amount of national wealth was made by Metelerkamp in 1804.<sup>2</sup> It was not until 75 years later that Verrijn Stuart made estimates of the national wealth on basis of the statistics of the succession duty in the years around 1855 as well as 1880.<sup>3</sup> About ten years ago Van Zanden presented estimates of income from capital in the years 1820, 1850, 1880, and 1910.<sup>4</sup> In this article these estimates will be discussed and alternative calculations will be presented. The article is divided into two chapters that cover the periods c. 1805-c. 1865 and c. 1880-c. 1910 respectively. This distinction is dictated by differences in the methods of calculation which arise out of the restrictions imposed by the source material. Until about 1865 estimates can only be made for benchmark years that are ten to fifteen years apart. For the

period between about 1880 and 1910 a continuous series of income from capital can be constructed.

Every chapter begins with a survey of the available sources. Subsequently estimates are made of the two components that constitute the national wealth, namely property in mortmain and private property. Calculations of the former type of property are based on data published in the *Handelingen van de Staten-Generaal* [Parliamentary Proceedings]. The estimates of private wealth are made by means of contemporary estimates as well as data on the yield of the succession duty.

## PART I. INCOME FROM WEALTH IN THE PERIOD C. 1805-C. 1865

### *1.1 Introduction*

After a description of the source material the next five sections discuss estimates of the value of the national wealth in the period c. 1805-c. 1865. These estimates concern six benchmark years, namely 1807, 1815/16, 1831/32, 1843/44, c. 1855 and c. 1865. Furthermore, in the fifth section the revenues of the succession duty will be used to examine the distribution of wealth between the northern and southern halves of the kingdom of Willem I (the Netherlands and Belgium respectively). Finally, section 1.10 presents estimates of the income from capital. In view of the debate on the question whether or not the first half of the nineteenth century was a period of real economic growth<sup>5</sup>, this section will also attempt to determine the extent to which national wealth and the income thereof underwent a significant increase.

### *1.2 The sources*

A study of capital income during the Batavian-French period can rely on the efforts of contemporary experts, such as Canneman, Metelerkamp and Montalivet. The government and informed representatives have made estimates for the years 1831/32 and 1843/44. As this regards it must be pointed out that at the beginning of the nineteenth century Zeeuws-Vlaanderen and Limburg were not yet a part of the Kingdom of Holland, and that the current province of Limburg was not incorporated into the Netherlands until 1842. This does not really hamper the calculation of the national wealth since this province accounted for a mere 2½ percent of the succession duty.

The estimates of national wealth around the middle of the century are based on the first succession statistics of the years 1854-1857 and the years 1862 and

1867.<sup>6</sup> The line of reasoning in applying this material is that inheritances can be considered a representative cross section of all property in the Netherlands. A great deal has already been written on the value of these data. The main shortcoming is that inheritances in the direct line of descent (i.e. from parents to children) were not taxed until 1878. Before this year only inheritances in the indirect line or collateral estates were taxed. The size and composition of indirect inheritances differed substantially from those in the direct line of descent. Therefore, collateral estates cannot be considered as a representative sample of all inheritances. Another question concerns the degree of evasion, which cannot easily be determined. Yet, there are strong indications that in practice the succession duty was only modestly evaded.<sup>7</sup> The final problem is that properties below 300 guilders were exempt from the succession duty. However, these comprised only a fraction of total inherited wealth.<sup>8</sup>

What information do the returns of the succession duty yield? These statistics show the value of a limited number of categories of property: real estate, domestic securities (after 1862 these were distinguished by type), foreign securities (without distinction), and various residual categories. This last group will henceforth be referred to as 'other moveable property'; it contains livestock, ships, furniture, cash, private loans, and so on. In addition, the returns state the amount of liabilities (or debts) in the estates. When estimating the amount of national wealth and income from property these liabilities are taken into account.

### 1.3 Property in mortmain

Property in mortmain consists of the possessions of public authorities, such as the state, provincial and local governments, and drainage authorities [*waterschappen*]. The property of charitable institutions is also included, as is the property of marks [*marken*], churches, hospitals and monasteries. This category essentially concerns all wealth that cannot be traced back to private owners. Hence, the property of companies is not included in this category, since this belongs to the shareholders or members of the firm.

A reconstruction of the size of the property in mortmain departs from the situation in 1859. This was the first year in which the *Handelingen van de Staten-Generaal* [Parliamentary Proceedings] give an overview of the size of these possessions (see table 1.1). This concerns the three main components of property in mortmain, namely land ('*ongebouwde eigendommen*'), houses ('*gebouwde eigendommen*') and subscriptions to the national debt. Between 1816 and 1910 the law prohibited such institutions from investing in foreign securities<sup>9</sup>; it can, therefore, be assumed that these reports present a comprehensive picture of the amount of property in mortmain in the year 1859.

The *Handelingen* do not give decisive information relating to the first half of the century; the amount of property has to be estimated. These estimates are based on data taken from the reports on poor relief institutions for which the accounts were annually published in the *Handelingen* from 1818 on. These reports show that in the five years before 1859 institutions for 'housebound poor' [*huiszittende armen*] and hospices accounted for 40 percent of the income from property in mortmain. If we assume that this share remained constant during the first half of the nineteenth century, then income from capital in mortmain can be estimated at 3.9 million guilders in 1818. This same procedure results in an income of 6.6 million in 1831/32 and 7.6 million in 1843.

Aside from these items, the income from the state domains must also be included. These revenues were stated annually in the government budgets since the early 1840s.<sup>10</sup> This information is absent for the period before 1840, but one estimate sets the value of the domains at 30 million guilders at the beginning of the nineteenth century.<sup>11</sup> It is also known that forty years later about half of this value consisted of real estate. The remainder was made up of toll revenues, bridge dues, ferry fares, and other source of revenue that are not considered income from capital. Thus, a value of c. 15 million guilders at the

Table 1.1. *Estimate of income from property in mortmain in the first half of the nineteenth century (millions of guilders)*

	1818	1831	1843	1859
rental value of buildings	•	•	•	0.8
rental value of land	•	•	•	3.0
public debt	•	•	•	3.1
subtotal	3.9	6.6	7.6	6.9
state domains	(0.9)	(0.9)	0.9 <sup>a</sup>	0.7
total income	4.8	7.5	8.5	7.6
estimated wealth	80	125	140	150

<sup>a</sup> 1841.

Note: The value of property in mortmain has been rounded to the nearest five million. Sources: *Handelingen van de Staten-Generaal*, Verslag van het armwezen, 1818/19 Bijlagen p. 651; 1833/34 Bijlagen p. 640, 644; 1844/45 Bijlagen p. 1174, 1186; Verslagen 1854-1858; 1858/59 Bijlage A p. 842.

current rate of return on real estate of 6 percent leads to an income of 0.9 million guilders.

Table 1.1 summarizes the estimates of the income from capital of the state domains and other categories of property in mortmain. In order to determine the value of these possessions income from real estate was assessed at the cadastral rate of return of 6 percent; the value of government bonds was based on the current yield.<sup>12</sup>

#### *1.4 The national wealth in 1807*

The earliest estimates of the amount of national wealth in the nineteenth century were made by Metelkamp in 1804. He assessed the total value of capital at almost 3,100 million guilders. His view of the structure of the national wealth was as follows:

real estate	1,134 mln or 37%
value of the public debt	600 mln or 19%
foreign securities	650 mln or 21%
international trade and transport	350 mln or 11%
waste land and other moveable property	350 mln or 11%
domestic trade, factories, traffic industries, and fisheries	?
coined silver and gold	?
<hr/>	
total	3,084 mln

This estimate is rather high for a number of reasons. First of all, Metelkamp assumed a lower return for real estate than was used in the new land tax of 1805.<sup>13</sup> This land tax yielded over 9 million guilders in 1807. It amounted to one sixth of the value of land rents, which in turn represented about 6 percent of the total value. A tax revenue of 9 million represents a rental value of 54 million and a capital of 900 million guilders.<sup>14</sup> Thus, the rate of return on real estate was 6 percent. In practice the difference between returns on real estate and on other items of property was reduced by the high land tax and by a host of local taxes that were levied as additional percentages on the land tax. Therefore, Kint estimates the real rate of return on land in the nineteenth century at c. 4.75 percent.<sup>15</sup>

The second problem concerns the interest on the public debt. Weeveringh set this interest at almost 35 million in 1807.<sup>16</sup> Metelkamp estimated it at 30 million guilders; he applied a yield of 5 percent. In 1807 this yield was probably higher. This relates to the market value of domestic securities, which was much lower than the nominal value. It is possible to use other data collected

by Weeveringh to calculate a -not quite properly- weighted average market value for the various government bonds. This results in a rate of return on the public debt of 7 percent in 1807. Riley also arrives at c. 7 percent for the same year.<sup>17</sup> Income from domestic securities amounted to 35 million guilders at a yield of 7 percent, which results in a capital of 500 million guilders.

Metelerkamp's estimate of the value of foreign securities is also quite high. A more accurate calculation can best be made by means of the estimates of Montalivet for 1811, which are based on the information provided by d'Alphonse.<sup>18</sup> He assesses the value of capital invested abroad at 210 million guilders, exclusive of investments in France and Great Britain. Riley quotes a report made by the prominent Amsterdam commercial house of Ketwich and Vroomberg, which mentions 8 million in income from England.<sup>19</sup> He also supports the estimate of Dickson, that in 1810 a maximum of 220 million guilders of the British public debt was in the hands of Dutch investors.<sup>20</sup> This same source also reports an income of 3 million guilders from France. A nominal interest of 5 percent results in a nominal debt of another 60 million. On this basis the nominal value of foreign investments in 1810/11 can be set at  $210 + 220 + 60$  is 490 million guilders. According to his graph Riley arrives at a market rate of c. 90 percent.<sup>21</sup> This brings the market value of foreign securities to well over 440 million.

Furthermore, Montalivet mentions a total of 10 million guilders in income from foreign securities in 1811. In addition to the above-mentioned income from France and Great Britain this sets the total income from abroad at 21 million guilders. Private investments in foreign plantation loans must be added to this figure. d'Alphonse estimated the nominal value of these loans at 94 million guilders in 1811<sup>22</sup>, but their value had plummeted. Carter arrives at a fall of 40 to 49 percent relative to the original value at the end of the eighteenth century.<sup>23</sup> In 1797 the income from these plantation loans was calculated at 2 million guilders by Canneman<sup>24</sup>, clerk of the Financial Council and 'alter ego' of the famous tax reformer and patriot Gogel.<sup>25</sup> Starting from the potentially optimistic estimate of Carter these loans can be valued at no more than 45 million guilders. This brings the total value of plantation loans and other foreign securities at 485 million, which corresponds fairly well with Van Stuijvenberg's estimate of 500 million guilders.<sup>26</sup>

Another category concerns the amount of cash in circulation. Metelerkamp did not take this item into consideration, but other contemporary authors arrived at a total of 75 to 100 million guilders.<sup>27</sup> The next category relates to the value of capital in trade and industry. Metelerkamp underestimated this value at 350 million, because he restricted his efforts to international trade and shipping. Around the middle of the nineteenth century ships, raw materials, private loans, merchant stocks, and livestock accounted for 18 percent of the value of inheritances. Assuming that these proportions were the same at the

beginning of the century, Metelerkamp's 350 million can be raised by another 110 million guilders for domestic trade, manufacturing, traffic industries, and the fisheries, which is not altogether unlikely. Metelerkamp presumably also overstates the value of waste lands and household effects (350 million). Waste lands are actually included in real estate, so that we only have to account for the category of household effects. Around the middle of the nineteenth century the group of 'other moveable property' -which comprised jewelry, furniture, etcetera- contributed 5 percent to the value of inheritances. Finally, liabilities were equal to about 8 percent of the value of estates around 1850. In conclusion, in 1807 the composition of the national wealth may have been as follows:

real estate	900 mln or 35%
domestic securities	500 mln or 19%
foreign securities	485-500 mln or 19%
cash	75-100 mln or 4%
trade and shipping, etc.	460 mln or 18%
other moveable property	100 mln or 5%
total	2,570 mln
liabilities (8%)	-250 mln
<hr/>	
national wealth	2,365 mln

### *1.5 The national wealth in the first years of the Restoration (1815-1823)*

How did the national wealth develop during the early years of the Restoration? In 1813 the Dutch economy was in a deplorable state. Napoleon's policy to force England on its knees by means of economic sanctions had forced the Continental System on the Netherlands to the detriment of overseas trade. To capital owners the partial bankruptcy of the state -Napoleon's reduction of interest payments on the public debt by two-thirds in 1811- was disastrous: 'Among the wounds inflicted by foreign oppression and hard times, the reduction of the public debt is one of the deepest. It is too deep to ever be healed completely...'.<sup>28</sup> Yet, not only did the interest payments of the Dutch state decline, foreign debtors defaulted as well. For example, in 1793 the interest payments on the French national debt were reduced to a third, which naturally resulted in a fall in the value of these securities. Riley estimates the loss of capital associated with this reduction at 70 to 110 million guilders. As the war progressed more governments got into financial trouble. Austria and Sweden

were in default from 1808 on, and Spain already defaulted in 1807. Moreover, in the decades around 1800 plantation loans had become an uncertain source of income. In the light of the general and continuous downward trend in the value of securities, the reduction of the Dutch interest payments was an appropriate conclusion to the financial catastrophe in Europe at the end of the Napoleonic era.

The effect of this financial crisis on private wealth can be estimated on basis of the revenues of the succession duty in the first years after the Restoration. This duty was introduced in 1806, but it was abolished after the kingdom of Holland had been incorporated into the French Empire at the end of 1810. In 1814 the succession duty was reinstated.<sup>29</sup> In 1817 the tax law was amended, so that the data for the years after 1816 cannot easily be compared with the earlier information.

In 1807 the revenues amounted to 2.0 million guilders as against 3.0 million in 1810.<sup>30</sup> In 1815 and 1816 the *Handelingen* assess the revenues at 1.8 and 2 million guilders respectively.<sup>31</sup> These figures indicate that the value of private wealth may have declined by a quarter after the Napoleonic period. The total national wealth can then be valued at approximately 1,750 million guilders. Of course, this can hardly be considered a 'concrete' estimate, as it is founded on the tax yield in a few years only. It is, however, beyond all doubt that the losses were substantial. Berghuis estimates the loss of capital of a number of investment funds at 75 to 80 percent by the end of the French period.<sup>32</sup>

The tax revenues of the succession duty also allow statements on the ratio between private wealth in the northern (Dutch) and southern (Belgian) parts of the country, which were united into the Kingdom of the Netherlands in 1815. In 1817 the Dutch tax laws regarding inheritances were also introduced in the Southern Netherlands. This offers the opportunity to compare the value of property in the various provinces of the north and south for a limited number of years, namely 1820-1823.<sup>33</sup> In the early twenties the three western provinces were indubitably the wealthiest part of the kingdom. As much as 42 percent of the tax yield was collected in Noord-Holland, Zuid-Holland and Utrecht. The three richest provinces in the Southern Netherlands -Oost-Vlaanderen, Brabant and Antwerpen- were responsible for only 26 percent. The difference between the coastal and inland provinces is even more remarkable. Ten of the nineteen provinces of the Kingdom of Willem I were inland provinces; from the north down to the south this were Drenthe, Overijssel, Gelderland, Noord-Brabant, Zuid-Brabant, Limburg, Henegouwen, Luik, Namen, and Luxemburg. These ten provinces accounted for merely 29 percent of the tax revenues. Departing from the later kingdoms of Belgium and the Netherlands, Belgium generated only 42 percent of the succession duty despite its larger number of inhabitants. Consequently, in the Northern Neth-

erlands private wealth per head of the population was about a third higher than in Belgium.

### *1.6 The national wealth in 1831/32*

The calculation of the value of the national wealth in 1831/32 is based on an estimate made by W.A. Schimmelpenninck van der Oye of January 1832.<sup>34</sup> He made his estimate in response to government plans to impose an additional capital levy in connection with the war with Belgium. Schimmelpenninck van der Oye valued private wealth at a minimum of 1,700 million and income from capital at 104 million guilders on the assumption of a yield of 6 percent for foreign securities (30 million) and real estate (55 million), and 6½ percent for domestic securities (19 million). He left aside capital invested in private loans and other moveable property. In c. 1855 and c. 1875 these items accounted for 28 percent of the property in collateral inheritances. Around 1880 this share was 29 percent for estates in direct line of descent. When we add 28 percent to an amount of 1,700 million, then the value of private wealth in 1831/32 can be set at 2,360 million guilders; after subtracting liabilities (8 percent of 2,360 million) this leaves 2,170 million. With income from property in mortmain at 125 million, this results in a national wealth of 2,300 million guilders.

These estimates require some clarification. First of all, Schimmelpenninck van der Oye deliberately assumes a very low value for income from real estate: 'When one accepts not the cadastral assessment of 69 million, but merely *a more accurate 55 million in net income*, at 6 percent the value of capital is... 9000,000,000 ...'.<sup>35</sup> In view of the deurbanisation and the unfavourable condition of agriculture in the western parts of the country this was not an unrealistic assumption.<sup>36</sup> In my opinion the cadastral value of rents on land and houses are an unfortunate measure for the calculation of income from real estate during this period. The cadastral values were founded on the income in the period 1812-1826, leaving aside years when prices were extremely high or low.<sup>37</sup> After 1817 an agricultural crisis set in, which reduced the cadastral value to a fiscal measure without an obvious relation to the actual situation at a given moment. The condition of Dutch agriculture brought Schimmelpenninck van der Oye to his low estimate. However, if one insists on using the rental values of the land register, the national wealth is raised by 233 million guilders.

A second matter concerns the high rate of return on the public debt. Klein assumes that the yield on government bonds was low during the nineteenth century.<sup>38</sup> This may have been true for the second half of the century, but especially during the years after the Belgian Secession the government was in

dire need of funds as a result of the continuous state of war. In the 1830s interest rates of 5 or 6 percent were not unusual.

The next subject relates to income from foreign securities. After the decline during the final years of Napoleon, when the value of foreign investments had dropped to 350 million guilders, the significance of and interest in these securities increased once again.<sup>39</sup> Klein estimates that around the middle of the twenties the value of foreign investments was 1,000 million guilders,<sup>40</sup> but contemporary estimates indicate a much lower amount. In 1829 income from abroad was assessed at more than 27 million guilders. This concerned a capital of 640 million at a yield of 4¼ percent.<sup>41</sup> Data published in *The Economist* of February 1913 suggest a decline in foreign investments from 800 million in the early 1820s to 610 million in the 1830s.<sup>42</sup> This amount is not inconsistent with Schimmelpenninck van der Oye's lower estimate of 500 million. By assuming a high rate of interest his calculation of the value of foreign securities amounted to about 500 million. When a yield of 5 percent is applied, instead of his 6 percent, the value of capital invested abroad in the early thirties comes to about 600 million guilders.

### *1.7 The national wealth in 1843/44*

At the beginning of the 1840s -when the reign of King Willem I drew to a close- Dutch public finance went through an acute crisis.<sup>43</sup> Due to the government's enormous demand for capital around 1840 the yield on Dutch bonds was still at 5 percent, whereas British securities had stabilized at over 3 percent and the return on French bonds fell to just over 4 percent.<sup>44</sup> During the thirties this high Dutch rate of return had also attracted foreign investors. In 1832 Schimmelpenninck van der Oye noted with respect to a recent government loan that 'foreigners... have recently acquired a substantial part of the 39 million 6 percent bonds'.<sup>45</sup> This is all the more remarkable, because it is generally assumed that loans to the Dutch government were produced by the inhabitants of the kingdom itself. According to Luzac this had indeed been the case during the Batavian-French period, but -as he noted in 1832- nowadays 'Europe has a better knowledge of and greater interest in our funds'.<sup>46</sup> In 1852 Weeveringh reported that Dutch administrative offices, involved in disbursing the interest on the national debt, were also operating abroad, most notably in Brussels and Paris.<sup>47</sup>

Finally, in 1844 the Minister of Finance Van Hall stated that as much as 300 million guilders of the nominal public debt was in the hands of foreigners<sup>48</sup>; this was equal to about a quarter of the debt.<sup>49</sup> By this time the financial situation had got out of hand to the extent that the Netherlands was at the brink of bankruptcy and the government contemplated the introduction of a forced levy

on wealth.<sup>50</sup> On its part the parliament argued in favour of exempting foreign bearers of Dutch government bonds from this tax.<sup>51</sup> The rationale behind this argument was that they wanted to preserve the confidence of foreign investors in the creditworthiness of the Dutch state, a confidence which still existed according to De Monchy, a Member of Parliament.<sup>52</sup>

In consideration of such a capital levy the government presented an estimate of the value of the national wealth. This was assessed at 3,000 million guilders.<sup>53</sup> Contrary to Schimmelpenninck van der Oye this estimate did depart from the cadastral value of real estate. It is true that land rents had more or less recovered since the early twenties, but for lack of information it cannot be determined whether or not these values gave an accurate picture.<sup>54</sup> Therefore, this estimate of a national wealth of 3,000 million is given the benefit of the doubt. However, in some respects the composition of this wealth is quite unreliable. The share of real estate of 38 percent (1,140 million) corresponds to earlier and later estimates. However, the government valued the contribution of domestic securities at 500 million or 17 percent of the national wealth. This amount seems to be very low. Interest payments on the public debt were 44 million guilders.<sup>55</sup> At the current rate of return this boils down to a market value of 880 million. Since a quarter of the debt was in the hands of foreigners, the national debt accounted for 660 million guilders or 22 percent of the Dutch national wealth.

The estimate that 1,000 million or 33 percent of the national wealth was invested abroad seems rather odd. Judging from the share of foreign securities in collateral inheritances in these years a share of 12 percent or 360 million guilders appears to be more likely.<sup>56</sup> The calculation of the value of 'moveable property, cash, shares in industrial enterprise, etcetera' is equally unrealistic at only 350 million guilders. This still leaves about 28 percent or 840 million guilders as a residual category, which is more plausible.

The aforementioned wealth of 3,000 million guilders is inclusive of c. 140 million of property in mortmain (table 1.1). Private wealth is thereby reduced to 2,860 million. After subtracting liabilities at 8 percent of the value of private property this leaves 2,630 million guilders. In short, the composition of the national wealth was as follows: 38 percent real estate, 22 percent domestic securities, 12 percent foreign securities, and 28 percent other categories.

### *1.8 The national wealth around 1855*

Verrijn Stuart estimated the value of the national wealth around 1855 at almost 6,000 million guilders. However, his methods of measurement were rejected for good reasons by Derksen<sup>57</sup> and have not been followed since.<sup>58</sup> My estimate of the value of wealth in 1855 departs from a share of real estate in

private wealth of 38 percent, which is the same as in 1880.<sup>59</sup> This is not in line with the returns of the succession duty that indicate a share of 31 percent. At this point the difference between collateral estates and inheritances in direct line of descent is made evident. Around 1880 the share of real estate in inheritances in direct line of descent was 42 percent as against 32 percent for collateral inheritances and 39 percent for the total of all inheritances. Because estimates for the years prior to 1880 resulted in a share of about 38 percent, it was assumed that this percentage was also valid for c. 1855.

In addition around 1855 28 percent of collateral estates consisted of the category of 'other moveable property'. In keeping with the succession statistics the remainder of the inheritances was divided between domestic and foreign securities, that together accounted for a third of private wealth as they also did in 1843/44.

The value of the total capital in real estate is calculated on basis of Van Zanden's estimates of the net yield of real estate. At a rate of return of 6 percent this yield of 92 million minus property in mortmain brings the value of real estate to 87½ million, 6% is 1,458 million guilders. This amount was equal to 38 percent of private property, so that the total value of private wealth was 3.8 thousand million guilders. Property in mortmain was valued at 150 million which raises the wealth to 3.9 thousand million, and after subtracting liabilities to 3.65 thousand million. Since 15 percent of the national wealth comprised foreign securities, this estimate results in a total value of foreign investments of 585 million guilders. This outcome confirms the conclusion of Van Stuijvenberg and Berghuis that the interest for foreign securities hardly grew during the first half of the nineteenth century.<sup>60</sup> And this amount does not deviate too much from the estimate of *The Economist*, which arrived at 630 million for the period 1850-1854.

### *1.9 The national wealth around 1865*

On basis of the value of the public debt in the inheritances -as was described in the statistics of the succession duty- the value of private wealth in the middle of the 1860s can be estimated at 5,150 million guilders after adjusting for liabilities (see chapter 2 section 4). At that time property in mortmain amounted to 150 million. The share of real estate in the collateral inheritances was 35 percent. This was between 3 and 4 percent higher than in c. 1855 and c. 1880. On the strength of this observation it could be argued that the share of real estate in all inheritances will also have been higher than around 1855 or 1880. In c. 1865 the share of real estate was presumably 42 percent rather than 38 percent. This large share fits in well with the comparatively high rates of return on investments in land at that time.<sup>61</sup> As before the categories of 'other

moveably property' and liabilities together accounted for 28 percent of the total wealth. Domestic and foreign securities were divided by means of their contribution to the total value of shares. Thus, the structure of total private wealth around 1865 was as follows: real estate 42 percent, domestic securities 16 percent, foreign securities 14 percent, and other moveable property 28 percent.

#### *1.10 Income from property c. 1805-c. 1865*

In calculating the income from capital it is not always common practice to include the income from loans to the government, since this concerns a transfer of taxpayers' income. However, when income from capital is studied as it is, the value of this component must be determined. Apart from this, the capital income from all kinds of moveable property presents a problem. It is quite evident that the ownership of livestock and ships represents income, because these items are used to make money. On the other hand, furniture, jewelry, coins, and other household items are less straightforward in this respect. At first sight no income is generated with these items; they are 'dead' capital. However, economic theory does indeed ascribe an income to these effects. The line of reasoning is essentially the same as in the question as to the 'income' someone earns from the ownership of his own farm and land or his house: how much rent would he have to pay if the property c.q. furniture were not in his possession? From this point of view investments in moveable or immoveable property actually represent an income. These effects are therefore included in this analysis.

For the benchmark years of 1807, 1831/32 and 1843/44 the income from capital has already been discussed in the estimates of the national wealth. It is not possible to make a decent estimate for 1815/16, but in view of the decline in the value of the national wealth it is not unlikely that capital income had dropped to c. 100 million guilders.

The following approach was used to calculate income from capital in 1855 and 1865. The rate of return on real estate was set at 6 percent before the land tax. The yield of government bonds was then about 4 percent.<sup>62</sup> This percentage can be applied to all domestic securities, since the number of quotations of Dutch East Indian funds was still very low.<sup>63</sup>

Unfortunately, it proved impossible to break down foreign securities by country. Investments in the highly profitable American railways would become important at a later stage; foreign government bonds prevailed in the Amsterdam stock exchange.<sup>64</sup> This obstacle was overcome by using the rates of return on French securities to calculate income from abroad in 1843/44, c. 1855, and c. 1865. These securities stood midway between the high yields of Prussian shares and the low returns on British shares.<sup>65</sup>

Private loans had varying interest rates about which we know virtually nothing. On the other hand, until 1859 in the succession statistics the rough rate of return that was used to assess the value of all components other than real estate and securities was officially 5 percent. This may be an adequate measure for the first half of the nineteenth century. For example, in 1846 the *Nederlandsche Handel-Maatschappij* considered an interest of 5 percent on its loans as normal.<sup>66</sup> However, in the years prior to 1859 it was argued in parliament that a rate of 5 percent was 'too high in these times, that the common standard can be set at a maximum of 4 percent and that the law ought to be in accordance with reality'.<sup>67</sup> Some even argued in favour of a standard interest rate of 3 percent. Obviously the rate of return to capital was lower in the 1850s than in the preceding period. Therefore, income from moveable property is valued at a yield of 4 percent in 1855 and 1865, and not at 5 percent as before.<sup>68</sup>

Since the estimates of income from capital in 1855 and 1865 are based on the amount of private wealth, the income from property in mortmain must be added. Finally, we have to allow for liabilities or debts in every one of the benchmark years. These debts accounted for about 8 percent of the value of inheritances and -viewed from the creditors' angle- these will have carried a return equal to that of other items of moveably property. The imputed income must be subtracted from the total income from capital.

The final results of these calculations is presented in table 1.2.

During the first decades after 1807 capital income declined. Only after 1831/32 can a gradual growth be perceived. After the middle of the nineteenth century income from capital had increased by 38 percent relative to 1807. At that time the level of income from property was considerably lower than Van Zanden estimated in 1985. He arrived at an estimate of 177 million guilders in 1820 and 236 million around 1850. The difference is mainly brought about by the use of lower rates of return for income from moveable property and -for the situation in 1831/32- by the lower level of income from real estate compared to the cadastral values applied by Van Zanden. In my view the level at which he sets capital income in 1820 was not reached until about the middle of the century, and the level of 1850 was reached only in the 1860s.

### 1.11 Summary

Tables 1.3 and 1.4 present a summary view of the estimates of the value of the national wealth in the first half of the nineteenth century.

Table 1.2. *Income from wealth in the Netherlands 1807-c. 1865 (millions of guilders) and the estimated rate of return (%)*

	1807	1831/32	1843/44	1854/57	1862,1867
real estate	54 6%	55 6%	69 6%	92 6%	141 6%
domestic securities	35 7%	19 6%	33 5%	32 4%	36 4%
foreign securities	23 5%	30 6%	25 4%	23 4%	31 4%
other	30 5%	33 5%	42 5%	43 4%	63 4%
liabilities	-10 5%	-10 5%	-11 5%	-13 4%	-18 4%
total income	132	127	158	182	253

Table 1.3. *The structure of private property in the Netherlands, 1807-1865 (%)*

	1807	1831/32	1843/44	1854/57	1862,67
real estate	35	39	38	38	42
domestic securities	19	13	22	19	16
foreign securities	19	21	12	15	14
other	27	28?	28?	28	28
total	100	100	100	100	100

Table 1.4. *The amount of national wealth 1807-1865 (millions of guilders)*

	1807	1815/16	1831/32	1843/44	1855/57	1862,67
private property	•	•	2,360	2,860	3,835	5,595
liabilities	-205	•	-190	-230	-305	-445
property in mortmain	•	80	125	140	150	150
national wealth	2,365	1,775	2,295	2,770	3,680	5,300

During the first half of the nineteenth century the great constant in the national wealth was the large share of real estate, which was consistently between 35 and 40 percent. Only in 1865 this share was higher at 42 percent, which was presumably caused by the highly favourable development of agriculture. Foreign assets comprised a varying part of wealth: between 12 and 22 percent. The biggest fall occurred in the 1830s when capital was shifted into domestic securities in response to the large demand of government for funds. Few changes can be observed in the category of 'other moveable property'. This concerns such items as private loans, livestock, personal possessions, stocks, ships, and so on. Private loans played a particularly important part in 'lubricating' the economy. Many companies and individuals were dependent on this type of credit.<sup>69</sup> Shortly after the middle of the nineteenth century liabilities to private persons constituted 16 percent of the gross national wealth.

The main change in the structure of the national wealth relates to securities. The fluctuating importance of domestic securities gives the best reflection of shifts in the structure of the economy of the Netherlands. For its part, the Dutch economy was strongly affected by the vicissitudes of its high public debt. This debt had increased sharply during the Batavian-French period (1795-1813). The partial bankruptcy in 1811, the well-known reduction of interest payments on the public debt (*'tiërcering'*), caused a strong decline in the income from Dutch government bonds. The debt soared once more after the Belgian Secession. This caused a shift in stock-holding towards domestic securities. It was not until after the middle of the 1840s that public finances were reorganized and the attraction of government borrowing on the capital market was reduced.

Income from capital did not increase during the first decades of the nineteenth century. Growth only occurred after the Belgian Secession. Moreover, the level of capital income was substantially lower than has hitherto been assumed. Insofar as the level of and income from the national wealth is concerned this study indicates that the first half of the nineteenth century was a period of stagnation, at least until 1830. The value of the national wealth did not exceed the level of the Batavian-French period until the 1840s.

## PART 2. INCOME FROM CAPITAL IN THE PERIOD C. 1880-C. 1910

### 2.1 Introduction

The development of capital income in the decades around 1900 is of great interest because the pattern of investments was changed fundamentally. Among

others, Berghuis gives an exhaustive description of these changes.<sup>70</sup> The dominant position of the public debt came to an end, which was partly due to the colonial remittances (the '*batig slot*'). This was initially offset by an increase in the amount of foreign investments; at a later stage modern shareholders emerged and investments in the colonies boomed. The 1870s marked the beginning of a long decline in the economic situation, a trend that would last until 1895. The agricultural depression -caused by the imports of cheap grain from the United States- was a major contributor.<sup>71</sup> After 1895 the economy of the Netherlands expanded enormously.

In this chapter I will examine the relationship between changes in the structure of the national wealth and the rates of return on its various components. It is first of all necessary to calculate the value of the national wealth and the income from capital. Some estimates have already been made. In 1888 Verrijn Stuart valued the national wealth at over 10,000 million, but this is a questionable figure. Derksen has made another well-known estimate of national wealth and capital income in the first decades of the twentieth century. Finally, Van Zanden has calculated income from capital in c. 1800 and 1910.<sup>72</sup> The outcome of these estimates will be tested in the fourth section of this chapter.

Subsequently, the composition and regional spread of the national wealth is examined. Very little is known about the regional distribution of wealth. Bos did look into the structure of wealth within the various regions during the second half of the nineteenth century.<sup>73</sup> However, the revenues and tax statistics of the succession duty offer an opportunity to describe the regional spread of wealth in the Netherlands in the nineteenth century. The main question concerns the extent of the decline in the large share of the western provinces in the total national wealth in the course of time.

The final sections discuss the calculations of the income from the various kinds of capital: income from real estate, securities, and other moveable property. Finally, an attempt is made to explain shifts in the structure of the national wealth from changes in rates of return. The first section, however, illustrates the nature and quality of the source material. This primarily concerns the statistics of the succession duty. These statistics are used to establish the value and structure of *private* wealth. The third section presents estimates of the value of property in mortmain.

## 2.2 *The statistics of the succession duty*

This study is mainly founded on the statistics of the succession duty in which the value and composition of Dutch inheritances are recorded. This information was gathered in order to adequately collect the succession duty. The shortcomings of this material have already been outlined in the chapter on capital

income in the period 1805-1865. After 1878 the situation had improved to the extent that the value and structure of all estates are stated, inclusive of the inheritances in direct line of descent. Yet, even these statistics have a number of drawbacks. The succession statistics are of course dominated by elderly investors, whose investment decisions were generally rather conservative.<sup>74</sup> It is quite possible that collateral estates -which were usually related to younger people- provide a more accurate picture of the composition of wealth. This is, however, purely hypothetical.

The statistics of the succession duty have been systematically collected and processed by J. Teijl and are now deposited at the *NEHA*.<sup>75</sup> Save statements to the contrary, the examination in this chapter is based on this material. Teijl did not merely collect information; he also calculated five-yearly averages for the period from 1878 on. For example, 'c. 1885' refers to the average for the years from 1883 to 1887. For the years around 1880 Teijl only calculated the average of four years. There is information on all inheritances in 1878, but these cover only a part of that year. Hence, the designation 'c. 1880' relates to the average in the period 1879-1882. The information that was collected and systematized by Teijl is supplemented with regional data that can also be taken from the statistics he used.<sup>76</sup>

The information recorded in the succession statistics gradually improved in the course of time, but it still leaves much to be desired. One improvement is that from the 1860s on the statistics distinguish between various types of domestic security. A similar distinction between foreign securities is made from 1905 on. On the other hand, from 1887 the category of 'other moveable property' is no longer broken down; items such as 'merchandise', 'livestock', or 'cash' are lumped together. A further shortcoming is that starting in 1887 interest-free loans were transferred from 'liabilities' to 'other moveable property'.<sup>77</sup> Yet, even before 1887 these were rather unmanageable categories. This was exactly where the representativeness of the inheritances in direct line of descent was doubtful. For example, in 1880 *De Economist* pointed out that in the succession statistics the share of livestock was very small, whereas the share of cash in the inheritances was overestimated.<sup>78</sup> Other drawbacks are that income from investments in the colonies is not shown separately, and that no distinction is made between the ownership of land and houses. This creates a major problem, since the rate of return on these components of the national wealth could diverge considerably. In the calculation of income from capital these problems can only be overcome to a limited extent, which implies that we can only make rough estimates of capital income.

### 2.3 Property in mortmain

In 1859, 1877, 1892 and 1911 statistical surveys were made of the income from and value of property in mortmain. These surveys relate to the three main components of this property: land ('*ongebouwde eigendommen*'), houses ('*gebouwde eigendommen*') and subscriptions to the public debt. In addition, the state domains must be included in property in mortmain. Their revenues were stated in the budgets of the central government since the early forties.<sup>79</sup> Finally, from 1864 the '*Verlag over het kroondomein*' [Report on the Royal Domains] was annually published in the *Handelingen*, and this source states the investments of the royal domains in the public debt.

Four categories can be distinguished in the income from the domains:

- (1) The 'ordinary' domains (rents of real estate, tithes, land rents, etcetera)
- (2) Income from real estate of the 'domains of war'
- (3) Income from ferries, harbour duties, tolls, etcetera
- (4) Incomes from the royal domains

The third category cannot be considered a part of income from capital. For the fourth category the reports only state the income from government bonds from 1864 on. Following the study of capital income in the first half of the nineteenth century, the income from these three categories was taken from the *Handelingen* on a decennial basis from 1854 on.<sup>80</sup>

Table 2.1 provides a summary view of the estimates of capital income from the domains and other components of property in mortmain. In order to assess the value of these possessions the income from real estate was set at 6 percent in accordance with cadastral criteria. The value of government bonds was determined on basis of the current rate of return.<sup>81</sup>

For the years around 1910 these figures correspond fairly well with those of Derksen, who estimates the value of property in mortmain at c. 700 million guilders in 1912/15. Some authors do present higher estimates; for example, Bongers assessed property in mortmain at 1,000 million guilders.<sup>82</sup>

Table 2.1. *Income from and the value of property in mortmain (millions of guilders)*

	1859	1877	1892	1911
rental value of buildings	0.8	3.0	4.2	4.7
rental value of land	3.0	2.9	3.0	4.7
public debt	3.1	5.4	7.0	14.7
subtotal	6.9	11.3	14.2	24.1
domains	0.7	0.8	1.9	1.8
total income	7.6	12.0	15.7	25.8
wealth	150	245	370	605

Note: The value of property in mortmain has been rounded to the nearest five million. Sources: *Handelingen van de Staten-Generaal*, 1891/92 Staatsbegroting Middelen 9, p. 4, 20-21; 1915/16 Bijlagen 209.3 p. 8.

#### 2.4 Four recipes: private wealth around 1880 and 1910

The statistics of the succession duty have been used before to estimate the value of private wealth in the Netherlands during the second half of the nineteenth century. The best-known attempts are those of Verrijn Stuart in 1888<sup>83</sup> and Derksen in 1941.<sup>84</sup> The estimates of Verrijn Stuart concern the years around 1855 and 1880, whereas Derksen's calculations relate to the first decades of the twentieth century. Other authors have also tried to estimate the national wealth on the eve of the First World War. A recent estimate was made in 1985 by Van Zanden, who calculates income from capital in the nineteenth century.<sup>85</sup> A less well-known -if not forgotten- study is that of Fabricant and Maarschalk from 1952.<sup>86</sup>

The methods applied by all these authors vary considerably. Verrijn Stuart departs from the notion that all private fortunes will pass to a following generation within a given space of time. He sets this amount of time equal to the average lifespan of a Dutchman, and uses this figure as a multiplier. He assumes a figure of 35.8 for the 1880s. In 1939 Derksen criticized Verrijn Stuart's method, which has not been followed since.<sup>87</sup> Derksen also attempts to calculate the national wealth on basis of the succession statistics. In addition, he

uses data on the property that was assessed in the wealth tax, on the total value of the debt of central government and lower authorities, etcetera.

Van Zanden was not really interested in the total value of the national wealth, but focussed instead on the income thereof. He started from the income from real estate, which is given for c. 1820, c. 1850, c. 1880 and c. 1910. He then defined total income from capital as the income from real estate divided by the share of real estate in the value of the inheritances. This method has been propagated before.<sup>88</sup> Yet, it is not suitable for a calculation of income from capital. It is after all assumed that all components of the national wealth have the same rate of return.<sup>89</sup> Since the yield of real estate was relatively high during the nineteenth century, his estimate of capital income is far too high. Van Zanden's method can, however, be used to reconstruct total private *wealth*. In chapter one a similar method is used for the 1850s.

The estimates of Fabricant and Maarschalk are somewhat more sophisticated. Their study centres on Dutch investments in other countries. Fabricant and Maarschalk depart from the value of foreign investments as mentioned in the succession statistics. Subsequently they have devised a 'multiplier' with which this amount can be converted into the total value of foreign investments.

For the period from about 1880 on this 'multiplier' is calculated as follows. First of all, Fabricant and Maarschalk assume that only those who were upwards of forty had property that was subject to the succession duty. Next, they use mortality figures to determine the maximum number of inheritances (i.e. the number of deaths of persons that were forty or more in a given year). By dividing the number of people upwards of forty by the number of deaths, it can be established how to raise the value recorded in the succession statistics so as to include all persons of forty or more. For example, in 1879 there were 1,124,711 people upwards of forty, the number of deaths in these age groups was 34,545, so that the multiplier can be calculated at 32.56 (=33). The returns of the succession duty mention a total of 57,851,000 guilders in foreign securities. Thus, the total value of foreign investments can be estimated at 57,851,000 multiplied by 33 is 1,909 million guilders. The same procedure can be used to calculate the value of total private wealth.

This method is less uncertain than it appears to be. An entirely different approach to calculate the private wealth yields similar results. In my own estimate I started from the interest payments on the public debt. Interest paid to owners of property in mortmain was deducted from these payments in 1859, 1877 and 1911. The market value of interest payments to private investors can be calculated by means of rates of return on government bonds. Next, the share of government debt in the value of inheritances is estimated. Finally, the value of government bonds in private ownership is divided by its share in the inheritances. The value of liabilities is subtracted from this amount. In the

case of the estimates of private wealth in about 1865 it should be noted that the share of government bonds in the value of inheritances was taken from the statistics on 1862 and 1867, since there are no data for the intervening years. Furthermore, for government bonds in mortmain the figure for 1859 was supplemented with the average annual increase between 1859 and 1877 in order to arrive at an estimate for 1865. Thus, the total value of private wealth could be estimated at 5,100 million guilders in 1865.

The same method can be applied to the share of real estate, which is comparable to the approach used by Van Zanden in his estimates of income from capital. Moreover, the advantage is that this calculation is not hampered by potential tax evasion. It is quite remarkable that there is not much difference between the outcomes of the three methods of Fabricant and Maarschalk, Verstegen, and Van Zanden. At the most these estimates were 6 percent above or below Derksen's calculation. The difference is even smaller for the years around 1880. For 1910 there is indeed a 'gap' of 11 percent between the estimates of Fabricant and Maarschalk on the one hand, and Verstegen on the other. However, this can be ascribed to the fact that an unknown proportion of the public debt was in the hands of foreign investors. In view of the close fit between these three methods for the years around 1880, it can be stated that Verrijn Stuart's figure of well over 10,000 million guilders in national wealth is far too high.

Table 2.2. *The value of private property c. 1880 and c. 1910 (millions of guilders)*

	1879-82	index	1908-1912	index
Derksen	-	-	12,120	105
Verrijn Stuart demographic method	10,662	127	-	-
Fabricant/Maarschalk demographic method	8,397	100	11,558	100
Van Zanden raising the value of real estate	8,262	98	12,240	106
Verstegen raising the value of the public debt	8,702	104	12,860	111

The above methods of calculation can only be used to establish the value of wealth in benchmark years. Only the method of Fabricant and Maarschalk offers the opportunity to construct annual series for the period 1880-1910. Therefore, this method was used for the years after about 1880. This implies that the estimated income from capital will be slightly underestimated.

### 2.5 *The composition of the national wealth between about 1880 and 1910*

By combining the aforementioned method of calculation with Teijl's processed returns of the succession duty the following survey of the structure and value of the private wealth can be constructed (table 2.3).

Table 2.3. *The structure of estates in the Netherlands c. 1880-c. 1910 according to the succession duty statistics (%) and the value of the national wealth (thousands of millions of guilders)*

	1879/ 1882	1883/ 1887	1888/ 1892	1893/ 1897	1898/ 1902	1903/ 1907	1908/ 1912
<i>Structure of estates</i>							
real estate	39	34	32	31	32	32	32
domestic securities	11	12	13	14	16	19	19
foreign securities	22	23	24	28	25	22	21
other	28	31	31	27	30	27	28
total	100	100	100	100	100	100	100
<i>Value of national wealth</i>							
private wealth	9.3	8.9	9.8	8.9	9.7	11.9	13.2
liabilities	-0.9	-0.9	-1.0	-1.0	-1.1	-1.4	-1.7
net wealth	8.4	8.0	8.8	7.9	8.6	10.5	11.5
property in mortmain	0.3		0.4				0.7
national wealth	8.7		9.2				12.2

Changes in stock-holding can be charted for a longer period of time when we restrict ourselves to collateral estates. These provide better insight into the timing of the remarkable rise of investments abroad after the middle of the nineteenth century and the emergence of modern share-holding around the turn of the century (see table 2.4).

Table 2.4. *The distribution of security-holding in collateral inheritances in the Netherlands 1865-1910 (%)*

	government loans	lower authorities	shares and bonds	foreign securities	total
1854/1857	}	64	{	36	100
1862/1867	40	5	7	47	100
1874/1877	28	4	7	62	100
1879/1882	22	4	14	61	100
1883/1887	20	5	14	62	100
1888/1892	16	4	15	65	100
1893/1897	16	4	15	65	100
1898/1902	14	4	21	62	100
1903/1907	11	5	26	58	100
1908/1912	9	4	31	57	100

It is generally assumed that the share of foreign securities in the value of inheritances increased strongly since the middle of the nineteenth century, from 15 percent in about 1855 to 20 percent around 1880. However, this rise has been challenged by B. de Vries.<sup>90</sup> She points out that the ownership of foreign shares did not grow nearly as strong among Amsterdam capital owners. She questions the low percentage in the succession statistics of about 1855, because this concerns the share of foreign securities in *collateral* estates, whereas the figure for 1880 relates to all inheritances. Moreover, foreign shares were taxed especially heavy in collateral inheritances prior to 1859. She argues that this undermines the reliability of the succession statistics for these years. However, table 2.5 indicates that the strongest increase in the share of foreign securities in the collateral estates did not occur -as one would expect- between about 1855 and 1865, but between the mid-sixties and mid-seventies. In 1913 *The Economist* also made mention of a doubling between 1865 and 1875 as against a rise of merely 30 percent between 1855 and 1865. It must furthermore be pointed out that De Vries' example of Amsterdam is not typical of the Netherlands as a whole. The relative increase of foreign securities during the third quarter of the nineteenth century appears to have been higher outside Holland and Utrecht than in the *Randstad* (i.e. the urban core) itself.<sup>91</sup>

## 2.6 The regional spread of the national wealth

Tax revenues and the succession statistics can also be used to estimate the regional distribution of the national wealth. One restriction of this material is,

however, that it only allows for a crude division into regions because for a very long period the revenues were recorded by tax district, the borders of which did not coincide with those of the various provinces.<sup>92</sup> The country was divided into four large regions, namely (i) the northern Netherlands (Groningen, Friesland, Drenthe), (ii) the eastern Netherlands (Overijssel and Gelderland), (iii) the western Netherlands (Utrecht, Noord-Holland, Zuid-Holland), and (iv) the southern Netherlands (Zeeland, Noord-Brabant, Limburg).

It is commonly known that during the Dutch Republic the wealth was concentrated almost entirely in the western parts of the country and more specifically in the large cities of Holland and Utrecht. As a consequence, since 1792 these two richest provinces had to produce more than two thirds of the federal tax revenues.<sup>93</sup> At the time of the Kingdom of Holland the distribution of wealth among the various regions seems to have been even more unbalanced than these tax yields lead one to suspect. In 1807/08 as much as 72 percent of the value of inherited wealth that was subject to the succession duty was concentrated in the three western provinces of Amstelland (Noord-Holland), Maasland (Zuid-Holland) and Utrecht. Naturally, within these provinces the big cities prevailed, with Amsterdam at the top. By itself this city accounted for a quarter of all inherited wealth! Furthermore, more large fortunes were found in the western provinces than anywhere else. Of the 50 fortunes over 100,000 guilders in 1807/08 80 percent was located in the big cities of Holland and the city of Utrecht.<sup>94</sup>

The overpowering position of the western provinces diminished slowly during the first half of the nineteenth century. Around the middle of the century the west was still responsible for three fifths of the value of collateral inheritances (table 2.5). The decline in the share of Holland was mainly caused by the increasing relative importance of the southern and eastern provinces of the country. The rising share of the south can partly be ascribed to the absence of Zeeuws-Vlaanderen and Limburg from the statistics in 1807/08 and of data on Limburg until 1843/44. The share of the northern provinces fluctuated between 10 and 15 percent.

Hardly anything changed in the course of the second half of the nineteenth century. The relative decline of Holland was mainly compensated for by the growing importance of the eastern parts of the country. The share of the north stayed between 10 and 15 percent. The east contributed only about 13 percent around the middle of the century, but by the beginning of the twentieth century its share had risen to 18 percent.

Table 2.5. *The regional spread of wealth in collateral inheritances c. 1810-c. 1905 (%)*

	1807/08	1818/22	1841/43	1854/57	1874/77	1903/07
North	14	9	10	11	14	10
East	8	11	15	13	16	18
West	72	68	64	61	58	58
South	6	9	11	15	12	14

Sources: 1807/08 see note 7; 1818/22 and 1841/43 *Handelingen van de Staten-Generaal*; 1854/57 *Statistiek van het Koninkrijk der Nederlanden. Bescheiden betreffende de geldmiddelen*, eerste stuk (Den Haag, 1861); 1874/77 *idem*, vierde stuk (1879); 1903/07 *Bijdragen tot de Statistiek van Nederland* (Den Haag, 1905 and following years).

In addition, the estimates of Bos indicate that there were also shifts in the composition of the wealth within the various regions. Outside Holland and Utrecht the dominant role of real estate was diminished, while domestic and foreign securities gained in importance. Around 1900 share-holding also increased relatively rapidly outside Holland and Utrecht.<sup>95</sup>

### 2.7 *Income from real estate*

Van Zanden has estimated the income from all real estate -i.e. inclusive of property in mortmain- for the years around 1880 and 1910. The following is based on his calculations.<sup>96</sup> In these two benchmark years this income amounted to 185 and 305 million guilders respectively. In estimating the income from real estate during the intervening years a distinction must be made between developments in land rents on the one hand, and those in the rental value of houses on the other hand.

Total income from land rents increased from 103 million guilders around 1880 to 130 million around 1910. The development of this income in the intervening period can be reconstructed on basis of statistic reports for the years between 1881 and 1905.<sup>97</sup> These statistics can be used to calculate average rents per hectare in five-yearly periods. Next, the increase in the area of agricultural land must be taken into consideration. The acreage increased from 2,015 million hectares around 1880 to 2,078 million around 1910. It is assumed that the amount of land increased gradually between 1880 and 1910. The rental value of buildings was more than 82 million guilders in 1880 and 175 million in 1910. This rental value is supposed to have increased evenly

between these benchmark years. This results in the following increase in income from real estate.

Table 2.6. *Income from real estate in c. 1880-c. 1910 (millions of guilders)*

	rental value of land	rental value of houses	total income
c. 1880	102	82	184
1881-1885	103	96	199
1886-1890	91	102	193
1891-1895	92	107	199
1896-1900	92	115	207
1901-1905	101	129	230
1906-1910	111	152	263
c. 1910	130	175	305

Sources: Calculated on basis of Van Zanden, 'De ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914', in: *A.A.G. Bijdragen* 25 (1985) pp. 118-123, 379, 380.<sup>98</sup>

## 2.8 *Income from securities*

In the decades around 1900 income from securities was of a complicated nature. It consisted mostly of interest on loans to the various levels of government, of shares and bonds of companies operating on the Dutch market, of income from investments in the Dutch Indies, and of income from abroad. For some of these securities the income can be calculated without further ado. The amount of interest paid on the public debt is known, including share-holding in mortmain.<sup>99</sup> Van der Voort has calculated the interest paid to lower authorities.<sup>100</sup> Yet, little can be said with certainty on the remaining shares and bonds. This is especially true for the period prior to 1900. For example, the market values of shares on the Amsterdam exchange -published by Tinbergen and Dalmulder- are not available until 1895<sup>101</sup>, and for foreign securities the succession statistics do not distinguish between government loans and industrial and other stocks until 1905. Similarly, in domestic stocks no distinction is made between the shares of Dutch and East Indian companies, for which the rates of return could diverge widely at the beginning of the twentieth century. Hence, a less sophisticated approach was used.

Apart from the interest on government loans, Derksen's estimates indicate that securities yielded an average of 240 million guilders in the period

1903-1912.<sup>102</sup> The method of Fabricant and Maarschalk can then be used to calculate the value of all securities on basis of the succession statistics. This results in an average of 4,383 million guilders during the period after 1900. Starting from a total income of 240 million the average return to these securities amounted to 5.5 percent.

No concrete statements can be made on the development of average rates of return before 1900, because the statistics of the succession duty do not distinguish between government loans and other stocks. The only (crude) data relate to the value of investments in the United States.<sup>103</sup> These investments totalled 600 to 740 million guilders between 1875 and 1900, which boils down to about 30 percent of the capital invested abroad.

How can we arrive at a choice for the general level of returns to securities before 1900? It could be argued that these yields followed the general trend of the leading low interest rates, namely the British consols.<sup>104</sup> In the 1880s these interest rates were above the level of the period after 1900; in the nineties they were somewhat below this level. This information has been used in the concluding table 2.9. Evidently, the choice for a different set of interest rates will result in a different income from capital. Half a percent more or less leads to an increase or reduction in capital income of several tens of millions, which equals about 5 percent of this income.

Capital income from the East Indies increased tenfold, from approximately 7.5 million guilders around 1880 to about 78 million in 1910. Its share rose from 1.5 percent to 12 percent of total income from capital. As much as 53 percent of income from shares and bonds of Dutch companies originated in the Dutch East Indies.<sup>105</sup>

### *2.9 Income from other moveable property*

This component of capital income is still shrouded in mystery. The rate of interest on private loans -responsible for a sixth of the national wealth- cannot be determined. The most obvious solution is to assume that the yield of all other moveable property was at least equal to that on the public debt. The value of these possessions can be assessed on basis of the succession statistics. This value must be reduced by the amount of liabilities (debts) in the inheritances; these debts amounted to between 10 and 15 percent of total private wealth. The income from this wealth is valued at the current rate of return on the public debt of 3 to 4 percent.<sup>106</sup>

## 2.10 Capital income between c. 1880 and c. 1910

Table 2.7 provides a summary view of income from capital in the period c. 1880-c. 1910. Income from property in mortmain has been discounted in the categories of real estate and government loans.

Table 2.7. *Income from capital in the Netherlands, c. 1880-c. 1910 (millions of guilders)*

	1	2	3a	3b	4	5	6	total income	annual increase
c. 1865								253	
1879-1882	184	5.65	17	7	115	31	66	420	11
1883-1887	199	5.55	12	13	115	35	65	439	4
1888-1892	193	5.10	17	16	122	36	61	445	1
1893-1897	199	4.45	12	20	108	38	43	420	-5
1898-1902	207	4.65	22	24	112	40	50	455	7
1903-1907	230	5.50	57	44	109	43	59	542	17
1908-1912	263	5.50	69	78	120	46	72	648	21

1: Income from real estate.

2: Estimated rate of return on securities, excluding Dutch government loans.

3a: Shares and bonds of Dutch enterprises: the Netherlands.

3b: Shares and bonds of Dutch enterprises: Dutch East Indies.

4: Income from foreign securities.

5: Income from Dutch government loans.

6: Income from other moveable property.

Sources: Own estimates. Derksen, 'Berekeningen', 10. Korthals Altes 202-203.

In the period 1880-1910 income from capital increased from about 420 million to 648 million guilders. When the above estimates are compared with the figures presented by Van Zanden in 1985, it appears that there is a fair amount of correspondence with respect to the years around 1880 and a large difference in capital income around 1910. Van Zanden estimates income from capital in 1880 at 473 million guilders, but he arrives at 953 million in 1910. Therefore, his figure for the years around 1910 must be adjusted downwards by about a third. This gap was mainly brought about by the high rates of return on real estates, which he used as a general measure.

### 2.11 Summary and conclusion

Looking back over the entire nineteenth century the national wealth increased from about 2,500 million guilders in 1807 to approximately 12,500 million in 1910, and income from capital rose from 142 million in 1807 to 648 million guilders around 1910. Property in mortmain contributed a mere 5 percent to the national wealth.

At the time of the Restoration the value of the national wealth was about a third higher than that of populous and industrializing Belgium. However, in the Netherlands this period was one of severe stagnation. After the Belgian Secession income from capital appears to have dropped below the level of the beginning of the century. Only then did growth set in, even though the rate of growth was initially very slow. Yet, this process gradually accelerated. Especially between c. 1865 and 1880 capital income expanded rapidly by about 11

Table 2.8. *The structure of private property and the assumed rate of return on the various components of wealth, 1807-c. 1910 (%)*

	1807	1831/32	1843/44	c.1855	c.1865	c.1880	c.1895	c.1910
<i>Structure of wealth</i>								
1	35	39	38	38	42	39	31	32
2	19	13	22	19	14	6	6	5
3a	•	•	•	•	2	5	8	14
3b	19	21	12	15	14	22	28	21
4	27	28	28	28	28	28	27	28
total	100	100	100	100	100	100	100	100
<i>Rates of return</i>								
1	6	6	6	6	6	6	8	7
2	7	6	5	4	4	3.8	3.0	3.5
3a	•	•	•	•	} 4	5.65	4.45	5.5
3b	5	6	4	4				
4	5	5	5	4	4	3.8	3.0	3.5

1: Real estate; gross returns excluding the land tax.

2: Domestic securities; government loans.

3a: Shares and bonds of Dutch enterprises from 1865 onwards.

3b: Foreign securities.

4: Other moveable property.

million guilders per year. Due to the unfavourable economic development of the fourth quarter of the nineteenth century this growth process slowed down considerably, and at the beginning of the nineties capital income actually declined. This was followed by a very rapid growth from 1895 on, which accelerated on the eve of the First World War.

The stagnation of the first half of the nineteenth century is also made apparent in the composition of private wealth. During this period the ratio between the share of government bonds and that of foreign securities merely fluctuated. Real estate was at a low relative level in the Kingdom of Holland, because at this time the public debt had expanded enormously. During the Restoration the share of interest payments on the public debt fell. However, in the 1830s -when the state exerted a large demand on the capital market in relation to its policy of perseverance against Belgium- the rate of return on domestic securities surpassed that of foreign investments, which consequently underwent a marked decline.

It was not until the middle of the nineteenth century that the structure of the national wealth became more dynamic. Initially, the share in real estate experienced a strong increase. This can be explained from the comparatively low rate of return on investments in securities. After this development foreign investments expanded enormously, which was followed by an increase in investments in (notably Indian) shares in Dutch companies. This shift towards stock-holding was accompanied by a clear lack of interest in real estate and government loans. The high rate of interest for real estate around 1895 is therefore misleading. It confirms that during the agrarian depression the value of land dropped at a higher rate than the income from rents.<sup>107</sup> This reduced attraction can also be perceived in the inland provinces. The increase in share-holding in the decades around 1900 can once again be ascribed to the relatively high yield of securities in these years as compared to government loans.

In conclusion it can be stated that this study confirms that structural changes in the composition of the national wealth did not occur until the late nineteenth century. The income from capital already began to increase at an earlier stage, but this growth was mainly due to favourable developments in the market for real estate and, subsequently, to the rise of foreign investment. It was not until after 1895 that capital income was sustained to a significant degree by Dutch enterprise.

## NOTES

1. I would like to thank Wantje Fritschy and Jan-Pieter Smits for their helpful comments. Translation: Edwin Horlings.
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3. C.A. Verrijn Stuart, 'Ons maatschappelijk vermogen voor 30 jaren en thans', in: *Bijdragen van het Statistisch Instituut* 4 (1888) p. 282.
4. J.L. van Zanden, 'De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914', in: *A.A.G. Bijdragen* 25 (1985) pp. 379-380.
5. J.L. van Zanden, 'Dutch economic history of the period 1500-1940: A review of the present state of affairs', in: *Economic and social history in the Netherlands 1* (1989) 17-21.
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10. *Handelingen der Staten-Generaal 1840-41*, Bijlagen 832-839.
11. J.M.F. Fritschy, *De Patriotten en de financiën van de Bataafse Republiek. Hollands krediet en de smalle marges voor een nieuw beleid (1795-1801)* (Amsterdam, 1988) 181.
12. I would like to thank Joost Jonker who has calculated this yield for the first half of the nineteenth century by means of data taken from the *Prijscourant*.
13. P.H. Engels, *De belastingen en de geldmiddelen van den aanvang der Republiek tot op heden* (Utrecht, 1862) 190.
14. J.M. Gogel, ed., *Memoriën en correspondentiën betrekkelijk den staat van 's Rijks geldmiddelen in den jare 1820 door I.J.A. Gogel* (Amsterdam, 1844) 514.
15. Ph. Kint, 'Het grondinkomen in Nederland in de negentiende eeuw', in: *NEHA-Jaarboek voor economische, bedrijfs- en techniekgeschiedenis* 57 (1994) 254 and 264.
16. For the following paragraphs see J.J. Weeveringh, *Handleiding tot de geschiedenis der staatschulden*, vol. 1: 'De Nederlandse staatschuld' (Haarlem, 1852) 38, 46, left column, 50-53.

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18. H.T. Colenbrander, *Gedenkstukken der Algemeene Geschiedenis van Nederland van 1795 tot 1840*, vol. VI: 1810-1813, 28 Oct. 1811, 216-219.
19. Riley, *International government finance*, 334 n42.
20. Riley, *International government finance*, 294.
21. Riley, *International government finance*, 242.
22. M. d'Alphonse, 'Eenige hoofdstukken uit het "Aperçu sur la Hollande"', in: *Bijdragen tot de statistiek van Nederland, nieuwe volgrees no. 1* (Den Haag, 1900) 426.
23. A.C. Carter, 'Dutch foreign investment 1738-1800, in the light of the Amsterdam "Collateral succession" inventories', in: *Tijdschrift voor Geschiedenis* LXVI, 32-34.
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26. J.H. van Stuijvenberg, 'De economie in de Noordelijke Nederlanden 1770-1970', in: *Algemene Geschiedenis der Nederlanden*, vol. 10 (Haarlem 1981) 107.
27. Fritschy, *De Patriotten*, 192.
28. 'Onder de wonden door vreemde overheersing geslagen, en door de druk der tijden toegebracht, is die der tiërcering van de nationale schuld een der diepste. Zij is te diep om ganschelijk geheeld te kunnen worden...' (*Handelingen van de Staten-Generaal* 1814, 8-9).
29. J.H.M. Sprée, M.P. Smissaert, S. Bartstra, and Ph.A. Holsboer, *De wet op het recht van successie en van overgang, uit de officiële stukken toegelicht, met de vroegere wetgeving vergeleken en met aantekeningen voorzien* (Den Haag, 1859) VII-VIII.
30. *Memoriën en correspondentiën betrekkelijk den staat van 's Rijks geldmiddelen in den jare 1820*, Bijlage A and EE.
31. For 1815: *Handelingen van de Staten-Generaal* 1818/1819, Aanhangsel, 60. For 1816: idem, Bijlagen, 106.
32. W.H. Berghuis, *Ontstaan en ontwikkeling van de Nederlandse beleggingsfondsen tot 1914* (Assen 1967) 73.
33. This can only be done for 1820-1823. Prior to 1820 the *Handelingen* do not give a provincial division of the tax yield. And from 1824 on the duty on foreign securities was raised by 50 percent, which may introduce a bias in favour of the Northern Netherlands.
34. *Handelingen van de Staten-Generaal* 1831/32, 198 (wednesday January 4, 1832).
35. 'Wanneer men niet den aanslag van het kadaster ad 69 millioen, maar slechts een meer naauwkeurig 55 millioen zuiver inkomen tot grondslag neemt, ad 6 percent tot kapitaal geslagen... 9000,000,000 ...'.
36. Van Zanden, 215; Kint, 257-258.
37. Engels, *De belastingen*, 312.
38. Klein, 175.
39. Berghuis, 73 and 77.

40. Klein, 179.
41. H.T. Colenbrander, *Gedenkstukken der algemeene geschiedenis van Nederland van 1795-1840*, vol. IX (Den Haag, 1917) 474.
42. Cited in S. Fabricant and G.D. Maarschalk, 'International capital movements: II Across Netherlands borders', *Capital requirements study, work memorandum no. 38*, National Bureau of Economic Research, March 1952, Table 4, 6-7.
43. K.B. van Popta, 'Staatsschuld en consolidatiebeleid in Nederland in de periode 1814-1994', in: *NEHA-Jaarboek voor economische, bedrijfs- en techniekgeschiedenis* 57 (1994) 165-169.
44. W. Fritschy, 'Staatsvorming en financieel beleid onder Willem I', in: C.A. Tamse and E. Witte, eds., *Staats- en natievorming in Willem I's koninkrijk (1814-1830)* (Baarn, 1992) 221.
45. 'vreemdelingen... onlangs eigenaars (zijn) geworden van een aanzienlijk gedeelte dier 39 million 6pcts effecten' (*Handelingen van de Staten-Generaal* 1831/32, 197).
46. 'Europa thans meer dan ooit te voren met onze fondsen bekend en bij dezelve geïnteresseerd' (*Handelingen van de Staten-Generaal* 1832/33, 45).
47. Weeveringh, 528: 'Tegenwoordig bestaan er verscheidene zoodanige administratiekantoren in de verschillende steden van ons vaderland waarvan sommigen de coupons en certificaten door hen uitgegeven ook buitenslands, met name te Brussel en Parijs, hebben betaalbaar gesteld'.
48. *Handelingen van de Staten-Generaal* 1843/44, 375.
49. M.G. Buist, 'Geld, bankwezen en handel in de Noordelijke Nederlanden 1795-1844', in: *Algemene geschiedenis der Nederlanden* vol. 10 (Bussum, 1981) 306.
50. H. Riemens, *Het Amortisatie-Syndicaat. Een studie over de staatsfinanciën onder Willem I* (Amsterdam, 1935) 21. See also I.J. Brugmans, 'De financiële crisis van 1844', in: *Welvaart en Historie. Tien studiën door I.J. Brugmans* (Den Haag, 1970).
51. *Handelingen van de Staten-Generaal* 1843/44, Bijlagen 1293-1294.
52. *Handelingen van de Staten-Generaal* 1843/44, 349.
53. *Handelingen van de Staten-Generaal* 1843/44, Bijlagen 298.
54. Kint, 256-258.
55. Riemens, 21. Brugmans, 73.
56. *Handelingen van de Staten-Generaal* 1841/42, Bijlagen 478-479; 1842/43 Bijlagen 1540-1541; 1843/44 Bijlagen 551-552.
57. J.B.D. Derksen, 'Berekening van het nationaal vermogen uit de aangiften voor de successiebelasting', in: *De Nederlandsche Conjunctuur X* (1934) 74.
58. J.A. de Jonge, *De industrialisatie in Nederland tussen 1850 en 1914* (Amsterdam, 1968) 504.
59. See Van Zanden, 379-380.
60. Van Stuijvenberg, 107. Berghuis, 77.
61. Kint, 265.
62. Teijl, table 10.
63. Berghuis, 101.
64. Berghuis, 101 and 103.

65. S. Homer, *A history of interest rates* (New Brunswick, New Jersey 1963) 195, 222 and 259.
66. W.M.F. Mansvelt, *Geschiedenis van de Nederlandse Handelmaatschappij 1824-1924*, 2 vols. (Haarlem, 1924) vol II, 219.
67. 'in den tegenwoordigen tijd te hoog was, dat de algemeene maatstaf hoogstens slechts op 4 gesteld kan worden en dat de wet in overeenstemming met de werkelijkheid behoort te zijn' (Sprée, 78).
68. The first budgets of the *Zuiderzeewerken* [public works of the Zuiderzee] indicate that this estimate is by no means too high. These budgets assumed an interest rate of 3 percent in 1866 and 4 percent in 1870. See J.Th. Thisse, *Een halve eeuw Zuiderzeewerken* (Groningen, 1872) 437.
69. H.F.J.M. van den Eerenbeemt, 'Bedrijfskapitaal en ondernemerschap in Nederland 1800-1850', in: P.A.M. Geurts and F.A.M. Messing, eds., *Economische ontwikkeling en sociale emancipatie*, vol. II (Den Haag, 1977) 16-18; S.W. Versteegen, 'Grootgrondbezit, revolutie en belastingdruk. De boekhouding van een Gelders edelman in de Bataafse tijd (1795-1806)', in: *Jaarboek voor de geschiedenis van bedrijfs en techniek* 10 (1993) 276-282.
70. W.H. Berghuis, *Ontstaan en ontwikkeling van de Nederlandse beleggingsfondsen tot 1914* (Assen 1967) chapter V ff.
71. F. de Roos and W.J. Wieringa, *Een halve eeuw rente in Nederland* (Schiedam, 1953) 8.
72. J.L. van Zanden, 'De ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914', in: *A.A.G. Bijdragen* 25 (1985) 379-380.
73. N.J.P.M. Bos, 'Vermogensbezitters en bevoorrechte belastingbetalers in de negentiende eeuw', in: *Bijdragen en mededelingen betreffende de geschiedenis der Nederlanden* 105 (1990) 566-567.
74. B.W. de Vries, 'Amsterdamse vermogens en vermogenbezitters, 1855-1875', in: *A.A.G. Bijdragen* 28 (1986) 201-202.
75. *Nederlands Economisch Historisch Archief*, Collection Teijl. Nationaal inkomen, Nederland binnenland, diverse tabellen.
76. A survey of these statistics can be found in Bos, 'Vermogensbezitters'.
77. Bos, 566.
78. *De Economist*, 1880-1, 496.
79. *Handelingen van de Staten-Generaal* 1840-41, B. 832-839.
80. *Handelingen der Staten-Generaal*, Staatsbegrotingen en Verslagen omtrent het kroondomein.
81. See Teijl, table 10-I 'De Nederlandse staatsschuld gedurende de periode 1848-1928, nominale bedragen en middenkoersen' and table 10-II 'De Nederlandse staatsschuld 1848-1928, beurswaarde'.
82. J.B.D. Derksen, 'Berekeningen van het nationale inkomen van Nederland voor de periode 1900-1920', in: *De Nederlandsche Conjunctuur*, speciale onderzoeken no. 4, June 1941, 12.
83. C.A. Verrijn Stuart, 'Ons maatschappelijk vermogen voor 30 jaren en thans', *Bijdragen van het statistisch instituut* 4 (1888).
84. See note 78.

85. Van Zanden, 'Economische ontwikkeling', 378-383.
86. S. Fabricant and G.D. Maarschalk, 'International capital movements: II Across Netherlands borders', *Capital requirements study, work memorandum no. 38*, National Bureau of Economic Research, March 1952. Copy present in the collection of Teijl.
87. Verrijn Stuart, 282; J.B.D. Derksen, 'Berekening van het nationaal vermogen uit de aangiften voor de successiebelasting', in: *De Nederlandsche Conjunctuur* (1939) 74.
88. Verrijn Stuart, 269-270.
89. Van Zanden, 'Economische ontwikkeling', 379.
90. De Vries, 'Amsterdamse vermogens', 210-211.
91. Bos, 566-567.
92. See Bos, 'Vermogensbezitters', 558-559.
93. Fritschy, 128.
94. See note 33.
95. Bos, 566-572.
96. J.L. van Zanden, 'De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914', in: *A.A.G. Bijdragen 25* (1985) 118-123, 379-380.
97. *Verslagen en mededeelingen van de directie van landbouw* 1906.
98. It is something of a problem that the five-yearly averages presented in this table do not match those calculated by Teijl. Therefore, the situation between 1881 and 1885 is assumed equal to that in 1883-1887, the situation in 1886-1890 to that of 1888-1892, and so on.
99. These have been calculated by J. Teijl by means of the *Staatsbegrotingen* [State budgets] and other published data. See Teijl's table 10.
100. R. van der Voort, notes.
101. J. Tinbergen and J.J. Dalmulder, 'De factoren welke het verloop van aandelen bepalen', in: *De Nederlandsche Conjunctuur* 10 (1939).
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103. K.D. Bosch, *De Nederlandse beleggingen in de Verenigde Staten* (Amsterdam, Brussels 1948) 463-478.
104. F. de Roos and W.J. Wieringa, *Een halve eeuw rente in Nederland* (Leiden, 1953) 252.
105. W.L. Korthals Altes, *De betalingsbalans van Nederlandsch-Indië 1822-1939* (Rotterdam, 1986) table 2, 202-203: 'Estimates of dividends per category of enterprises, 1870-1926'.
106. De Roos and Wieringa, 252.
107. H. Blink, *Geschiedenis van den boerenstand en den landbouw in Nederland*, vol. II (Groningen 1904) 317.

# VI

## DUTCH INDUSTRIAL WAGE DEVELOPMENT IN AN INTERNATIONAL PERSPECTIVE, 1850-1913

by

*Ary Burger and Annelies Vermaas*

### *1. Introduction*

The level of Dutch wages has been at the centre of the industrialization debate in the Netherlands. Dutch wages were according to many authors such as Mokyr, Griffiths and Bos too high to sustain an early industrialization.<sup>1</sup> Whereas Mokyr was mainly concerned with the presumably high wage, Griffiths and Bos also pointed at other factors such as raw materials and transportation costs. However, most of their findings are based on a comparison of Dutch-Belgian wage figures for the year 1819. Systematic and long-run comparisons of Dutch and foreign wages for the second half of the nineteenth century have never been attempted before.

This article is concerned with the relative level and development of Dutch wages in the period 1850-1913. Were wages in the industrial sector in the Netherlands really on a higher level than wages in the neighbouring countries? To answer this question we will compare average wages in the Dutch industry with average industrial wages in Belgium, France, Germany and the United Kingdom. To explore the compositional effects of the occupational force on our figures we will take into account the divergent employment structure of the industrial sector in the different countries. Besides a comparison of wage levels we will also try to distinguish the particular development of Dutch industrial wages in comparison with other European countries. Did Dutch wages follow some kind of European growth pattern or was there a distinct development?

In addition, we try to explore the nature of the Dutch wage developments in the second half of the nineteenth century. What were the reasons for the in-

crease in nominal wage levels? Did the changes in wage levels simply reflect the rise or decline in the cost-of-living index or was the relation between wage growth and trends in unemployment or productivity performance of more importance? This paper thus ultimately deals with three related questions. Firstly, how high or low were Dutch wage levels in the nineteenth century in comparison to other European countries? Secondly, in what sense did Dutch wages develop differently from wage trends in other European countries? Thirdly, how can we account for the changes in the Dutch wage rates?

The structure of this article is as follows. After this introduction we will describe in section 2 the relative levels and growth trend of Dutch industrial wages in the second half of the nineteenth century, with special attention to the compositional effect of the labour force. Next, in section 3 we will explore the causes for the trends in Dutch wages trends. Especially the relation between changes in wage levels and changes in productivity performance, the cost-of-living and unemployment levels will be studied. Finally, some concluding remarks will be made.

## *2. Levels and development of nominal wages in the industrial sector*

In this section the level and development of Dutch wages in the industrial sector will be compared with wages in the neighbouring countries: Belgium, France, Germany and the United Kingdom. In our definition the industrial sector consists of the manufacturing industries, mining and public utilities. In 1850 approximately 25 % of the total occupational force in France and Germany was working in the industrial sector. In the Netherlands and Belgium this was around 33 % and in the United Kingdom more than 40 %. In 1910 the share of industry in the working population was about the same in France, Germany and the Netherlands (35 %), whereas in Belgium and the United Kingdom the industrial sector was much more important with approximately 45 % of the working force.<sup>2</sup>

For every country series of the average actual earnings in the industrial sector were collected. The amount of hours, days and weeks worked per year can be different per country, which causes discrepancies in the relative wage levels. Therefore, a comparison of hourly wages seems to be more appropriate. However, we need yearly wages to be able to make comparisons with productivity figures which are only available on a yearly basis. All wage figures used consist of the total remuneration of the average industrial worker in the national currency per year. These data are converted into guilders on the basis of the international exchange rate, which showed almost no fluctuations during the period 1850-1913.<sup>3</sup>

The wage data used consist of average yearly earnings on a national level in the total industrial sector, including mining, construction and the manufacturing industries. For all countries the most recently available and most complete series of industrial wages are used. Ideally all branches, skills, occupations, regions, bonuses, overtime fees, and also children's and female's wages should be included in the wage figures. Many times, however, small firms and traditional sectors are underrepresented in the series. Moreover, an average wage rise can be the result of both rising wage rates and structural changes in the composition of the working force. High-wage regions or high-wage occupations will become of increasing importance during a period of industrial growth. Therefore moving employment weights are necessary to capture these structural changes in the composition of the occupational force in the wage figures.

Firstly, we will discuss the origin of the wage data per country. For the Netherlands the first long-run wage index on a national level was presented by Van der Veen and Van Zanden. They combined the data on wages collected by Van Zanden in three industrial firms in the high-wage city of Amsterdam with Fischer's data of several low-wage textile firms in Twente to construct an unweighted national wage index for the Netherlands from 1870 to 1910.<sup>4</sup> Recently, Vermaas has constructed a new industrial wage series for the second half of the nineteenth century on the basis of regional wage data on labourers in the public utilities sector<sup>5</sup> and occupational wage data from the payment rolls of more than forty companies.<sup>6</sup> The regional and occupational wage data were weighted into a national average on the basis of the yearly shifting share of all regions and branches in the total industrial working population. The wage index consists of actual earnings of all workers, including women and children, with the assumption of a fixed working year of 275 days for the whole period and for all branches. This index was linked to the annual wage figures from the public accident insurance data, which were published from 1903 onwards.<sup>7</sup>

The first long-run series of Belgian industrial wage data for the 19th century was constructed by Peeters.<sup>8</sup> His series consisted of an unweighed average of hourly or daily wage data for several occupations, directly derived from companies' archives. On the basis of extensive research into wage data Scholliers has recently constructed a new wage index.<sup>9</sup> This index is based on the average of yearly wages payed in 13 different industries with corrections for female and children's labour and variable employment weights. It consists of actual yearly wages for men and women, including changes in working hours, bonuses and payments for overtime. For the development of industrial wages in the years 1850-1913 we used the new Scholliers index and linked it to Blomme's estimate of the level of average industrial wages in 1913, which was extrapolated from the census wage figures per branch Scholliers had presented in an earlier article.<sup>10</sup>

All series on French wage development in the 19th century are actually still based on the research of Simiand.<sup>11</sup> Singer-Kérel used the Simiand data on Paris and wage data for 23 occupations in the rest of France to calculate an average national industrial wage.<sup>12</sup> For the years 1860-1913 Phelps Brown calculated the daily wages of male adult labourers, based on Simiand, into yearly wages of the total industrial working population with the use of a fixed amount of 49 working weeks per year and fixed employment weights.<sup>13</sup> The effects of structural changes in the composition of the working population are therefore not captured in this index, which results in an understatement of wage growth.<sup>14</sup> Lévy-Leboyer and Bourguignon extended this series to the period before 1860, again mainly based on Simiand's data.<sup>15</sup> We linked the Phelps Brown index for the period 1860-1913 to the average industrial wage level as calculated by Dormois for 1906<sup>16</sup> and used the Lévy-Leboyer and Bourguignon figures for the years 1850-1860.

For Germany 19th-century wage indexes are abundantly available. The first unweighted long-run series was made by Kuczinsky and was mainly based on trade union data, reports of the chambers of commerce and companies' payment rolls.<sup>17</sup> However, the composition of his series was very unclear. On the basis of data from the public accident insurance lists and industrial censuses Hoffmann corrected and weighted the wage index for the years after 1888-1913.<sup>18</sup> Further improvements were made by Desai, who calculated average wages for a representative series of branches for the period 1871-1913, mainly based on Kuczinsky and the data of the public accident insurance.<sup>19</sup> We use the wage index of Gömmel, which is the most recent and comprehensive one and consists of weighted average wages in the total industrial sector for the period 1850-1913.<sup>20</sup> For the years 1850-1870 Gömmel's index is based on Hoffmann's figures for industry and handicraft, whereas after 1870 Desai's series is used by Gömmel.<sup>21</sup>

In the United Kingdom the first long-run series on 19th-century industrial wage development were constructed by Bowley and Wood and consisted of average earnings per occupation or industry, with a fixed working year of 49 weeks for the period 1790-1860.<sup>22</sup> Wood extended this index for the period 1850-1902 with wage data from building, mining and nine manufacturing occupations.<sup>23</sup> The level and development of the industrial wages in these two series is used by Phelps Brown for the period 1860-1913.<sup>24</sup> In recent years Lindert, Williamson and Feinstein made some improvements and extended the coverage of the wage series to all manual workers, including non-industrial labourers.<sup>25</sup> As we are solely interested in average wages in industry for our comparison, we used the level and development of industrial wages as calculated by Phelps Brown, completed with Crafts' and Mills' figures for the period 1850-1860.<sup>26</sup>

An interesting point to study is the effect of the different structure of the industrial working population on the average wage level. What would have happened with average wages if the Netherlands would have had the same industrial structure as for example Belgium, with a larger share of high-wage branches such as mining and engineering? Table 1 shows the effect of a different composition of the labour force on the Dutch industrial wage level in 1913. The table shows the presumed Dutch wage level per branch with the occupational structure of the other countries around 1910 in index figures, with the 'real' Dutch wage level at 100.

Table 1. *The compositional effect of the industrial labour force on the average wage level (index, The Netherlands=100)*

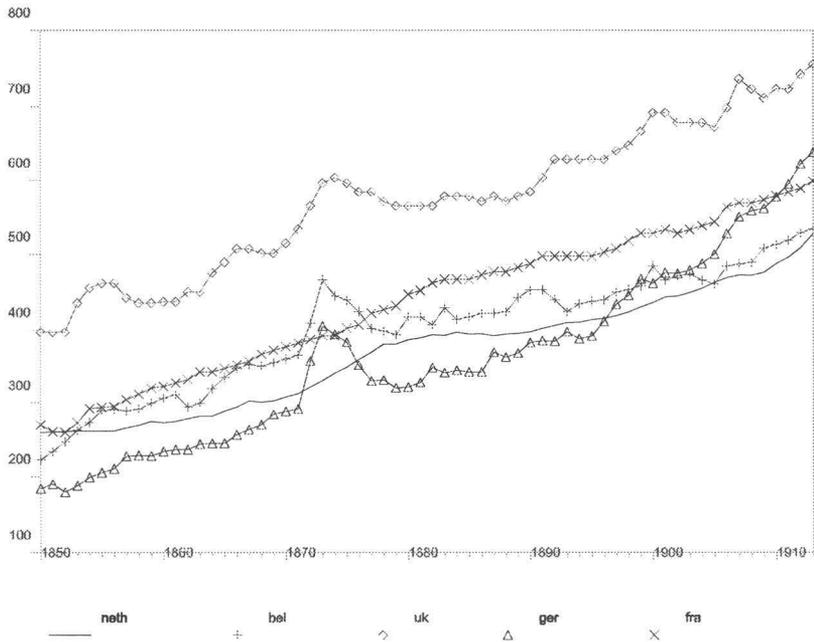
	Belgium	France	Germany	United Kingdom
Dutch wage with structure of	107.2	91.3	101.8	100.2

Sources: Vermaas, 'Real industrial wages', Oomens et al., 'De beroepsbevolking', Scholliers, 'Industrial wage differentials', Dormois, 'Anglo-French labour productivity' Hoffmann et al., *Das Wachstum*, Phelps Brown, *A century of pay*.

The effect of the composition of the industrial labour force on the average wage level is obviously very small, especially in the case of Germany and the United Kingdom. In the Belgian industrial structure the high-wage branches of mining and engineering are of much more importance, whereas the low-wage food processing industry is smaller. On average the Dutch industrial wage would have been 7 % higher with the Belgian occupational force. As a result of the larger woodworking, textile and clothing branches in France average industrial wages would have been about 9 % lower with the French structure. In the case of Germany and the United Kingdom the positive compositional influence of high-wage branches such as mining and engineering on the average wage level is compensated by a larger share of several low-wage branches than they had in the Netherlands.

Graph 1 shows the development of nominal wage levels in guilders using the international exchange rate. During the second half of the nineteenth century yearly wages were clearly on the highest level in the United Kingdom. The difference between the average wage level of the continental countries was not so large. Germany had the lowest industrial wages around 1850, followed by Belgium. France and the Netherlands started on approximately the same

Graph 1. *Yearly nominal industrial wages in guilders in five European countries, 1850-1913*



Sources: see text

level. Due to the high growth rates of German wages as a result of the industrial spurt this situation changed dramatically between 1850 and 1913. In contrast to 1850 German wages were the highest of the four continental countries in 1913, whereas Dutch industrial wages had clearly stayed behind. The huge wage gap which existed between the United Kingdom and the continental countries remained considerably and was only in the German case really levelled out. Dutch wages remained on the same level relative to the United Kingdom in the second half of the nineteenth century, whereas France and Belgium diminished their wage gap somewhat. A remarkable feature in graph 1 is the steep wage peak in Germany and Belgium in the 1870s, which was a result of the French-German war. In the French figures this peak is mysteriously missing; the reliability of the French wage data for these years can therefore be questioned.<sup>27</sup>

In table 2 the annual growth rates of industrial wages are presented for the second half of the nineteenth century, divided into several subperiods. During the whole period 1850-1913 the highest growth figures can be found in Ger-

many, where an average annual growth rate of 2.0 % can be discerned. Wages in the German industry more than tripled in the investigated period. Belgium and France roughly show the same overall growth pattern, with annual growth figures of 1.3 and 1.4 %. In the Netherlands and the United Kingdom growth rates clearly stayed behind; with an annual growth figure of about 1 % wages merely doubled between 1850 and 1913.

Table 2. *Annual growth rates of nominal wages in industry, 1850-1913*

	Belgium	France	Germany	Netherlands	United Kingdom
1850-1860	3.2	1.8	2.4	0.5	1.0
1860-1870	1.7	1.6	2.1	1.2	1.6
1870-1880	1.5	1.7	1.1	2.3	0.9
1880-1890	0.8	0.9	1.8	0.3	0.3
1890-1900	0.7	0.8	1.9	0.9	1.7
1900-1910	0.6	0.9	2.2	1.1	0.4
1850-1880	2.0	1.7	1.9	1.3	1.2
1880-1910	0.8	0.8	2.0	0.8	0.9
1850-1913	1.4	1.3	2.0	1.1	1.0

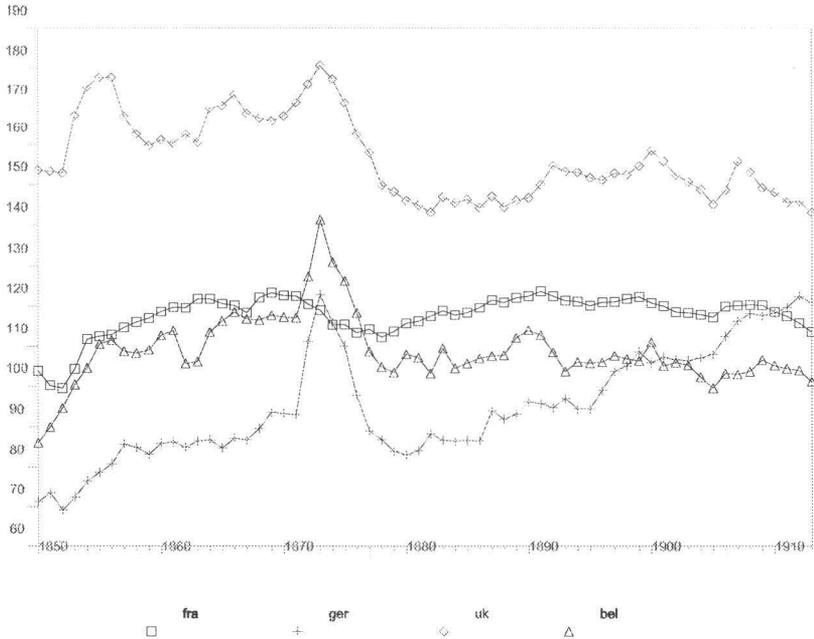
Sources: see text

When we divide the annual growth figures into subperiods the following pattern can be discerned. Until 1880 the largest annual wage growth can be discerned in Belgium and Germany, closely followed by France. Again the Netherlands and the United Kingdom showed the lowest growth rates. After 1880 the overall growth figures are roughly the same for all countries -about 0.8 %-with the exception of Germany, where the huge annual increase in wages continued at the same pace. German growth figures are also the highest for most ten yearly subperiods; only in the 1850s Belgian wages increased at a faster pace and in the 1870s Dutch wages showed an inimitable growth.

In the second half of the nineteenth century the relative position of wages in Dutch industry clearly deteriorated. In 1850 Dutch wages were on a higher level than wages in the other continental countries, although the mutual differences in wage levels were very small. Belgian and French wages were close to the Dutch level, whereas German wages were about 75 % of the Dutch wage level. In the period 1850-1913 the Netherlands even developed into a relative low-wage economy; in 1900 Dutch wages were the lowest of the continental countries we included in our research. The largest part of the decrease in rela-

tive wage levels occurred in the period 1850-1870 and especially in the 1850s. In this period nominal wage growth was much lower in Dutch industry than in the neighbouring continental countries. German wages, which were much lower in 1850, reached the Dutch level around 1870, whereas French and Belgian wages surpassed the Dutch level as early as in the 1850s. Even the huge wage gap which existed in 1850 with the United Kingdom increased even more between 1850 and 1860.

Graph 2. *An international comparison of nominal wage levels using the exchange rate, 1850-1913 (index, The Netherlands=100)*



Sources: see footnote 2

As can be seen in graph 2 wage levels in Germany, Belgium and the Netherlands clearly converged in the second half of the nineteenth century. After 1900 Dutch and Belgian wages stayed roughly on the same level, whereas the German wages increased at a much faster pace. After an increase in the wage gap between the Netherlands and the United Kingdom between 1850 and 1870, differences roughly stayed on the same level after 1880. The small wage differences with France stayed approximately on the same level during the whole period.

Contrary to the statements of Mokyr, Griffiths and Bos the Netherlands were clearly no high-wage economy in the second half of the nineteenth century. It is true that Dutch wage levels in 1850 were the highest of the continental countries we investigated, but the relative differences were not spectacular. Belgium and France surpassed the Dutch wage level in the 1850s, whereas the difference with the German wage level was finally diminished in the 1890s. In the next section we will investigate how the growth pattern of Dutch wages, and especially the slow growth during the period 1850-1870 corresponds with developments in the cost of living, unemployment figures and productivity levels.

### *3. Determinants of wage developments*

After staying on a fairly stable level from the seventeenth century until half-way the nineteenth century Dutch nominal wages in industry started to rise in the 1860s.<sup>28</sup> In this section we explore the causes of Dutch wage increases after this long period of stagnation. From the 1860s onwards Dutch industrial wages grew at a substantial rate, but still less fast as wages in its neighbouring countries. Especially in the period 1850-70 wage growth stayed behind the wage increases in the European neighbours (see previous section). By examining Dutch wage development in a comparative perspective the slower wage growth in the Netherlands will be investigated. In answering the questions of the sudden rise in nominal wages in the 1860s and the relatively slower growth, Dutch wage development will be linked to changes in the demand for labour, cost-of-living prices and productivity.

The reasons for the sudden rise in Dutch nominal wages have not been convincingly demonstrated. One obvious hypothesis states that the price for labour increased because demand for labour rose relative to supply. Firstly, demand for labour grew with the expansion of business activities from the 1860s onwards. In this decade the process of modern economic growth spread through the Dutch economy.<sup>29</sup> Output in all major industries increased, and one may expect that the demand for labour also increased. Secondly, a fall in the supply of labour resulted in the rise of wages. Van Zanden regards the development of migrant labour as an important indicator for the smaller supply of labour.<sup>30</sup> Migrant labourers usually combined the work on their smallholdings in rural areas with seasonal wage labour in the coastal regions of the Netherlands. Lucassen detects a decline in migrant labour from the middle of the nineteenth century onwards.<sup>31</sup> Fewer migrant labourers came to the Netherlands, because the main pull-factor, the level of wages, had lost much of its attraction. Wages in the coastal provinces of the Netherlands were no longer that high in comparison with the wages in the home areas of the migrant labourers and in Ger-

man areas that experienced an economic boom, such as the Ruhr.<sup>32</sup> Thus, Dutch wages increased from the 1860s because demand rose relative to its supply: the expanded business activities increased the demand for labour and the decrease in migrant workers lowered the supply of labour.

There are of course other possible reasons for the rise in wages. A rise in the cost of living might have been a reason for wage increases. Especially in times of sudden and steep rises in the cost of living, workers tend to demand wage compensation. In cases like this, wage developments merely reflect changes in the (general) price level. For instance, regional wage disparities in the Netherlands are said to reflect regional differences in the cost of living.<sup>33</sup> The relative price level per region correlates strongly with the relative regional wage level. If differences in wage levels within the Netherlands were due to differences in the price level, it is perceivable that the overall wage increases after the 1860s were simply the result of the rising cost of living.

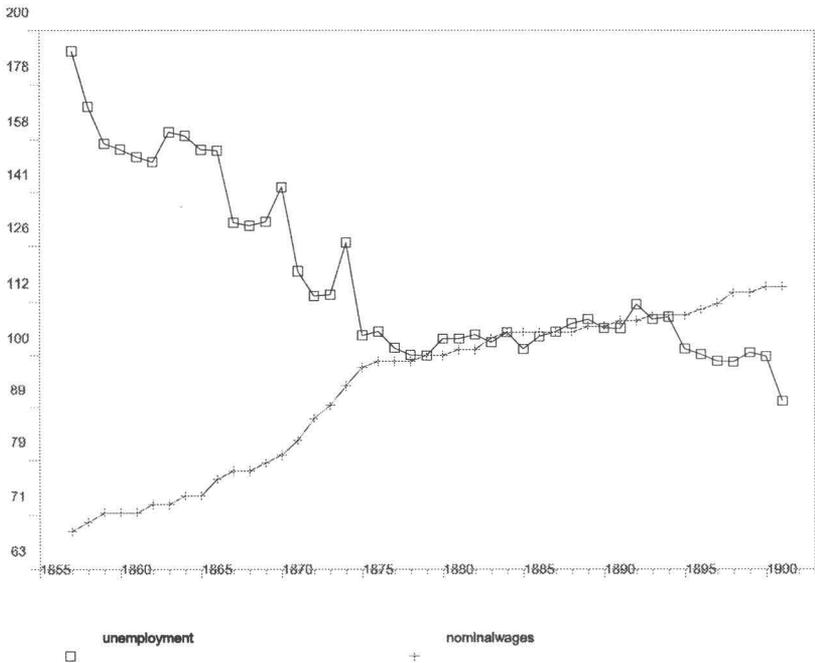
Improvements in the quality of labour may be a third reason for the rise in wages. More educated and skilled workers usually earn higher wages. Economic theory predicts that the increased levels of human capital are reflected in a higher output per worker. Thus, productivity rises as the skills accrued in formal education or on-the-job-training of the workers augments. There is, however, a serious problem in taking productivity performance as an indicator of human capital formation. On the one hand, wage increases may be due to higher skills and productivity. But on the other hand, wage increases may stimulate the incentives for labour-saving investments, which increase the capital-output ratio. Substitution of labour for capital also leads to a higher output per worker. In this situation, productivity grows as a result of a higher capital-intensity. The rise in output per worker and wages need not be accompanied by an increase in human capital. It is therefore difficult to distinguish between the effects of higher skills and the effects of investments in physical capital. The relation between productivity and human and physical capital formation is even more complicated, because changes in both human and physical capital can effect productivity at the same time. Higher wages may stimulate investments in labour-saving production techniques which, in its turn, require handling by more skilled employees. In this case, labour productivity, human capital, and physical capital increase simultaneously.

By taking productivity besides unemployment and cost of living as a third factor influencing the wage development, we realize that the interpretation of the relation between productivity and wages cannot be simple or conclusive. Increases in the levels of productivity may be due to higher skills of the workers, or may be the result of the increased capital-intensity of production. We cannot distinguish between these two reasons for productivity gains because of the absence of solid data on formal and informal training of workers and on capital formation in industry.

The relative rise of demand for labour relative to its supply can be demonstrated by data on wage developments and unemployment. A.W. Phillips has been one of the first researchers on the relation between wages and unemployment. In his well-known article of 1958 he portrayed the correlation of the level of unemployment with changes in wage rates in the UK that has been known since as the Phillips curve.<sup>34</sup> The essence of the Phillips curve is that at high levels of unemployment wage increases are small or even negative, while at low unemployment levels the competitive bidding of employers are expected to lead to high wage increases. Phillips formalised the unemployment-wage relation into a regression equation on the basis of nineteenth century British data (1861-1913). One of his most remarkable findings is that the relation proved to be stable well into the twentieth century. Also data from the interwar and the post World War II period fitted in the estimated regression line. Phillips was strongly criticised immediately after publication of his article. Criticism focused on the form of the equation and foremost on his inferences on the causes of inflation after 1948. Phillips stated that inflation in the UK was for the largest part of the 1948-1957 period more due to the competitive bidding for labour by employers (demand-pull) than to the wage demands fuelled by rising retail prices (cost-push).<sup>35</sup>

For the Netherlands it is possible to examine the relation between unemployment and wages for the second half of the nineteenth century. Thanks to the work of Jan de Meere and Edwin Horlings we now have proxy estimates for unemployment.<sup>36</sup> The figures reflect the percentage of the working population permanently supported by poor relief. It is unlikely that the figures indicate the precise level of structural unemployment. Contrary to the claims of some authors, recent studies have shown that the poor relief benefits were too small to bear the full cost of living of a person or family.<sup>37</sup> Since permanent benefits only accounted for about 15% of annual income they merely supplemented family income in order to overcome immediate hardship. Instead of providing direct evidence for the extent of structural unemployment, the figures show the percentage of the working population that was affected by a lack of employment.<sup>38</sup> This means that it is not advisable to use the figures in cross-country comparisons of unemployment *levels*, because they do not accurately represent the absolute level of unemployment. They do, however, properly reflect the *changes* in employment opportunities. Adverse or buoyant employment opportunities directly influenced the number of people on permanent relief. In conclusion, the data on the number of people on permanent poor relief need not reflect the absolute level of unemployment, although it may come very close. The reader should bear in mind that when we speak of Dutch unemployment levels in this article, the data actually represent levels of *underemployment*. The figures do provide reliable information on the changes in the demand for labour.

Graph 3. *The development of nominal wages in industry and unemployment in the Netherlands, 1858-1901 (index, 1880=100)*



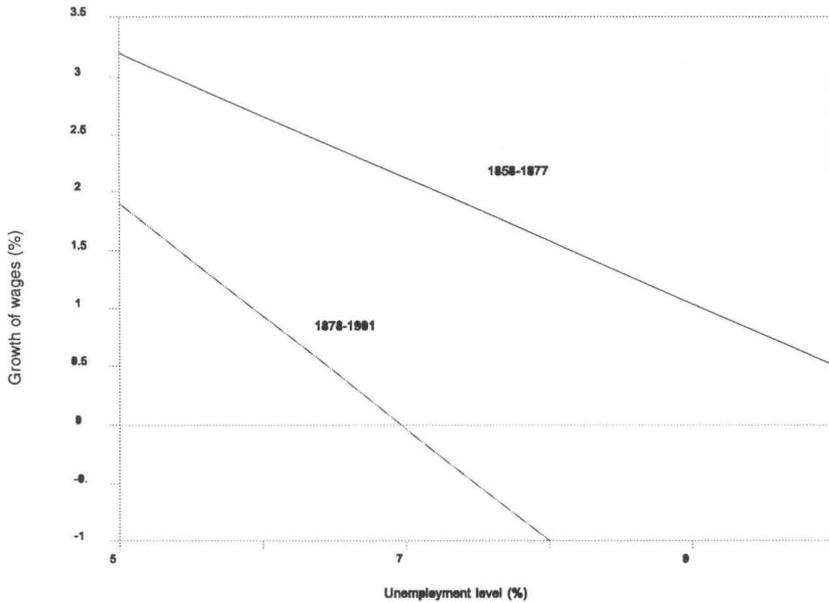
Sources: see text.

Graph 3 provides a first glance at the relation between unemployment and the growth of nominal industrial wages in the Netherlands. The graph clearly portrays the inverse development of unemployment and wage growth, particularly for the period until approximately 1880. These years witnessed a sharp decline in unemployment combined with a fast increase in nominal wages. After 1880 unemployment stayed on a more or less stable level until the late 1890s when a further decrease set in. At the same time wages grew steadily, but at a low rate. Towards the turn of the twentieth century the growth of wages slightly accelerated.

Graph 4 resulted from the combination of the unemployment data and the wage figures mentioned in the previous section. The graph shows for two periods the in Phillips curves formalised relation between the level of unemployment (horizontal axis) and wage growth (vertical axis). As said before, we expect an inverse relation between unemployment levels and wage increases. If unemployment is high, wage increases are likely to be small and vice versa. Two periods were discerned because there was not a single Phillips curve for

the period as a whole. Closer inspection revealed that there were two representative subperiods which were distinguished by the unemployment level. The first subperiod covered the years 1858 to 1877. These years witnessed a drastic decrease in unemployment levels and also the largest wage increases. In the whole period under consideration unemployment fell from a starting level of about 10% in 1860 to about 6% at the end of the period. The decline to 6% had already been achieved around 1877. In the second subperiod (1878-1901) unemployment fluctuated only a little and remained close to the 6% level. Wage growth in the second period was smaller and in some years even negative.

Graph 4. *The relation between unemployment and wage growth in the Netherlands, 1858-1901*



Sources: see text

The inverse relation between the level of unemployment and changes in wage rates is visible for both periods. The backward bending curve of the first period ran from the small wage increases at the 10% unemployment level to the larger wage increases of about 3% at an unemployment level of 5%. Besides the spectacular decrease in unemployment other important changes occurred in the Dutch economy in this subperiod. First of all, the start of modern eco-

conomic growth witnessed by a marked acceleration in output in all sectors of the economy. As a result income per capita increased in a fast pace. The sudden economic growth had an effect on the labour market as well. Van Zanden dates the transition of the Dutch labour market between 1850 and 1880.<sup>39</sup> Prior to 1850 there were large seasonal variations in the demand for labour. Especially in the summer period demand for labour rose. Migrant labourers satisfied the need for labour in periods in which demand was booming. As a result of the seasonality of demand, many workers were unemployed during parts of the year. In the transition period 1850-1880 two important changes took place: both the seasonality of demand for labour and the supply of (migrant) labour decreased. The result was a decline in (seasonal) unemployment and a rise in wages. The consequences of these developments are reflected in Graph 3. An illustration of the higher demand for labour is that seventy percent of the nominal wage increases over 1.5% occurred in the years between 1858 and 1877. The rising demand for labour from the 1860s onwards was not confined to industry. Also in agriculture labour became increasingly scarce.<sup>40</sup> Thus, there are indications that throughout the economy the demand for labour rose more than its supply.

The situation on the labour market probably became less tense in the 1880s. By the 1880s the rise in wages of the former decades had attracted permanent migrants that relieved the urban labour markets.<sup>41</sup> At the same time the scarcity of labour in agriculture diminished as well.<sup>42</sup> In the second period (1878-1901) the modest wage growth reflected the less tense situation on the labour market. The low or negative wage growth was concentrated in the 1880s. The shift of the Phillips-curve towards the origin in the second period is a reflection of these developments. What was remarkable in this period is the stable level of unemployment. Despite considerable variations in wage changes unemployment remained at a steady level of about 6%. There was still underutilization of labour, but to a smaller extent than before. At the end of the nineteenth century the situation with an unusually high labour reserve in the Dutch economy had come to an end. The Dutch labour market had at last lost some of its most typical characteristics: stable wage rates and a large labour reserve. The changes occurred in the same period in which other distinctive features of the Dutch economy were disappearing. Also with regard to its labour market the Netherlands was increasingly behaving like a normal European country.<sup>43</sup>

One thing is clear from Graph 4. In contrast to the UK for which Phillips observed a curve that was representative for the whole period from 1862 to 1957, there was not a single Phillips curve in the Netherlands for a much shorter time span. The evidence presented indicates that there were two separate curves. The first ran from 1858 to 1877. A second curve was visible for the 1880s and

the 1890s. The occurrence of several curves within a forty-year time span can be considered as evidence of more profound changes on the Dutch labour market than on the British.

After having graphically shown the influence of unemployment levels on wage changes, we will now investigate the effect of changes in unemployment, the cost of living and productivity levels on Dutch wage development. By means of regression analysis the impact of each of the three variables will be measured. As a result of the lack of data for Belgium on productivity and unemployment, only the developments France, Germany, the Netherlands and the United Kingdom will be analyzed. The regressions link the growth of Dutch nominal wages to the year to year changes in labour productivity, the cost of living, and unemployment levels. The data are expressed in natural logarithms to allow non-linear relations. This approach helps to answer the key question of the causes of Dutch industrial wage growth. Was it a result of rising cost of living prices, or was the increased scarcity of labour witnessed by falling unemployment, or was a rise in productivity the main factor behind Dutch wage development?

The results of the regressions are summarised in table 3. The table reports for each of the four countries the coefficients for a constant, the productivity ( $\ln LP$ ), the cost of living ( $\ln PRICE$ ) and the unemployment ( $\ln U$ ) variables. The standardised coefficients which indicate the relative effect of the three variables are also shown. An asterisk marks coefficients that are significant at the 5% level.

The results for the Netherlands show a negative correlation between the cost of living and wages. Thus, we can safely conclude that rising cost of living prices were not the cause of rising wages. On the contrary, the growth of wages coincided with a fall in prices, and as a result real wages increased considerably. The connection of changes in unemployment and productivity with wage development is more clear. The results are in line with our expectations: wage growth is positively correlated with productivity performance and negatively correlated with unemployment. The coefficients for both variables indicate a strong correlation. The relative effect of both variables, as indicated by the standardised coefficients, was equally large. This means that the rise in productivity and the increased demand for labour both heavily influenced wage development in the Netherlands.

A cautious remark should be added here. The variable productivity incorporates both the accumulation of human and physical capital in Dutch industry. It is possible that in case of the availability of separate data series for workers' skills and industrial investments the results would be different. This analysis should be part of further research.

Table 3. *Regression results of wage functions for the Netherlands 1858-1901, Germany 1887-1913, United Kingdom 1855-1913, and France 1895-1913*

	c	lnLP	lnPRICE	lnU	R <sup>2</sup>	N	SEE
Netherlands	5.43*	.39*	-.46*	-.37*	.96	44	.03
SC		.33	-.37	-.43			
Germany	-2.01	.98*	.35	-.01	.95	27	.04
SC		.84	.16	-.04			
UK	6.65*	.69*	-1.13*	-.03	.84	59	.06
SC		.68	-.59	-.06			
France	2.06	.74*	-.20	.04	.66	19	.03
SC		1.10	-.22	.13			

where

the dependant variable is the natural logarithm of the nominal wage index;

c = constant;

lnLP = natural logarithm of the index of labour productivity performance;

lnPrice = natural logarithm of the cost of living index;

lnU = natural logarithm of unemployment levels;

SC = standardised coefficients;

\* = significant at the 5% level

Sources: Mitchell, *International historical statistics*, 159-161; Gömmel, *Realeinkommen*, 27-29; Lévy-Leboyer and Bourguignon, *L'économie française*, Table A-IV; Crafts and Mills, 'Trends in real wages'; A.L. Burger, 'Wages, productivity and the growth of industry. A new comparative perspective on Dutch industrialization in the nineteenth century', mimeographed (Utrecht, 1995).

Dutch wage developments were strongly correlated with changes in productivity performance and unemployment. Was this also true for wage developments in the neighbouring countries or did price trends have a larger effect? Table 3 shows that wage growth in the other European countries was not a result of rising cost of living prices. As in the Netherlands the price variable in France and the United Kingdom was negatively correlated with wage growth. Germany is, however, the exception that proves the rule. The positive connection between wages and prices can be explained by the idiosyncratic trend of German retail prices. Germany was the only one of the four countries in which the cost of living steadily increased over the course of the century.

In contrast to the Netherlands where productivity had the smallest effect on wage growth, it had by far the largest effect on wage development abroad. This is the strongest finding of our regressions. The productivity variable was significant at the 5% level in all cases. Also the results for the two countries for which we had the least number of observations showed that productivity growth and wage growth are closely correlated. This relation was apparent abroad, but less in the Netherlands.

The most striking finding of the regressions for the other countries is the small effect of unemployment on wage growth. In the Netherlands unemployment had the largest effect on wage growth and the effect of productivity was only a little less. Unemployment in the other European countries, however, accounts only for a very small part of the wage development. The implication of these results is that the influence of the labour market on wage growth was larger in the Netherlands than abroad. In other words, changes in unemployment had a larger effect on wage development in the Netherlands than in the other investigated countries. The robustness of this finding was tested by running the regressions without the price variable. The results were generally the same. The effect of unemployment was now somewhat larger, but still far smaller than the effect of productivity.

The smaller effect of the unemployment variable in other European countries might be due to flaws in the unemployment figures. The foreign unemployment data refers to unemployed trade union members. This is the case for Germany, France as well as for the United Kingdom. The Dutch data, however, were constructed from expenditures on poor relief. They show less yearly variance than the foreign figures. The volatility in the foreign series is rather high, while the Dutch data shows a steadily declining trend until the 1870 and a stable level afterwards that was hardly interrupted by fluctuations.

The key question is whether the level and the variations in the trade union data are representative for the development of unemployment as a whole. Phillips obviously believed that the British trade union data were indeed representative. An important point to note is that Phillips contemporary opponents rarely criticized the basic data he used. Also more modern scholars like Maddison have not questioned the British unemployment figures.<sup>44</sup> By taking five-year averages the fluctuations can be smoothed. The results of the regressions with a moving five year unemployment average, however, show hardly any difference from the original results. The effect of unemployment changes on wage growth is in some cases a little larger, but still far smaller than the effect of the productivity variable. The regressions for all foreign countries continue to show the large effect of productivity changes on wage growth.

Flaws in Dutch unemployment data could also be a reason for the large effect of unemployment on Dutch wage growth. Especially the sharp decline of Dutch unemployment between 1860 and 1875 may be questionable to some.

As said before, due to their construction the Dutch data are a measure of under-employment that need not represent the true level of unemployment. On the other hand, they do properly reflect the changes in employment opportunities, and thus, unemployment. The starting level of unemployment of about 10% in 1860 may be incorrect, although it corresponds to the estimates of a distinguished scholar.<sup>45</sup> The subsequent changes of that level, however, are very likely to be correct. Unemployment halved between 1857 and 1875, but a what level it exactly started or ended is yet unclear.

Furthermore, the findings are consistent with many studies that point at a large labour reserve in the Netherlands that disappeared in the second part of the nineteenth century.<sup>46</sup> The unemployment figures reflect the existence of a such labour reservoir which was a distinctive feature of Dutch development of the time.

Table 4. *Annual growth rates of nominal wages and labour productivity in industry 1850-1910*

	1850-1880		1880-1910	
	wages	productivity	wages	productivity
Belgium	2.0	2.0	0.8	1.1
France	1.7	1.1	0.8	1.2
Germany	1.9	2.1	2.0	2.1
Netherlands	1.3	1.6	0.8	0.8
UK	1.2	1.4	0.9	0.9

Source: Burger, 'Wages'

A comparison of wage and labour productivity growth in the second half of the nineteenth century provides additional evidence for the finding that unemployment had a larger effect on wage development in the Netherlands than in other European countries. Table 4 shows that wage growth was generally nearly as fast as the growth in labour productivity. This tendency is very clear in the second subperiod 1880-1910. In this period the growth of wages and productivity in Dutch industry was much more in line with the experience in the other countries than in the first subperiod. Between 1880 and 1910 both wages and productivity grew with about 1% per annum in the Netherlands as well as in Belgium, France, and the UK. Germany is the exception to the rule with its growth rates of about 2% per year.

In the first subperiod, however, there is a large discrepancy between the Dutch growth rates of wages and productivity. Labour productivity grew at an average rate of 1.6% annually, but wages in the Netherlands showed a lower

growth of 1.3% per annum, which was the lowest figure. Thus, between 1850 and 1880 the growth of Dutch wages stayed clearly behind the growth of productivity. As supposed earlier, the labour reserve in the Netherlands is an obvious reason for the slower wage growth. Until the 1870s the large number of underemployed workers slowed down the rise in wages to such an extent that the gap between wage growth and productivity growth widened. After 1875, when the labour reserve had decreased sharply and remained at a more or less 'normal' level, wages followed the pattern of productivity growth more closely.

The figures on the growth rates of wages and productivity provide an independent check of the quality of the unemployment data. Considering the gap between wage growth and productivity growth the sharp fall in Dutch unemployment between 1860 and 1875 makes perfect sense. The unemployment data properly reflect the decrease of the labour reserve as the process of modern economic growth spreaded through the economy which increased the demand for labour. At the same time the fall in the number of migrant workers reduced the supply of labour. As labour became scarcer Dutch wages grew, but – due to the large labour reserve – not as fast as productivity increased. In comparison to other countries, where the growth of wages closely followed productivity growth, Dutch wages might have increased more considering the large productivity gains. However, the existence of a large labour reserve prevented a further increase in wages.

#### *4. Conclusion*

In 1850 industrial wages in the Netherlands were on a higher level than wages in some of the neighbouring continental countries. However, contrary to the statements of Mokyr, Griffiths and Bos relative differences were small. The wage gap between the continental countries and the United Kingdom was huge and remained considerable throughout the whole period under investigation. Especially as a result of the very low growth figures between 1850 and 1870 this situation of the Netherlands as a relative 'high-wage' economy changed dramatically in the second half of the nineteenth century. Around 1900 wages in Dutch industry were relatively on the lowest level and even German wages surpassed the Dutch level in the 1890s.

After having measured the level and growth pattern of Dutch wages we explored the factors behind the distinct development of Dutch nominal wages. The evidence presented in this paper indicated that changes in the cost of living were not the prime mover of Dutch wage development in the nineteenth century. The relatively high level of un(der)employment seems to have been at the heart of the distinct development of Dutch industrial wages. The regressions showed that Dutch wage development was strongly influenced by changes

in unemployment and productivity performance. Contrary to the other investigated countries Dutch wage developments correlated to a much lesser extent with labour productivity performance. The effect of unemployment on industrial wage development proved to be the principal difference between the Netherlands and its neighbours.

The large labour reserve still present in the Dutch economy may have been the reason for the slower wage growth in the Netherlands in the third quarter of the nineteenth century. In comparison to other European countries estimated unemployment in the Netherlands may have been at a higher level around 1860, but direct, comparable evidence is lacking. The high levels of unemployment in the Netherlands were responsible for the gap between wage and productivity growth between 1850 and 1880. In this period the largest increase of labour productivity in Dutch industry occurred, but industrial wage growth stayed clearly behind. After 1880 the relative development of nominal wages and labour productivity in the Netherlands was more in line with the pattern in its neighbouring countries. The reason for the slower growth of Dutch industrial wages cannot be entirely found in the higher levels of un(der)employment. Labour productivity in Dutch industry also rose less fast than in the other investigated countries.

In the 1850-1880 period two long-standing features of the Dutch labour market disappeared: the wage rigidity and the surplus of labour. In explaining these changes the thesis of the conjunction of a fall in supply and a rise in demand of labour offers the most fruitful approach. Between 1850 and 1880 all economic sectors experienced such a marked expansion that the start of the process of modern economic growth has been dated in this period. At the same time the surplus of labour that has been present in the Dutch economy for over several centuries diminished. As a result, un(der)employment levels declined and wages rose.

## NOTES

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## VII

### A BENCHMARK COMPARISON OF SERVICE PRODUCTIVITY BETWEEN EUROPE AND THE UNITED STATES FOR 1910

by

*Ary Burger and Jan-Pieter Smits*

#### *1. Introduction*

The role of the service sector in the process of economic growth has been neglected for a long time. Manufacturing was considered to be the main carrier of economic growth. Until the early 1980s the relation between long term economic growth and structural change was analyzed and explained in terms of the so-called 'sectoral' models.<sup>1</sup>

In these models it was argued that the economic 'centre of gravity' in the long run shifted from agriculture, through the industrial sector to services. Changes in sectoral (labour) productivity were responsible for this process of structural change. Because of processes of organizational and technological changes in agriculture, productivity reached at such a level that the surplus of labour was absorbed by the industrial sector. At the moment that - as a result of the 'first industrial revolution' - also in this sector the level of productivity was rising rapidly, the newly created surplus could be absorbed by the service sector. This process was facilitated since services -at least according to the 'sectoral models'- were considered to be characterized by low levels of labour productivity. According to these theories services did not play an important role in the process of economic modernization. On the contrary, services did only show significant growth at a time that processes of modernization had already been taken place in agriculture and manufacturing.

The key-element in this model is the relative low level of productivity in services. Output per worker in services is considered to be substantial lower than in agriculture and services. As a result of this, however, the demand for services should decline. Yet, this is clearly not the case. During the twentieth century the share of services in GDP increased from circa 40% in 1900 to 65%

in 1990. Moreover, it is striking that in literature on nineteenth century economic development the so called 'productivity gap' between services and the rest of the economy has not been discerned. This phenomenon is in contradiction with the sectoral models. How can this paradox be explained? The analysis of the long-term changes in the *structure* of services might provide us with some answers.<sup>2</sup>

Diagram 1. *Shifts in productivity within the service sector during the nineteenth century*

	personal services (mainly domestic servants)	trade and transport	government and other public services
<i>level of productivity</i>	low	high	high
<i>growth of productivity</i>	low	high	low

Diagram 1 shows that the productivity growth in services in the nineteenth century was determined by two factors: (a) a relative decline of low productivity activities such as personal services; there is substantial empirical evidence that the share of these personal services (especially domestic servants) in service product showed a significant decline, while trade and transport began to determine the nature of services. (b) Furthermore, a significant increase in value added per worker can be established in the distributional services. As a result of major technological and organizational changes a considerable increase in productivity occurred. These findings fit rather well in the Gershuny en Miles' model on the growth and structural change in services.<sup>3</sup> They make a distinction between several categories of services such as trade, transport and financial services (high productivity levels) and personal and social services (relative low levels of productivity). They argue that parts of the service sector like trade, transport and banking could have made a significant contribution to economic growth, while in the public and personal services productivity levels were comparatively low, as is also maintained in the 'sectoral models'.

In the last twenty years new views on economic growth have been developed. It is already pointed out that some new theoretical ideas have been formulated by Gershuny and Miles. Yet, also important empirical research has been done. Especially research into the 'first industrial revolution' has been of great importance.<sup>4</sup> Cameron, for instance, showed that economic development in continental Europe was not exclusively dominated by the industrial sector.<sup>5</sup>

On the contrary, other sectors such as agriculture and services made an important contribution towards the process of economic modernization. The British 'model' of economic development was no longer considered as the 'normal' pattern of development. Crafts argued that even for Britain industrial development was not as strong as most economic historians had suggested until then.<sup>6</sup>

Gradually a new perspective on the role of services in economic development arises. But a more detailed analysis is only possible when more empirical research is done. This research should primarily be focused on the changes in productivity levels in services, because much of the historiographical debate concentrates on the alleged low productivity levels. As in many empirical studies services have been treated as a residual -services production is 'estimated' by extracting output in agriculture and industry from total GDP that was calculated from the income or expenditure side- until now a thorough analysis of international differences of service productivity was seriously hampered.

In this article we present a first benchmark comparison of service productivity on the eve of World War I. Prior productivity studies deal almost exclusively with agriculture and industry.<sup>7</sup> The supposed subordinate role of services in economic development partly explains its neglect in historical productivity comparisons. A direct comparison of service productivity fills this void, and has, in addition, relevance for international comparisons of national income. The results of the comparison can be added to the existing sectoral productivity estimates for industry and agriculture in order to allow a direct productivity comparison for the whole economy. A first attempt will be presented in the last section. Secondly, the comparison of service productivity can play a role in the convergence debate. The usual explanation of convergence has recently been rejected by Broadberry.<sup>8</sup> The large and persistent gaps between European and American productivity levels in industry cast serious doubt on the role technology transfers in manufacturing as the key element in the convergence process. Broadberry's findings emphasise the need for a broader view of convergence which includes the role of productivity trends in sectors other than manufacturing. In this respect, a comparison of service productivity is very useful.

In section 2 of this article a critical review of the service production estimates and its methods for the pre-1913 era will be given. Furthermore, we will point out how some of the existing estimates can be refined. The actual comparison of the productivity levels in services will be presented in section 3. We will compare the level of productivity in the service sector in France, Germany, the Netherlands and the United States to the productivity level in the United Kingdom. In the concluding section of this article we will discuss the implications of our results.

## *2. Evaluation of estimates on service production around 1910*

Before a direct productivity comparison for 1910 will be made, we should first review the reliability of the estimates on service production for the pre-1913 period. In the following we will give an overview of the methods and sources that were used in several countries to estimate service production. We will concentrate upon the following industries: transport, communications, trade, government and domestic servants. At this moment of research we do not have sufficient data at our disposal to include the other service industries in our comparison. However, the industries that are included in this article comprise about 75% of service employment and value added in services. The exclusion of the financial services, the professions and some personal services will not have much influence on our final results.

The measurement of service production has always been a difficult task. There are varying measurement techniques of service output in historical national accounting as well as in contemporary national accounting.<sup>9</sup> In addition, historical estimates of service output often face data problems, because not all of the required information has previously been collected or has survived over time. Output measurement for agriculture and manufacturing is less difficult. It basically consists of summing the quantities times the prices of goods. This procedure is impossible to follow for many service industries since that kind of information is lacking. Only for branches like transport and communications is the 'commodity' approach applicable. Output in many other service industries is arrived at by means of input valuation, i.e. adding the value of inputs, mostly wages. This procedure has a major shortcoming. Output is not estimated independently of inputs, and, as a consequence, cannot be used for productivity purposes. A benchmark comparison of service productivity should take the different measurement techniques into account. Service output across countries has been measured in a comparable way as far as possible at this stage of research.

We now briefly review the measurement methods of output per branch hitherto adopted and explain what kind of alterations or alternative estimates we have made.

- *Transport*: output volume in transports is ideally estimated by multiplying the number of passengers and the tonnage of goods transported with the distance of transportation. In this way the output volume of the transport sector is expressed as the number of passenger kilometres and the number of ton kilometres. Next these output figures are linked to freight rates, that is the weighted price of transportation per passenger kilometre or per ton kilometre. This results in the value of output. Finally, the value of inputs are deducted in order to arrive at estimates of value added.

In most countries such estimates have not been made. Often value added has been calculated by multiplying employment figures with data on the average income. For instance Feinstein and Hoffmann use this method to estimate production in the transport sector for a benchmark year around 1910.<sup>10</sup> Direct estimates from the output side (i.e. the actual calculation of outputs and inputs) are scarce. Yet, in the Swedish historical national accounts much work has been done in this respect.<sup>11</sup> For the United States the work of Gallmann and Weiss should be mentioned.<sup>12</sup> By using annual reports of important transport companies, gross earnings and the value of inputs could be calculated. However, in most other countries 'guestimates' from the income side were made.

The quality of many benchmark estimates may be questionable, yet even more serious problems arise if we try to analyze growth patterns for the pre-1913 period. It was already mentioned that in most countries 1910/13 benchmark estimates were projected backwards using all sorts of production indices. Hoffmann was one of the few who used actual data on output volume, such as the number of passenger kilometres and ton kilometres. In the British historical accounts, however, rough indicators were used in order to make backward projections. For instance, Feinstein was able to estimate value added for transport for the benchmark year 1907. Next, series on production volume (derived from Lewis) were used in order to extrapolate the 1907-estimates backwards.<sup>13</sup> In this way a transport series in constant prices was constructed. For railways it was simply assumed that production in the period 1855-1907 increased at a rate of 3% a year. As far as sea shipping is concerned Lewis used the total tonnage of Britain's merchant fleet as an indicator for production. Because of the fact that steam ships were sailing at a greater speed, the tonnage of steam ships was multiplied by a factor 3. Furthermore, on the basis of data derived from the foreign trade statistics, it was assumed that the rate of utilization in sea transport increased with 0.5% a year.

Of course serious criticism can be levelled against such assumptions. First of all, no estimate on the actual volume of transportation was made. For example, no attention is paid to possible changes in the average distance. Furthermore, changes in input/output relations are disregarded. Thus, the effect of technological and organizational changes in transport is not measured. Moreover, it should be noted that by using a fixed set of prices, changes in relative prices are not reflected in the production estimates for earlier years.

- *Trade*: the analysis of productivity in trade causes even more problems. Mostly value added in trade was calculated for a benchmark year around 1910 on the basis of data on employment and average income (see the United Kingdom, Germany and the United States). As far as the construction of time series is concerned the growth of distribution is often calculated on the basis of agri-

cultural and industrial output figures as well as the value of imports. In the British historical national accounts, for example, the growth of distribution is considered to be equal to the growth of output volume in agriculture, manufacturing, mining and the volume of imports (including re-exports).

In Germany more or less the same method is followed. Hoffmann, however, stressed that his estimates are of a tentative nature.<sup>14</sup> In his calculations it was assumed that no elimination of intermediate trades took place. This means that trade margins (i.e. difference between sales and purchase value) are supposed to be constant throughout the period 1850-1913. Such an assumption may not be plausible. We know for instance that in the period 1890-1913 trade margins in the United States were rising.

There are strong indications that suggest that trade margins did not remain at a constant level during the nineteenth century. First of all, important structural changes took place in retail trade. The rise of multiple shop organizations and department stores of course had a decisive impact on productivity and on the development of trade margins. Furthermore, innovations in the field of transport and communication made an elimination of intermediate trade possible, as a result of which the costs of distribution could be lowered substantially.

To arrive at more reliable estimates for value added in trade it is therefore important to establish trade margins for wholesale and retail trade. On the basis of records of trading companies and by comparing levels of different types of prices (producer prices, wholesale prices and retail prices) trade margins can be established. Next we can check the validity of such estimates by calculations from the income side, i.e. by using employment data and information on average incomes.

• *Other services (mainly government and domestic servants)*: production in this part of the service sector is estimated by combining employment data with figures on average income. For the period around World War I we are amply provided with such data. Analyzing productivity changes over time, however, leads to serious problems. If the production series (calculated as employment multiplied by income) are deflated by wage indices, it is supposed that productivity did not rise. Of course this is not plausible. In the Swedish historical accounts Krantz therefore tried to construct indicators for the development of productivity. For example, he used the number of patients in hospitals as an indicator for the volume of production in medical services, and for education the number of pupils was used.

It should be noted that the income estimates are not always comparable because of different methods of deflation and the underlying assumptions concerning productivity changes.<sup>15</sup> Lewis, for instance, supposes that productivity in the 'income related' services (i.e. government, domestic servants,

professions and other personal services) increased with an average of 0.5% a year. In most other countries such an adjustment was not made, as a result of which the British estimates on services for the pre-1907 period are not comparable with those of other countries.

As far as government is concerned, it should be noted that these estimates are usually based upon data for the central government. For the other governmental services (especially municipalities) additional estimates are made. Feinstein, for instance, takes the value added of the central government as a starting point. By analyzing the share of municipalities in total government expenditure, he makes an additional estimate for the value added of municipalities.

For the period around 1910 estimates of service production are available for some countries. It should be noted, however, that these calculations are often made from the income side. By linking employment figures with data on average income, value added in services is estimated. In order to make direct estimates of productivity we first have to make calculations of actual service *output*. Using all kinds of published sources we will estimate output volume and -if possible- output value of transport (railways, sea shipping), communications (post, telegraph, telephone), trade, government and domestic servants. In the next section these new estimates will be presented and analyzed.

### 3. *A benchmark comparison of service productivity in 1910*

A main purpose of this article is to make a direct comparison of productivity levels in services for several countries on the eve of World War I. The benchmark estimate for 1910 can be used in the productivity comparison for the economy as a whole. In combination with the existing productivity estimates for agriculture and industry, it is possible to make a direct comparison of the economic performance of these countries shortly before World War I. Furthermore, the benchmark comparison is useful as a point of reference for convergence studies. It provides a check for the extrapolations, and it allows to follow the pattern of convergence back into the nineteenth century.

Historical comparisons of service productivity are rare. Kuznets was one of the first to make comparisons in terms of relative sectoral productivity.<sup>16</sup> The interpretation of these sectoral ratios is, however, difficult: relatively high productivity in services may be due to low levels in agriculture and industry. Thus, these ratios only shed light on the productivity performance of services in comparison to agriculture and industry, but not on comparative performance in services between countries.

Recently, Lee and Dormois have made historical comparisons of service productivity.<sup>17</sup> Lee's approach comes down to linking Maddison's series of

GDP in US dollars at purchasing power parities of 1970 to contemporary shares in service output and employment. Comparing sectoral productivity in constant prices of a recent year has some major disadvantages. Service output for earlier years is estimated by linking the share of services in national product (in current prices) to national output in constant prices of, say, 1970. Such a procedure ignores changes in relative prices and it will probably result into serious distortions in the levels and (sectoral) composition of output. Furthermore, the divergent quality of time series for the several countries introduces another bias. It is apparent that earlier periods are more vulnerable to these biases.

Dormois compared productivity in seven service branches between France and the United Kingdom. His method, namely comparing contemporary estimates of service production, already resulted into significant differences with Lee's findings. Dormois' comparison is, however, somewhat flawed for two reasons. Firstly, he used the same output converter for all seven branches, and excluded thereby differences per branch. Secondly, his output figures for the United Kingdom were not truly direct estimates but extrapolations from 1920.

We present a direct benchmark comparison of service productivity based on the industry-of-origin methodology. Rostas and Paige & Bombach were pioneers of this methodology, which has also been used by Pilat, Maddison & Mulder, and Mulder in their international comparisons of service productivity for recent years.<sup>18</sup> The industry-of-origin method has advantages with regard to using data from the output side (in some cases we constructed output estimates ourselves), and with regard to making detailed branch comparisons which are subsequently aggregated to sector level. We have used two main methods in comparing service productivity: converting value added per person by means of unit value ratios, and measuring physical output per person by means of quantity relatives.

Unit value ratios basically work in the same way as Purchasing Power Parities.<sup>19</sup> They serve as an alternative for the exchange rate, which need not reflect the relative value of currencies because they are based upon tradable goods and services only and may be subject to international capital flows. The prices of a set of countries are compared to the prices of the numéraire country, in our case the United Kingdom, on a bilateral basis. The output of one country, say Germany, is valued at the prices of the numéraire country, the United Kingdom, and vice versa: German output is valued at British prices. The price or unit value comparisons are aggregated by value added weights. The procedure results into two ratios: the ratio between German and United Kingdom output in weights of the United Kingdom, and the ratio between German and United Kingdom output in German weights. The next step is to convert value added per person employed into a common currency by means

of these aggregated unit value ratios. The result is labour productivity at respectively German and United Kingdom weights.

Historical productivity comparisons based on unit value ratios have already been made for agriculture and industry.<sup>20</sup> Data problems prevent a full unit value comparison for services. Such a comparison requires data on quantities and values of output, which are much easier to obtain for commodity-producing sectors. Only in a few service industries can output and prices be measured directly. Another way of comparing productivity in services is by means of the so-called *Quantity Relatives*. In this method physical output per person employed is measured, so data on prices are not required. In this respect we have used the same methodology as Rostas, and Paige & Bombach have used in their estimates of comparative productivity for later years.<sup>21</sup>

In our comparison of service productivity both methods have been used. For every branch we compared quantity relatives and, if possible, made unit value comparisons. In comparing output per worker the use of unit value ratios is preferable to quantity indicators, because it measures value added in a common currency. Value added per person is regarded as a better indicator of economic efficiency than physical output per employee. In this section we will present productivity estimates for transport (railways and sea shipping), trade, government and domestic services. Since these industries account for over 75% of service output and employment we are confident on the representativeness of our results. Banking and insurance, services from dwellings, professions and some personal services are not included in this comparison.

- *Transport*

We were able to compare productivity in railways and sea shipping. Sufficient data for inland navigation and road transport could not be collected. As far as railway transportation is concerned, we have calculated the number of passenger kilometres and ton kilometres. On the basis of statistical yearbooks for the several countries the gross earnings of passenger transportation and transport of goods could be estimated. The same sources also contained information on the number of passenger kilometres and ton kilometres. Unfortunately, we have not yet found value added figures for all countries, so labour productivity could not be calculated by means of unit value ratios. Therefore, we had to confine our productivity comparison to indicators of physical output per worker.

Table 1. *Comparative productivity in railways, measured by Quantity Relatives, in 1910 (indices; United Kingdom=100)*

	United Kingdom weights	National weights
France	88	89
Germany	94	92
The Netherlands	86	89
United States	174	211
United Kingdom	100	100

Sources:

- France: *Annuaire Statistique (1912) 168-171.*
- Germany: Hoffmann, *Das Wachstum*, 201; *Statistisches Jahrbuch für das Deutsche Reich*, 139-140.
- Netherlands: Smits, *Economic growth and structural change*, appendix II and XIV.
- United States: S. Lebergott, 'Labor force and employment, 1800-1960', in: *Output, employment, and productivity in the United States after 1800*, Studies in income and wealth, Vol. 30, 117-204. (New York, 1966) 119; *Statistical abstracts*, 1910-1913; *Interstate commerce commission. Twenty third annual report on the statistics of railways in the United States*, 1910-1913; *Statistics of railways of Class I, 1911-1921*; B.R. Mitchell, *International historical statistics. The Americas, 1750-1988; Historical statistics of the United States. Colonial times to 1970. Part 1; Statistical abstract of the United States*, 1913, 270.
- United Kingdom: *Statistical abstract for the United Kingdom*, 1910-1913; *Commonwealth bureau of census and statistics. Transport and communication. Bulletin no. 15*, 1913-1923; B.R. Mitchell, *International historical statistics. Europe 1750-1988* (London, 1992).

Table 1 presents weighted output per worker in railways in comparison to the United Kingdom. Productivity seems to have been the highest in the United States. Performance in British railways is about 30% better than in the continental countries. The small differences between the figures in national and United Kingdom weights reflect the comparable structure of output in the European countries. Only for the United States is the difference substantial, which points at the different composition of output: the share of freight transport is much larger in the United States than in Europe.

Table 2. *Average distance in passenger and freight transport (in kilometres)*

	Passenger transport	Freight transport
France	34	190
Germany	23	98
The Netherlands	30	104
United States	54	222
United Kingdom	30	85

Sources: see table 1.

Table 2 indicates that the average distance per journey is not a crucial factor in explaining productivity performance within Europe. There are hardly any differences in the average distance of passenger transport between the European countries. The average distance of freight transport is the shortest in the United Kingdom, and by far the highest in France. Productivity performance, however, is not likewise. The United States lead may be attributable to the longer average distances in freight transport, and to the higher share of freight transport.

For sea shipping we have not made an estimate of the *value* of output. At this stage of research we were not able to collect series of freight rates for sea shipping in the different countries. We therefore confined ourselves to estimates of output volume. On the basis of shipping statistics the total tonnage could be established. Next we had to estimate the rate of utilization, i.e. the actual volume of freight. Finally, the average distance of transportation had to be established. Fortunately in all sources the harbours of origin and destination were mentioned. In this way shipping patterns could be analyzed. By combining the data on the capacity of sea ships, the rate of utilization and the average distance of transportation, the output volume in sea shipping could be calculated in millions of ton kilometres.

Table 3 shows that productivity in seashipping was the highest in the Netherlands, closely followed by Germany and France. It is interesting to see that productivity in British sea shipping is about 30% lower than in the Netherlands. The results for the United States are curious. Although the American merchant fleet is relatively small -only 10% of imports and exports in the United States were carried by American ships- this figure is not plausible.

In order to interpret the differences in productivity levels, different variables should be analyzed. Differences in the rate of utilization do not seem to

Table 3. *Comparative productivity in sea shipping, measured by Quantity Relatives, in 1910 (index; United Kingdom=100)*

France	124
Germany	127
The Netherlands	134
United States	34
United Kingdom	100

Sources:

- France: J.P. Dormois, *Des machines ou des hommes? Etudes des différentiels de productivité entre la France et la Royaume-Uni avant la première guerre mondiale*, unpublished Ph.D. Thesis European University Institute (Florence, 1993) 142, 395; *Statistique générale de la France. Annuaire statistique, 1910-1913; Tableau général du commerce et de la navigation. Année 1910*.
- Germany: Hoffmann, *Das Wachstum*, 200, 417, 425.
- Netherlands: Smits, *Economic growth and structural change*, appendix I and XIV.
- United States: Lebergott, 'Labor force', 119; *The foreign commerce and navigation of the United States, 1910* (Washington, 1911); *Historical statistics of the United States. Colonial times to 1970. Part 1.* (Washington, 1975); *Foreign commerce and navigation of the United States, 1910-1913*. Hoffmann, *Das Wachstum*, 200, 417, 425.
- United Kingdom: Lewis, *Growth and fluctuations*, 263, 265; *Annual statement of the trade and navigation and shipping of the United Kingdom with foreign countries, 1910-1913*

explain the results presented in table 3. On the contrary, the rate of utilization in the Netherlands was very low (about 50% of the British level). This phenomenon can be explained by the lack of outgoing freights; the lack of mass exports of industrial products was an important factor for the late introduction of steam ships.<sup>22</sup> However, the low rate of utilization in the Netherlands did not lead to low levels of productivity. As far as the other countries are concerned it should be stressed that differences in the rate of utilization were relatively small. Therefore, the poor performance of the American shipping sector cannot be explained from this factor.

Another possible explaining factor is the average distance. If the average distance per journey is high, this will probably lead to a high level of labour productivity a result of economies of scale. In the United Kingdom and the United States the average distance was quite high (circa 6000-6500 kilometres). Long distance transport was prevailing in Britain because of the large extent of the British colonial empire, while transport between the United States and the United Kingdom predominated American sea shipping. The average dis-

tance of transportation in the other countries was substantially lower and amounted to 3000-4000 kilometres in Belgium, France, Germany and the Netherlands. We can therefore conclude that differences in the average distance also do not explain the differences in productivity.

Finally, we take a look at differences in the composition of the merchant fleet in the various countries.

Table 4. *Labour intensity of production and the structure of the merchant fleet, 1910 (indices; United Kingdom=100)*

	employment per ton	%steam
France	279	62
Germany	1200	91
The Netherlands	597	101
United States	944	83
United Kingdom	100	100

Sources: see table 3.

Column 1 in Table 4 shows that British sea shipping was relatively labour extensive by nature. In the other countries (especially the United States and Germany) the number of people employed per capacity ton was much higher. This fact can not be explained sufficiently by the structure of the fleet. Although the percentage of steam tonnage in France was considerably lower than in Germany, German sea shipping was much more labour intensive. Furthermore, these data do not make clear the differences in productivity as presented in Table 3.

It is obvious that much research needs to be done in order to explain the international differences in productivity in sea shipping. Besides, we must check our calculations for the United States because of the implausible outcome of our productivity estimate. Maybe the American employment data include people engaged in coastal shipping and shipping on the Great Lakes. These activities are not part of sea shipping. In that case employment is over-estimated. Furthermore we could make a more detailed analysis of shipping patterns on important routes. It is, for instance, possible that sailing ships were especially used in shipping grain to and from Europe. Cereals being a high volume/low value product, it is likely that sailing ships were used because of the low level of freight rates. This labour intensive form of shipping might also explain our low estimate on value added per worker. Finally, it should be stressed that it would be better to include freight rates and information on

input/output relations in our calculations. Such research is however far beyond the scope of this article.

• *Communications*

Productivity in the communications sector was measured on the basis of price comparisons of letters, phonecalls and telegrams. These price comparisons were weighted into a single unit value ratio for communications with which value added per person employed was converted into a single currency. Most data such as gross earnings could be directly derived from different published sources. Assessing the volume of output -i.e. the number of letters and parcels, telegrams and telephone calls- proved to be more difficult. Especially as far as the postal services were concerned, it was not always possible to calculate gross earnings per postal item. Nevertheless, the available data allowed the calculation of unit value ratios. Table 5 reports comparative labour productivity in communications. UVRs were used to express value added per worker in a common currency.

Table 5. *Comparative productivity in communications, measured by Unit Value Ratios, in 1910 (indices; United Kingdom=100)*

	United Kingdom weights	National weights
France	73	72
Germany	77	81
The Netherlands	67	97
United States	131	152
United Kingdom	100	100

Source:

- France: Dormois, *Des machines*, 484; *Statistique générale de la France. Annuaire statistique*, 1910-1913.
- Germany: Hoffmann, *Das Wachstum*, 200; 418-425.
- Netherlands: Smits, *Economic growth and structural change*, appendix V and XIV.
- United States: *Thirteenth census of the United States taken in the year 1909* (Washington: Department of Commerce, 1920); *Statistical Yearbook United States*, 1913; *Statistical abstract of the United States*, 1913.
- United Kingdom: *Statistical abstract for the United Kingdom*, 1913.

Productivity in the continental countries is (again) lower than in Britain. Output per worker in the United States is 30-50% higher than in the United King-

dom. The comparison of prices and productivity in communications may be flawed by the state intervention in this sector. Especially tariffs of postal services were often determined by the government. It should be noted that communications is only a small branch (about 3% of service employment), and has therefore little weight in the aggregation to sector level.

• *Trade*

It appears rather difficult to calculate the production in this sector from the output side. Therefore, value added for this industry is often estimated by combining employment data with figures on average income levels. In this article we have also followed this procedure. Next, the income estimates had to be converted into British Pounds. Unfortunately, for most countries no data

Table 6. *Comparative productivity in trade, measured by implicit trade margins, in 1910 (indices; United Kingdom=100)*

	United Kingdom weights	National weights
France	92	88
Germany	54	56
The Netherlands	118	118
United States	98	93
United Kingdom	100	100

Sources:

- France: Dormois, *Des machines*, 220, 265; *Statistique générale de la France. Annuaire statistique*, 1910-1913; *Tableau général du commerce et de la navigation. Année 1910*.
- Germany: Hoffmann, *Das Wachstum*, 205; 313; 476-480.
- Netherlands: M. Knibbe, *Agriculture in the Netherlands, 1851-1950. Production and institutional change* (Amsterdam, 1993); *Statistiek van voortbrenging en verbruik*; Smits, *Economic growth and structural change*, appendix VI, VII and XIV.
- United States: *Thirteenth census of the United States taken in the year 1909; Historical statistics of the United States. Colonial times to 1970*. Part 1; B.R. Mitchell, *International historical statistics. The Americas, 1750-1988; Foreign commerce and navigation of the United States, 1910-1913*.
- United Kingdom: E.M. Ojala, *Agriculture and economic progress* 208; *Census of production 1907. Final report of the first census of production of the United Kingdom 10; Annual statement of the trade and navigation of the United Kingdom with foreign countries and British possessions, 1910-1913*.

on profit margins in trade could be found. We were, however, able to estimate these margins in an indirect manner.

It should be noted that we have the disposal of value added data for the trade sector, calculated from the income side. Furthermore, it appeared to be possible to calculate the output value (turnover) of the trade sector, by summing up the output value of agriculture, industry as well as imports. By combining the value added estimates with the output data, (implicit) trade margins could be calculated. Fortunately, we were able to check the validity of this procedure. For the United States the 'implicit' trade margins could be compared to 'real' margins. It seems that these 'implicit' trade margins are fairly reliable<sup>23</sup>, although of course more direct information should be preferred. It is clear that more research into price development (i.e. a comparison of producer-, whole-sale- and retail prices) is needed.

As in sea shipping the Netherlands is a productivity leader in the trade sector. Value added per worker in the Dutch trade sector is almost 20% higher than in Britain. This is not surprising since from the seventeenth and eighteenth centuries onwards Amsterdam was one of the main centres of trade, transport and banking services. The level of productivity in France and the United States lies somewhat below the United Kingdom. The figure for Germany is surprisingly low. How can these differences in productivity be explained? It should be noted that high levels of productivity can be the result of a high turnover per worker and/or high trade margins. Table 7 gives some extra information on the structure of trade in the different countries.

Table 7. *International differences in the level of trade margins and the share of foreign trade in total value added of the trade sector in 1910 (indices; United Kingdom=100)*

	trade margins	%foreign trade
France	49	71
Germany	57	60
The Netherlands	68	166
United States	111	27
United Kingdom	100	100

Sources: see table 6.

Table 7 shows that the high level of productivity in the Dutch trade sector is not so much the result of high trade margins. On the contrary, the trade margins in the Netherlands are rather low in comparison to the British figures. It seems that the turnover per worker in the Netherlands was substantially higher than in other countries. This can partly be explained from the strong development of foreign trade in the Netherlands.<sup>24</sup> This part of the trade sector is labour extensive by nature. The share of income from wages in total value added is rather modest, while trade margins are very low due to economies of scale. Thus the relative low trade margins in the Netherlands, as well as the high level of value added per worker seem to be dependent on the share of foreign trade.

Value added per worker in France and the United States are more or less on the same level, despite the fact that the foreign trade sector in America is not that important. However, trade margins in the United States are quite high. This can probably be explained by the fact that retail trade (which is characterized by high trade margins) is strongly developed as a result of the high standards of living in this country. A comparison of the German and French figures leads to interesting results. Value added per worker in the German trade sector is much lower than in France, although the structure of the trade sector in these countries does not differ that much. The share of foreign trade in France and Germany amounts to 25-30%, while also the size of the trade margins do not vary much.

We therefore have to conclude that value added in the German trade sector is underestimated. Recently Fremdling has suggested that it is likely that Hoffmann's estimates are biased downwards.<sup>25</sup> Hoffmann estimated value added by combining employment data with data on income from wages. Finally, he made an additional income for capital income. It is well possible that the share of capital income in total value added is underestimated. Therefore new estimates for German trade should be made.

- *Government and Domestic Personnel*

For the other services (government and domestic servants) we made use of the existing data on employment and income. In the system of national accounts productivity in these kind of services is defined as the income per worker. The absence of price and output indicators do pose serious problems for the international comparisons of productivity. We take the arbitrary measure of real wages as an indicator of productivity performance. The wages in national currencies are converted into British pounds by means of a cost of living ratio.<sup>26</sup> This results into internationally comparable real wages which reflect the purchasing power of wage earners in the various countries. A disadvantage of the cost of living ratios is the limited coverage. The prices of foodstuffs are com-

pared as items such as rents and non-foods (fuel, textiles, etc.) are not included. 'Productivity' in domestic services is calculated in the same way as was done for government. Cost of living ratios were used to convert the output estimates into British Pounds.

Table 8. *Comparative 'productivity' in government, on the basis of cost of living ratio's, in 1910 (indices; United Kingdom=100)*

	United Kingdom weights	National weights
France	66	74
Germany	126	137
The Netherlands	84	91
United States	57	61
United Kingdom	100	100

Sources:

- France: Dormois, *Des machines*, 142, 404
- Germany: Hoffmann, *Das Wachstum*, 201-5, 487, 498.
- Netherlands: Smits, *Economic growth and structural change*, appendix IX and XIV.
- United States: Lebergott, 'Labor force', 119; *Thirteenth census*.
- United Kingdom: Lewis, *Growth and fluctuations*, 263, 265.

Table 9. *Comparative 'productivity' in domestic services, on the basis of cost of living ratios, in 1910 (indices; United Kingdom=100)*

	United Kingdom weights	National weights
France	62	69
Germany	75	82
The Netherlands	64	69
United States	81	87
United Kingdom	100	100

Sources: see Table 8.

Table 8 shows that 'productivity' in the German government sector is quite high, while the American figure is at a low level. As far as the domestic per-

sonnel is concerned, the United Kingdom is clearly the 'productivity leader' (Table 9). Contrary to the estimates for government, also in Germany value added per worker is substantially lower than in the United Kingdom. This proves that the wage and salary figures used by Hoffmann are not *systematically* overestimated. The results for the United States are also more in line with the estimates for the other countries. In France value added per worker in government as well as domestic services amounts to 60%-70% of the British level. In the Netherlands, however, the differences between the 'productivity levels' of government and domestic personnel are more considerable.

- *Aggregation*

Next, the separate branch estimates of comparative productivity will be aggregated to sector level, and a comparison of economy-wide productivity will be presented. Table 10 summarises the productivity estimates per branch. The picture that emerges from these branch estimates is that, in comparison to the continental countries, the United Kingdom had only a higher productivity level in communications and domestic services. The Dutch performed better in trade, which was probably due to the higher share of the more profitable foreign trade, and the better paid German officials were supposed to ensure bigger and 'better' government. The comparable levels of productivity in transport within Europe is remarkable. Transport is the only branch where none of the European countries had a clear productivity lead. Only in transport and communication were United States productivity levels higher than the British. In trade, government and domestic service United States performance was lower.

Table 10. *Comparative productivity per branch at the geometric average of national and United Kingdom weights (indices; United Kingdom=100)*

	Transport	Comm.	Trade	Govern	Domestic
France	102	73	90	71	66
Germany	101	79	55	131	78
the Netherlands	102	81	118	87	66
United States	155	142	96	59	84
United Kingdom	100	100	100	100	100

Sources: tables 1, 3, 5, 6, 8 and 9.

The separate branch productivity estimates were aggregated to sector level by means of value added weights. Table 11 reports the resulting figures of comparative productivity at sector level for the year 1910. It must be repeated that at this stage of research no productivity estimates could be made for some branches, such as inland transport, finance, and insurance. The sector estimates are based on the figures for five branches: transport (railways and shipping), communications, trade, government, and domestic services.

The figures indicate that overall productivity performance in services was higher in the United Kingdom than in Germany and France, but lower than in the Netherlands and the United States. Productivity levels in French and German services were not far apart: about 90% of the British level. The gap with the Netherlands was, however, small. The United States lead was somewhat firmer, but not when its performance is measured at United Kingdom weights. The modest productivity lead of the United States can be attributed to the small weight of its efficient branches: transport and communications. We do not think that the inclusion of the other services, such as inland shipping and finance, will substantially change the resulting picture.

Table 11. *Comparative productivity in services in 1910; estimates according to the benchmark comparison, the exchange rates, and in US dollars of 1985 (indices; United Kingdom=100)*

	Benchmark comparison		Exchange rate	US dollars of 1985
	National weights	United Kingdom weights		
France	84	95	58	54
Germany	91	86	79	61
The Netherlands	106	112	87	102
United Kingdom	100	100	100	100
United States	124	100	224	189

Sources: table 10 and Feinstein, *National income*; Historical statistics of the USA; Hoffmann, *Das Wachstum*; M. Lévy-Leboyer, & F. Bourguignon, *l'Economie Française au XIXe siècle. Analyse macro-économique* (Paris, 1985); W.A. Lewis, *Growth and fluctuations 1870-1913* (London, 1978); O. Marchand, & C. Thélot, *Population active, structure sociale, productivité et durée du travail depuis 200 ans*, (Paris, 1990); Maddison, *Dynamic Forces*.

The small difference in service productivity between the United Kingdom and the United States is one of the most remarkable findings, the more striking because the United States had a clear lead in manufacturing as well as agricul-

ture. Services seems to have been the only sector in which United States performance was not highly superior. Furthermore, a productivity comparison by means of the contemporary exchange rate suggests a large gap: performance in American services is then twice as high as the British level (Table 11). Estimates of service productivity in 1910 using exchange rates, and the extrapolated figures in US dollars of 1985 are also presented in the table. The benchmark estimates show, in comparison to the indirect and less reliable methods, substantially higher productivity levels for France and Germany: the gap with the United Kingdom is now less wide. The improvement in performance is considerable, especially for France. The Dutch productivity level is according to most approaches higher than the British level.

We have performed some sensitivity tests to analyze the vulnerability of the results to different assumptions and alternative weighting procedures. Firstly, we have assumed no productivity differences in the branches in which output is measured by the wage bill, i.e. government and domestic services. Secondly, we have aggregated the separate branch estimates with employment weights. The alternative results hardly deviate from the original results in which value added weights were used and productivity differences in government and domestic services were allowed (Table 12). The general picture is still the same. Labour productivity in services is, in comparison to the United Kingdom, higher in the Netherlands and the United States, but lower in France and Germany.

Table 12. *Alternative estimates of comparative productivity in services in 1910 assuming no productivity differences in government and domestic services (indices; United Kingdom=100)*

	Value added weights		Employment weights	
	National	United Kingdom	National	United Kingdom
France	91	103	96	96
Germany	84	86	83	83
The Netherlands	110	118	106	107
United Kingdom	100	100	100	100
United States	129	106	120	104

Source: see table 11.

An important result of the benchmark comparison is the small difference in productivity performance. The benchmark findings show less divergence than the extrapolated figures. Thus, productivity levels in services seem to have been less divergent in 1910 than hitherto assumed on the basis of exchange

rate comparisons or extrapolations in US dollars of 1985. These findings shed a new light on the timing and the (sectoral) pattern of the convergence process. Convergence in service productivity may have taken place at an earlier stage than at the economy level, and may have played a more important role in the narrowing of productivity gaps than manufacturing.

The benchmark comparison of service productivity can also be used to build up a direct estimate of productivity per worker for the whole economy. The benchmark estimates for agriculture and industry were added to the figures of service productivity to arrive at the following picture of GDP per worker in 1910 (Table 13).<sup>27</sup> Some of the observations on service productivity also apply to the economy-wide comparison of productivity. GDP per worker is, according to the direct comparison, for the continental countries closer to the British level: the benchmark figures indicate that performance in 1910 is ten percent points higher for France, Germany, and the Netherlands than the comparison by means of exchange rates suggest. The small productivity lead of the United States over the United Kingdom is again remarkable. The productivity level in United States services has a major effect on performance for the economy as a whole.

Table 13. *Comparative economy-wide productivity in 1910; GDP per worker according to the benchmark estimates, the exchange rates, and in US dollars of 1985 for the year 1913 (indices; United Kingdom=100)*

	Benchmark National weights	comparison United Kingdom weights	Exchange rate	1913 GDP in US dollars of 1985
France	79	77	67	61
Germany	88	75	76	64
The Netherlands	95	87	75	90
United States	144	114	180	142
United Kingdom	100	100	100	100

Source: Table 11 and A.L. Burger, 'New estimates of comparative income and convergence in the nineteenth century', mimeographed (Utrecht, 1995).

The difference between the benchmark figures of economy-wide productivity and the estimates based on the exchange rates is rather large. This observation might indicate that the benchmark figure for United States GDP per worker is too low. On the other hand, the correspondence between the estimate in US dollars of 1985 for 1913 and the benchmark figure for 1910 in United States weights (respectively 142 and 144) may give some credibility to our estimates.

It must be noted that the 1913 estimate is on the basis of the geometric average of the prices of both countries. The productivity figure at the geometric average for the United States/United Kingdom benchmark comparison is 130, which is somewhat lower than the extrapolation in US dollars of 1985. It is only in the United States/United Kingdom comparison that the results at own country weights are divergent. For the other countries there is hardly any difference between the results in United Kingdom or national weights.

GDP per worker in 1910 seems to have been about 80% of the British level in France and Germany, while Dutch performance reaches 90%. Thus, the estimates of economy-wide productivity by means of exchange rates and extrapolations vary considerably from the benchmark results on the eve of World War I. This observation may have some important implications. Firstly, it shows that exchange rates are indeed unsuitable for converting output into a common currency. This point has already been well established for the twentieth century, and our results indicate that it also holds for the nineteenth century.<sup>28</sup> Secondly, it may have an effect on our view of comparative performance on the eve of World War I. The benchmark comparisons may indicate that differences in GDP per worker and per capita income were in fact smaller than prior indirect estimates indicated. Thirdly, if the productivity figures according to the extrapolations in US dollars of 1985 and the figures on the basis of exchange rates indeed overestimate actual differences in GDP per worker between these countries, convergence in productivity performance and per capita income may have occurred earlier than previously believed.

#### *4. Conclusion*

This article has made a first attempt to quantify the differences in productivity levels in services between four European countries and the United States for the benchmark year 1910. This was not easy because of the low quality of service estimates in some countries. Section 2 discussed the quality of the estimates of service production in the different countries. Furthermore, it pointed out how some of these estimates can be refined. Section 3 presented productivity estimates of service productivity for the most important branches, namely railways, sea shipping, communications, trade, government and domestic services. In some cases we had to make our own estimates of service output, because no such data were available.

Despite the fact that much of the estimates presented in this article might be refined, some conclusions can already be drawn. So far the discussion on convergence and catching up has mainly dealt with manufacturing. In the literature it is stressed that convergence mainly took place in the twentieth century

as a result of the diffusion of technology. It seems that by including the services sector, a different pattern arises (see table 18).

Table 14: *Differences in productivity levels in services and the economy at large, 1910 (coefficients of variance)*

	Coefficient of variance
Services, direct estimates	0.10
Services, indirect estimates (in 1985 \$)	0.48
Whole economy, direct estimates	0.19
Whole economy, indirect estimates (in 1985 \$)	0.32

Sources: calculations based on tables 11 and 13.

First of all, it should be noted that according to our new, direct estimates the rate of convergence in services around 1910 is substantially higher than when the indirect estimates in 1985 dollars are used. Furthermore, we can conclude on the basis of the *direct* benchmark estimates, that the differences in productivity levels in services were much lower than in manufacturing and agriculture. By linking the results for services as presented in this article with direct productivity estimates that were already made, we can give some impression of the differences in productivity for the whole economy in the years preceding World War I. These figures show that the level of convergence for the economy at large was probably much larger than hitherto assumed in the historiography.

Our findings shed an interesting light on the timing and the pattern of the convergence process. According to the literature this process takes mainly place in the twentieth century, and especially after 1950. Furthermore, much attention is paid to differences in manufacturing productivity levels. Table 14, however, shows that already in 1910 the differences in overall productivity levels were rather small. Furthermore, the differences in the levels of output per worker were smaller in services than in the rest of the economy.

Convergence may also have followed a different pattern than assumed before. The transfer of technology in manufacturing is often mentioned as the cause behind convergence processes.<sup>29</sup> The results presented here suggest a different story. The convergence of per capita income levels that has been ascertained for the OECD countries may have been the result of employment shifts towards the service sector, for which international differences in productivity were very small. Differences in agricultural and industrial produc-

tivity were probably of greater importance in the divergence in per capita income levels between countries at the beginning of the twentieth century than differences in service productivity. There were larger productivity gaps in agriculture and industry than in services between the productivity leader, the United States, and Europe. In this view the observed convergence in per capita income among OECD countries is not the result of converging sectoral productivity levels, but the result of converging sectoral employment structures.<sup>30</sup> As over the course of the twentieth century labour increasingly moves out of agriculture and industry towards services, international differences in per capita income decrease.

Since twentieth century economic development is to a large extent accompanied by the growth of the public sector, we should pay more attention to these kind of services. It is obvious that the growth of the public sector can not be explained in terms of technological innovations. The process of productivity convergence should therefore not be analyzed solely in the framework of technological development. Also the political and institutional framework should be part of our analysis. The levelling of differences in income per capita in the twentieth century should be analyzed in terms of the growth of the modern welfare state as well.

## NOTES

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27. Benchmark estimates of industrial productivity were taken from Burger, 'Five-country comparison', and Broadberry, 'Convergence and manufacturing'. Agricultural output converters were taken from O'Brien & Prados, 'Agricultural productivity', whose work we extended to the US and the Netherlands.
28. Cf. Kravis, 'Comparative studies'.
29. Cf. Broadberry, *Manufacturing and convergence*; B. van Ark, *International comparisons of output and productivity. Manufacturing productivity performance of ten countries from 1950 to 1990* (Groningen, 1993) 85-86; W.J. Baumol, S.A. Batey Blackman and E.N. Wolff, *Productivity and American leadership. The long view* (Cambridge, MA, 1989) 100; D. Dollar and E.N. Wolff, *Competitiveness, convergence and international specialization* (Cambridge, MA, 1993) 10-14.
30. Cf. Burger, 'New estimates' for a further elaboration of this point.



# VIII

## DUTCH PATTERNS OF DEVELOPMENT: ECONOMIC GROWTH AND STRUCTURAL CHANGE IN THE NETHERLANDS 1800-1910

by

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### *I. Introduction*

The question whether the Dutch economy of the nineteenth century was backward or just different has been capturing the minds of historians for over fifty years now.<sup>1</sup> The pessimists often pointed at the late and slow process of industrialisation and at the supposedly slow rate of growth. The optimists, on the other hand, claimed that the Dutch economy grew at a steady pace (balanced growth) and that Dutch economic development was simply different from its neighbours. Due to the absence of reliable national income data for the nineteenth century this controversy has never been settled. New findings, however, enable to answer this question. Thanks to the relentless efforts of the Reconstruction of National Accounts research group we now have reliable growth rates for most of the previous century. In the following we will look into the characteristics of Dutch economic development and its supposed backwardness by investigating:

- (1) the rate of economic growth; did the Dutch economy grow less than the economies of its neighbours and in which periods was growth particularly lacking or concentrated?
- (2) the pattern of structural change; what kind of structural changes took place in the Dutch economy in the nineteenth century and in which way did they deviate from the 'ideal' or common 'European' pattern?

Economic backwardness is here not seen in Gerschenkronian terms with its focus on the development of industry.<sup>2</sup> In assessing a country's backwardness Gershenkron only looked at the industrial sector: the later a country industrialises the more backward it is supposed to be. Behind the work of Gerschenkron and others is the notion that the economic development of Brit-

ain was the succesful model that other countries simply followed, with industrial progress being the only path to economic growth and prosperity.<sup>3</sup> The focus on industry is out of date since many writers have shown that British development was not the growth model for Europe. Many countries followed their own specific growth pattern.<sup>4</sup> Furthermore, the focus on industry disregards positive developments in the agricultural and services sectors. Here income per capita is taken as the indicator of economic backwardness. By doing so the growth pattern of the economy as a whole, and not only one single sector, is considered.

Economic growth and structural change are closely related phenomena. Kuznets defined modern economic growth as a sustained increase in real product per capita, usually accompanied with sweeping structural changes.<sup>5</sup> Among those structural changes he mentioned, among others, the growth of population, the growth of productivity in all sectors of the economy, a decrease in the share of agriculture in total output and employment. Chenery and Syrquin illuminated in a quantitative way the structural changes of economies as income increases.<sup>6</sup> Their research revealed a pattern of common characteristics, a common pattern of structural change that accompanies the growth of national income. These patterns of development highlight the structural transformation of growing economies. Comparisons with the 'ideal' cross-country patterns can reveal the distinct features of the economic development of a given country. This procedure is adopted here to investigate the specific Dutch patterns of structural change.

## *2. Economic growth rates*

For a long time the Dutch economy of the nineteenth century has been described in terms of stagnation and backwardness. The late industrialisation in the Dutch economy was seen as evidence of its stagnation and of its backwardness. Early writers such as Van Dillen and Wieringa may have differed in their opinion on the causes of the stagnation, but they certainly agreed in their view of the development of the Dutch economy in the nineteenth century: stagnation for most of the century, and only after 1890 a strong upward development.<sup>7</sup> Many early writers have regarded industrialisation and economic growth as synonyms. The start of economic growth coincides with the expansion of industry at the end of the nineteenth century. Before that time, strong or sustained growth was lacking. This view was fortified by De Jonge's study on Dutch industry in which he dated the industrial breakthrough and strong growth in the economy as a whole in the 1890s.<sup>8</sup>

More recent studies, however, have pointed at strong growth in several sectors long before the 1890s. For instance, shipping on the Rhine already expe-

rienced fast growth in the 1830s, as well as the shipbuilding and cotton industries.<sup>9</sup> By looking at the other sectors than industry only Griffiths and De Meere came to the conclusion that the Dutch economy already started to grow in the 1830s.<sup>10</sup> Growth occurred in all sectors of the economy, so industry was not the draught horse of Dutch economic growth. Dutch economic development in the nineteenth century was in their view characterized by a long process of small but incremental balanced growth in all sectors. After putting Dutch economic development in the framework of Gerschenkron's theory of relative backwardness Griffiths concluded that the Dutch economy of the nineteenth century was not backward. It only developed later and in a different way than other European countries.<sup>11</sup>

Many of the mentioned studies lacked a sound statistical basis for their arguments. After publishing a pilot-study in 1987 in which he showed the results the method of national accounting could yield, Van Zanden formed a research group that has been investigating the main sectors of the Dutch economy in the nineteenth century.<sup>12</sup>

The findings of the research team on Dutch Historical National Accounts can settle the controversy over the rate of growth of the Dutch economy in the nineteenth century. The figures have been reconstructed within the framework of national accounts and replace previous proxy estimates of national income which should be regarded as unreliable.<sup>13</sup> The findings for the period 1850-1913 are not yet definitive, but they will probably be close to the final results of the project. The figures for the first half of the nineteenth century are provisional and may be subject to modifications for some specific industries, but that will probably not alter the overall growth rate to a great extent.

By comparing income per capita and its growth rate of several European countries in the nineteenth century we obtain a better judgement of the alleged backwardness of the Dutch economy. A backward country is expected to show slower rates of per capita output growth, and a lower income per head of population. Table 1 reports growth rates of real Gross Domestic Product (GDP) per capita for ten European countries between 1820 and 1913. For two subperiods we compare the annual growth rate of the Dutch economy to other European nations.

In the first subperiod economic growth in the Netherlands was somewhat lower than the European average. Growth performance was on par with countries like Germany, Sweden and Norway, but considerably smaller than in Belgium and the UK. The greater part of the growth in the first subperiod was concentrated in the 1860s. Growth was much slower in the period 1820-50. The precise rate of growth before 1850 is, however, not yet clear. There are indications of a positive but modest growth rate. Here we have assumed a pessimistic scenario of zero per capita income growth.<sup>14</sup> The figures at hand for the years

Table 1. *Annual growth rates of real Gross Domestic Product per capita , 1820-1913*

	1820-70	1870-1913
Netherlands	0.7	1.2
Belgium	1.4	1.0
Denmark	0.9	1.6
France	0.8	1.3
Germany	0.7	1.6
Italy	0.4	1.3
Norway	0.7	1.3
Sweden	0.7	1.5
Switzerland	n.a.	1.2
UK	1.2	1.0
Arithmetic average	0.9	1.3

Source: A. Maddison, *Dynamic Forces in Capitalist Development. A Long-Run Comparative View* (Oxford, 1991) 49. For the Netherlands the latest growth rates of the research project 'Reconstruction of National Accounts of the Netherlands 1800-1940' have been used.

before 1850 are not (yet) as solid as for the period after 1850, but future revisions will definitely leave substantial differences in the growth rates.

In the second sub-period Dutch growth performance was more substantial and comparable to that of its neighbours. Between 1870-1913 only Denmark, Germany and Sweden grew clearly faster than the Netherlands. Closer scrutiny of the data reveals that growth accelerated in the 1870s, and again after 1895. These figures imply that Dutch economic growth in the nineteenth century was not spectacular or exceptional. It is clear that Dutch growth stayed behind the growth rates of other European countries until the 1850s. Generally, the Dutch economy in the nineteenth century grew at an average rate. If there has been a period in which growth lagged, it was before the 1850s.

Next, we will turn to the evidence on comparative income levels. Table 2 reports Maddison's estimates of income per capita for ten European countries. These figures should be interpreted with some caution due to the familiar index number problems. Nevertheless, the broad outline of the figures, which are the best available, is sufficiently reliable. The table clearly shows that the Netherlands were a high-income-country at the beginning of the nineteenth century. The Netherlands rate second after the UK. It could be that national income for the year 1820 was somewhat lower than 20 years earlier because in

1820 the Dutch economy had not yet fully recovered from the blows to trade and industry resulting from the Napoleonic period. Due to the greater importance of trade and export industries the Dutch were probably more severely hit than other countries.

Table 2. *GDP per capita in 1820 and 1913 (in US dollars at 1985 US prices)*

	1820	1913
Netherlands	1223	3178
Belgium	1024	3266
Denmark	988	3037
France	1052	2734
Germany	937	2606
Italy	960	2087
Norway	856	2079
Sweden	947	2450
Switzerland	n.a.	3086
UK	1405	4024
Arithmetic average	1044	2855

Source: Maddison, *Dynamic forces*, 6-7. The Dutch figure for 1820 has been computed on basis of the growth rates in Table 1.

One hundred years later the Netherlands had lost little ground considering its third place in the income ranking. At the brink of the twentieth century Belgium was the only European nation that had surpassed the Dutch and taken the second place after the UK. Nevertheless, the Netherlands were still considerably wealthier than other European countries. In 1913 as well as in 1820 Dutch GDP per capita was about ten to fifteen percent higher than the average.

The evidence presented in this section leads to the conclusion that with regard to income per capita or growth rates the Dutch economy cannot be described as backward. The Dutch economy grew at an average European rate and the Netherlands was one of the richest countries in Europe at the beginning of the nineteenth as well as the twentieth century. It is also clear now that Dutch growth in the nineteenth century was not confined to the industrial sector. On the contrary, agriculture and some services sectors may have prospered earlier than industry.<sup>15</sup> Also it is clear now that growth occurred before 1890 or 1870. The views of earlier older writers who dated the start of Dutch economic growth in the 1890s are not confirmed. The Dutch economy grew earlier, at least from the 1860s onwards. If growth took place prior is difficult

to say. The growth record of the period before 1850 has not been fully compiled yet. Some missing information prevents drawing up a balance. The Dutch economy clearly expanded in the first half of the nineteenth century, but population grew as well. If there was any per capita growth it was probably not very large. Still it seems that Griffiths and De Meere were overoptimistic in their claim for balanced growth in the first half of the century. Besides the fast growing industries they examined there were other less spectacular growing industries.<sup>16</sup> The earlier writers, on the other hand, were too pessimistic in stating that there was no growth before the 1890s.

### *3. Dutch patterns of structural change*

Another way of establishing the backwardness of the Dutch economy is to compare its structural features with the so-called 'European norm' derived from the European patterns of development. Patterns of development offer a quantitative description of the structural changes in an economy that accompany a rise in per capita product. These patterns have been established by Chenery & Syrquin for the period 1950-1970.<sup>17</sup> Chenery & Syrquin regarded economic development as a multidimensional transition from one relatively constant structure to another. They have singled out ten development processes that describe the structural transformation of a low income country into a rich one. The ten processes are: investment, education, structure of demand, structure of production, structure of trade, labour allocation, urbanisation, demographic transition, income distribution and government revenue. Using data from one hundred countries and taking per capita income and population size as independent variables they built regression equations which describe the relationship between structural variables and a rise in per capita income. These equations simply established the occurrence of structural changes as income per capita grows, without making inferences on the direction and nature of causal relationships.

Following the Chenery & Syrquin methodology, Crafts has derived patterns of structural change for nineteenth century Europe.<sup>18</sup> These patterns reveal the 'stylised facts' of European economic development as income per capita grows. The underlying regression equations enable the measurement of each country's divergence in structural change from the 'typical' or 'normal' European pattern. This section compares the Dutch patterns of development to the patterns of a 'typical' European country which has the same population size and per capita income as the Netherlands. This procedure helps to highlight the distinct characteristics of the Dutch economy and its structural transformation in the nineteenth century. It also reveals the divergence in structural change from the European pattern.

Table 3. *Patterns of development in the Netherlands 1810-1910*

	1810	1850	1870	1890	1910
I. Accumulation					
1. Domestic investment (percentage of GNP)					
Actual value	n.a.	8.6	10.1	12.6	18.9
European norm	12.1	12.4	14.6	16.7	18.4
2. School enrolment (percentage of population aged 5-19 enrolled in primary education)					
Actual value	n.a.	41.4	44.2	45.2	49.1
European norm	27.1	28.3	39.0	49.5	57.5
II. Resource allocation					
3. Structure of demand					
a. Private consumption (percentage of GNP)					
the Netherlands	n.a.	74.3	70.7	81.0	84.4
European norm	83.1	82.5	79.9	77.5	75.5
b. Government consumption (percentage of GNP)					
the Netherlands	n.a.	5.3	4.4	4.9	5.2
European norm	7.6	7.5	6.9	6.4	5.9
4. Structure of trade (exports as a percentage of GNP)					
Actual value	n.a.	19.2	57.6	48.8	55.1
European norm	15.1	14.6	19.5	24.0	27.2
5. Structure of production					
a. Share of agriculture (percentage of GNP)					
Actual value	31	23	27	19	17
European norm	45.0	44.2	35.0	26.0	19.3
b. Share of industry (percentage of GNP)					
Actual value	27	31	27	33	35
European norm	19.9	20.7	24.7	28.8	31.9
III Demographic and distributional processes					
6. Labour allocation					
a. Share of agriculture in total labour force					
Actual value	43	40	37	34	28
European norm	58.5	58.5	48.4	38.9	31.9
b. Share of services in total labour force					
Actual value	31	29	31	35	37
European norm	21.5	22.0	28.4	34.7	39.4
7. Urbanisation (percentage of population living in towns over 20,000 inhabitants)					
Actual value	19.0	21.0	24.1	33.4	40.4
European norm	3.8	6.0	15.7	25.3	33.0
8. Demographic transition					
a. Crude birth rate (births per 1000 inhabitants)					
Actual value	31.7	34.6	35.9	32.9	28.6
European norm	33.3	33.7	31.2	28.9	27.3
b. Crude death rates (deaths per 1000 inhabitants)					
Actual value	29.0	22.2	25.9	20.5	13.6
European norm	22.0	22.7	20.1	17.8	16.3

Notes: Many of these figures are state of the art, and not the definitive results of the research project 'Reconstruction Dutch National Accounts'.

Source: Appendix I.

The 'European norm' is but a theoretical construct which merely represents the average patterns of structural transformation of European countries in the nineteenth century. No country was completely 'normal' or 'typical' in its patterns of change. The 'European norm' has been derived from the countries Crafts included in his regressions. Early developers, or high-income countries, and countries from Northwestern Europe are overrepresented in his sample. The Dutch structural changes are, thus, compared to the changes that have taken place in the economically more advanced European countries.

Table 3 reports the actual Dutch levels of 12 variables that represent economic development. In addition to the variables and their regressions Crafts has reported, we also have included the variables foreign trade, urbanisation rate and share of services in total employment, which belonged to the set of variables that Chenery and Syrquin have derived and for which reasonable reliable data is available.<sup>19</sup> The values for the 'European norm' describe the 'normal' changes in the economic structure for a 'typical' European country with the same population and income level as the Netherlands. The Netherlands is thus compared to an a-temporal and counterfactual equivalent that shows typical 'European' features. The Dutch patterns of development offer a description of the typical features of the Dutch economy and its structural transformation. It does not offer a clear cut analysis in itself. The results still need to be analyzed.

### *Accumulation*

One of the most distinct features of the Dutch economy in the nineteenth century is without doubt the low investment rates. The accumulation of physical capital and after 1880 also human capital remained clearly behind the European norm. Considering the low rate of domestic investment, the growth rate of the Dutch economy has been rather satisfactory (section 2). Despite large public expenditures for the improvement of the infrastructure since the 1860s, investment rates stayed persistently low. The investment rates remained low, but converged slowly to the European norm. An investment 'spurt' at the turn of the century resulted into a normal European value in 1910. The table also reveals the large commitment to foreign investment, a feature that the Dutch shared with the British.<sup>20</sup>

Attendance of children at primary and secondary schools is taken as an indication of human capital formation. Dutch school rates show a remarkably slow growing trend. At first, the rates were well above European standards in the first half of the nineteenth century. A high proportion of Dutch children went to primary or secondary schools. However, school rates grew less than would

be expected, and from the 1880s onwards they fell below the European norm. A strong element of the Dutch economy thus gradually eroded and became a weakness. This development is difficult to explain. The government expenditures on education continued to rise steadily after 1870. Moreover, the ratio of children aged 6 to 12 attending school rose from 80% in 1870 to 90% in 1900.<sup>21</sup> And Dutch literacy rates were still very high at the turn of the twentieth century.<sup>22</sup> The lower school rates may be due to smaller attendance at secondary education in the Netherlands. Furthermore, one should bear in mind that the European norm is an a-temporal norm that is mainly based on income levels. It predicts Dutch school rates at an income level that many other European countries only achieved halfway the twentieth century.

### *Resource allocation*

Sectoral shares of output and employment are probably the most common used indicators of structural change. A long-standing feature of the Dutch economy is the relatively low share of agricultural output and employment. The Dutch agricultural sector already declined in the preceding centuries. According to De Vries agriculture employed only 40% of the Dutch labour force as early as 1700.<sup>23</sup> It should be noted that the shares of agricultural employment and output converge to European standards as the differences between actual values and the norm decline over the course of the nineteenth century.

A highly productive agricultural sector is another long-standing feature of Dutch economic development. The sectoral productivity gap is modest in comparison with other countries. The gap increased after 1890 when the share of agriculture in national output declined faster than agricultural employment. Thus, also with regard to agraricultural productivity the Netherlands became a more 'normal' European economy at the end of the period.

The share of industry in national output shows a idiosyncratic trend which may be at the heart of the peculiarities of Dutch economic development. Considering the European norm, a gradual rising trend would be expected. In the age of European industrialisation the share of industry in national product increased from 27% in 1810 to 31% in 1850, but afterwards decreased to 27% in 1870. Only after 1870 is a rising trend in industry's contribution to national wealth observed for the rest of the period. The first half of the nineteenth century showed a short but substantial revival of the some industries as a result of the increased exploitation of the colonies in the East-Indies. The revival of these industries, which were typical for the commercial capitalistic structure of the Dutch economy of that time, ended in the 1850s. The decline of industry after 1850 probably reflected the decline of these industries. From

the late 1850s onwards a new economic structure emerged: industrial capitalism.<sup>24</sup> The growth of more modern industries from 1865 onwards and also after 1890 on the waves of the second industrial revolution, accounts for the rising contribution of industry to the nation's output.<sup>25</sup>

Dutch demand patterns seem different from elsewhere. Private as well as government consumption were at first well below the European norm. Thus, we may conclude that the low domestic investment was not caused by high private consumption. The particular development of private consumption can be put into perspective by including information on foreign trade. The Netherlands were an economy for which foreign trade mattered a lot. Although the information is not yet completely available, we have a fairly accurate picture of the development of the balance of trade and its relation to domestic expenditures. At first the share of private consumption remained far below the European norm. The trade balance showed at the same time a large export surplus that resulted from low domestic consumption and investment. After 1880 the situation reversed. The higher share of private consumption was probably caused by a substantial import surplus. Government in the Netherlands was relatively small. The share of government expenditures were relatively small but converged to European standards. The difference with the norm decreased steadily since 1870.

The high share of exports reflect the open character of the Dutch economy. The Netherlands was in the nineteenth century still a country of trade and merchants, as it had been since its Golden Age. The reliance on export demand increased sooner than it decreased over time. Exports rose especially fast between 1850 and 1870. At the turn of the century exports accounted for 50-60% of national income, a figure that is twice as high as the European norm.

### *Demographic processes*

Considering the high rate of urbanisation, the Netherlands were already a modern country long before 1800. Its urbanisation rate has been the highest in Europe since at least 1500 (De Vries).<sup>26</sup> The high rate was, of course, to some extent connected to the relatively small agricultural and, thus, rural population and the large service sector. Still, the urbanisation rate of the Netherlands was in 1810 by comparative standards extraordinary high. However, in the course of the century the differences with the European norm decreased considerably. The rate in 1910 remained high, but not as spectacularly as a century earlier.

The demographic transition in the Netherlands is generally believed to have been late. Birth rates as well as death rates declined earlier in other countries.

The a-temporal comparison between the Netherlands and its counterfactual equivalent in income and population size but with 'European' features, also reveals this picture. Both birth and death rates were relatively high. The rates slowly approached the European norm, although the convergence is less apparent for death rates. The continuously high death rates were mainly caused by the poor quality of drinking water and bad hygiene in the cities. These circumstances made the urban population vulnerable for cholera epidemics. Thus, the unusually high death rates in the Netherlands were (at least partly) due to the modern feature of a high urbanisation rate.

### *Evaluation*

Looking at the whole of Dutch economic development in the nineteenth century, a first conclusion is at hand. It seems that the Netherlands was closer to being a normal European country in 1910 than a century earlier. The Dutch economic structure deviated less from European standards in 1910 than around 1800-50. The features of the Dutch economy of that time were largely a result of the economic structure of the Dutch Republic. The legacy of the Golden Age and its merchant-capitalistic structure was apparent in many features, such as a small but productive agricultural sector, a large service sector, the high rate of urbanisation, and high death rates.

Under the new conditions created by the industrial era, that economic system was no longer viable and gradually a reorientation towards a new economic system took place. Especially after 1860/70, when the local and provincial taxes were abolished and a national transport infrastructure was completed, a more common European structure emerged. Convergent trends are clearly visible in, for example, school rates, government consumption, employment in agriculture, and urbanisation. It is not a coincidence that the transition to the industrial-capitalist structure kicked off at the same time as Kuznetsian 'modern economic growth'.<sup>27</sup>

At the end of the nineteenth century the Netherlands was less different from its neighbours than a century earlier. In the course of the nineteenth century the Netherlands had become a common European country. However, despite these converging trends the Dutch economy still showed some particular characteristics at the turn of the century. The high share of exports in national income reveals that despite some similar 'European' features the Dutch were eager to continue their reputation as a people of merchants.

Like any other European country, the Netherlands had followed its own specific development path. The result was, however, a more typical European (industrial-capitalistic) economic structure than the point of departure a century earlier. Thus, the patterns of development show the specific transition of

the Dutch economy from a divergent merchant-capitalistic structure into a much more typical or average European country with a normal industrial-capitalistic structure.

#### *4. A comparison of Dutch and British patterns of development*

Comparing the structural transformation of the Netherlands and Great Britain sheds new light on the peculiarities of Dutch economic development in the nineteenth century. A comparison with Great Britain is useful because it was the richest country at that time and it is considered as an example of early and successful structural transition to a prosperous society.

Table 4 shows the British patterns of development, as reported by Crafts, and also the variables foreign trade, urbanisation and the share of services in the working population. It is clear from the table that the Dutch and British structural transformation was in several ways strikingly similar. Both economies more or less show the same modern features and the same weaknesses.

The modern characteristics of the British economy include the small but productive agricultural sector, a large service sector, and high rates of urbanisation. The share of agricultural employment was throughout the period well under the European norm. From 1840 onwards it was only half of the predicted value. The share of service employment was relatively high, but converged to more 'normal' values at the end of the period. Urbanisation rates were also higher than the European norm. The differences remained stable as no trend versus convergence or divergence can be observed.

Also the weaknesses of both economies were similar. Strangely enough, the accumulation of physical capital was slow in the two richest countries of nineteenth century Europe. What is remarkable is that the low rates of domestic investment play a prominent role in the 'failure' historiography of both countries.<sup>28</sup> The lack of investment opportunities in the home country has often been mentioned as the most likely explanation in both cases.

Despite these similarities there were also some substantial differences. One difference concerned the Dutch economy's larger dependence on export demand. The share of exports in GNP rose to over 50% in the Netherlands while the British figure remained stable at a level of about 20%.

The most important difference of the two countries' structural transformation concerns the growth and importance of the industrial sector. In the UK industry grew at an earlier point in time and became more and more important, while industry in the Netherlands developed later and grew less. The reasons for the absence of an early industrialisation in the Netherlands cannot be easily accounted for by the data on the structural transformation of both econo-

Table 4. *British patterns of development 1700-1910*

	1700	1760	1800	1840	1870	1890	1910
I. Accumulation process							
1. Domestic investment (percentage of GNP)							
Actual value	4.0	6.0	7.9	10.5	8.5	7.3	7.0
European norm	10.9	21.1	12.6	14.5	17.5	18.9	19.8
2. School enrolment (percentage of population aged 5-19 enrolled in primary education)							
Actual value	na	na	na	na	16.8	38.5	54.2
European norm	na	na	na	na	51.4	58.2	62.6
II. Resource allocation Processes							
3. Structure of demand							
a. Private consumption (percentage of GNP)							
Actual value	91.2	74.4	76.8	80.4	80.5	81.6	73.8
European norm	83.5	82.0	81.0	78.5	75.0	73.3	72.1
b. Government consumption (percentage of GNP)							
Actual value	4.8	12.7	15.3	7.9	4.8	5.9	8.2
European norm	7.9	7.6	7.5	7.0	6.2	5.9	5.6
4. Structure of production							
a. Share of agriculture (percentage of GNP)							
Actual value	37.4	37.5	36.1	24.9	18.8	13.4	10.3
European norm	51.3	46.5	44.8	37.3	25.0	19.1	15.3
b. Share of industry (percentage of GNP)							
Actual value	20.0	20.0	19.8	31.5	33.5	33.6	31.8
European norm	18.5	20.7	22.1	25.9	31.6	34.3	36.2
5. Structure of trade (exports as a percentage of GNP)							
Actual value	na	na	na	15.5	25.6	21.2	22.2
European norm	na	na	na	13.3	20.1	22.8	24.3
III Demographic and distributional processes							
6. Labour allocation							
a. Share of agriculture in total labour force							
Actual value	57.1	49.6	39.9	25.0	20.0	16.3	15.1
European norm	68.0	63.2	62.4	55.5	42.4	36.3	32.6
b. Share of services in total labour force							
Actual value	na	na	na	30.8	39.6	43.1	45.1
European norm	na	na	na	26.0	34.8	38.9	41.5
7. Urbanisation (percentage of population living in towns over 20,000 inhabitants)							
Actual value	na	na	23.1	30.7	42.0	53.7	60.6
European norm	na	na	9.8	20.4	33.0	39.8	44.3
8. Demographic transition							
a. Crude birth rate (births per 1000 inhabitants)							
Actual value	33.1	33.9	37.7	35.9	35.2	30.2	25.1
European norm	36.8	35.8	36.1	34.8	31.8	30.4	29.6
b. Crude death rates (deaths per 1000 inhabitants)							
Actual value	26.5	28.7	27.1	22.2	22.9	19.5	13.5
European norm	26.3	25.4	26.0	25.0	21.9	20.6	19.9

Notes: The school enrolment figure for 1870 is misleadingly low according to Crafts, p.451.

Source: Crafts, 'Patterns' 450. Data on labour force in services and urbanisation, Appendix I. Foreign trade figures from B.R. Mitchell, *British historical statistics* (London, 1988).

mies. Crafts considered two features crucial for Britain's industrial revolution: a declining agricultural sector which releases labour at an early stage, and the small productivity gap between agriculture and the other sectors of the economy.<sup>29</sup> These two features were also distinct characteristics of Dutch economic development, yet the Netherlands did not industrialize.

Why the Dutch economy did not experience an early industrialisation is still the subject of a continuing and unresolved debate. Explanations focus on high wages and on high production costs, which include wages, raw materials and transportation.<sup>30</sup> The industrial era offered new mechanised production techniques based on the application of steam power and the use of coal as fuel. Thanks to its natural endowments the British could take full advantage of the latest technologies to establish a lead in manufacturing.<sup>31</sup> The Dutch lacked the crucial natural resources such as coal and iron ore. Of course, the availability or absence of natural resources cannot entirely explain the difference between Dutch and British development. It has been of equal importance that the unfavourable Dutch natural resource endowments could not be compensated by low factor prices, economies of scale or pioneering technology. Especially factor prices seem to have mattered as a recent study shows that the growth of Dutch industry in the second half of the nineteenth century is highly correlated with an improvement in its comparative wage-productivity ratio.<sup>32</sup> The picture that emerges from these studies is that the Dutch could not be in the front of industrial development as they lacked the necessary natural resources. They could not be immediate followers either, because production costs were too high.<sup>33</sup>

On the other hand, it is anachronistical to expect an early industrialisation in the Netherlands. British development was not the only successful model in the nineteenth century. Like any other country the Netherlands followed its own path of development. While Britain in the nineteenth century evolved into an more industrial economy, the Dutch specialised in services and (later) also in agriculture. Both agriculture and services contributed substantially to the economic progress of the nineteenth century. The absence of an early industrialisation in the Netherlands should not be seen as a failure. The specialisation in services and agriculture, following its natural endowments and comparative advantage, has been a positive response to the economic challenges of the nineteenth century. Considering its growth rate and income levels in the nineteenth century, the Dutch economy developed rather well for an economy that was not in the forefront of industrial expansion. Dutch economic development was clearly not backward, but simply different and by no means less successful.

By taking a very long run perspective we can regard Dutch economic development in the nineteenth century as a step in the transition of the Netherlands from a world power and strongest economic state in the seventeenth century

to the small and ordinary European country of today. Some of the main developments can be illustrated by the comparing the long run changes in employment structure in the Netherlands to those in the UK. The employment data reveal the distinct characteristics of the Dutch economy during its Golden Age. It is clear from Table 5 that the share of agricultural employment was small at an early stage. The Netherlands had around 1700 probably the smallest and most productive agricultural sector in the world. Either through voluntarily specialisation or compelled by natural circumstances of a rising water level dairy farming became more and more important in the western part of the Netherlands. As a consequence, grains were imported which stimulated international trade and transport. The growth of Amsterdam as a staple market strengthened these trends as well as the genesis of several kinds of related industries such as shipbuilding, rope and sails. Other industries also flourished as export opportunities rose. The extent of the non-agricultural activities is reflected in the large shares of the working population employed in industry and services. At the time the Dutch economy was more modern than the British. The Dutch employment structure of 1700 is almost the same as the British of 1820. This means that the Netherlands had already around 1700 an employment structure of an industrialised country. As the central position of Amsterdam as a staple market and the dominant Dutch role in trade and transport diminished industry was more hit than services. During the eighteenth century some kind of de-industrialisation process took place as output in many industries declined.<sup>34</sup> The Dutch had during their prime in the seventeenth and eighteenth centuries competitive export industries, mainly based on 'veredeling', that is transforming imported raw materials and half products into finished goods. These industries were already in the eighteenth century subject to a decline under the strain of foreign rivalry, especially British and French. Due to the barriers imposed on their trade and the innovations in British industry the Dutch had at the end of the eighteenth century not only lost the battle at sea, they had also lost the battle in manufacturing.

In comparison to many European countries the UK had an uncommon early release of labour out of agriculture. The shift away from agriculture accelerated in the nineteenth century and the role of industry and services grew. The Netherlands experienced even an earlier release of labour out of agriculture than the UK. The eighteenth century witnessed a stagnation in the transformation of agriculture, while the share of industry in employment declined. The decline of industry was only reversed from the middle of the nineteenth century, but the size of industrial employment was still modest in comparison to the UK. Even at the end of the twentieth century when the employment structure of the two countries has converged, some long-standing features are still present. Although the differences are now very small, agriculture is still more

important in the Netherlands, while industry has less significance than in the UK.

Table 5. *Structure of employment in Britain and the Netherlands 1700-1989*

	United Kingdom			the Netherlands		
	Agriculture	Industry	Services	Agriculture	Industry	Services
1700	56	22	22	40	33	27
1820	40	32	28	43	25	31
1890	16	44	43	34	30	35
1989	2	29	69	5	26	69

Source: Maddison, *Dynamic forces*, 32; Table 3.

### 5. Conclusion

The Dutch economy of the nineteenth century cannot be described as backward considering its comparative income level in the nineteenth century. It grew at an average European rate and was one of the richest countries of its time. With regard to the structural transformation of the Netherlands it is evident that the economy showed many modern features at the beginning of the nineteenth century, such as the small and productive agricultural sector, large share of service employment, and high rates of urbanisation. There is no doubt that the Dutch economy rated among the most modern economies of its time.

The development of industry has been the most peculiar aspect of Dutch structural transformation, which the comparison with the 'modern' economy of Great Britain also reveals. Both modern and backward features of the two economies are alike. The only substantial difference concerns the absence of an early industrialisation in the Netherlands. It must be mentioned that despite an early industrialisation the Dutch economy grew at a substantial rate and maintained one of the highest national income figures in Europe. On the other hand, from a counterfactual point of view there could have been opportunities for an even higher growth rate and income level if Dutch industry had managed to grow at an earlier point in time.

The development of the Dutch economy in the nineteenth century seems to fit in the Chenery & Syrquin concept of structural transformation that reflects the transition of one relatively stable economic structure to another. In the Dutch case the first structure has been the merchant-capitalist system which already showed some 'modern' characteristics. In the course of the nineteenth century it became increasingly apparent that the rather unique merchant-capi-

talist system was replaced by a more common industrial-capitalistic economic structure. The decisive changes took place in the period 1850-70 as Kuznetsian 'modern economic growth' swept through the Dutch economy.

These observations might to some extent rehabilitate Brugmans, one of the older writers on Dutch economic development in the nineteenth century. But, it must be stressed that in the eyes of a historian from the 1990s Brugmans was only right for the wrong reasons. After having portrayed the Dutch economy of the first half of the nineteenth century as stagnant and backward, Brugmans dated the transition period to a state of dynamic, entrepreneurial, and economic progress between 1850 and 1870. Brugmans chose this particular period because it witnessed, in his view, the start of the Industrial Revolution in the Netherlands. For a historian of Brugmans' generation the Industrial Revolution was a synonym for economic growth and progress.<sup>35</sup>

What exactly happened in the years of transition and why is not entirely clear yet. What is clear is that the rapid development of industry in this period was just one of the changes. To identify the major changes is one thing, to assess their relative importance in the process of modern economic growth is another task that belongs to the greater challenges of the historical national accounts project.

### *Appendix I*

The values for the European norm, i.e. the counterfactual country with the same population and income levels as the Netherlands had but with typical European characteristics, were derived from the regressions Crafts ('Patterns', 441) reported and from the regressions mentioned below. Dutch national income data was expressed in US dollars at prices of 1970 using the most recent growth rates of the research project 'Reconstruction of Dutch National Accounts'. Population figures, as well as crude birth and crude death rates were taken from E. Horlings, *De ontwikkeling van de Nederlandse bevolking in de negentiende eeuw, 1795-1913* (mimeographed, Utrecht, 1993). Data on investment, private consumption, government expenditure and exports came from Smits and Horlings, 'Private consumer expenditure in the Netherlands', Van der Voort, *Overheidsbeleid en overheidsfinanciën*. Finally, school enrolment figures were taken from B.R. Mitchell, *European historical statistics* (London, 1991).

In addition to the regression equations and variables Crafts (1983) has reported, three more variables have been included, i.e. export share in GNP, share of service employment, and urbanisation rate. The regression equation for the exports variable was taken from C. Molinas and L. Prados de la Escosura, 'Was Spain different? Spanish historical backwardness revisited', *Explora-*

tions in *Economic History* 26 (1989) 392. The equations for the urbanisation and service employment variables were obtained by combining the information on: GNP in US dollars of 1970, population levels, urbanisation rates, and service employment. These two equations share the functional form of the Chenery & Syrquin and Crafts equations.

Variable	Constant	lnY	lnN	R <sup>2</sup>	SEE	N
URB	-155.855 (-7.948)	25.931 (8.340)	3.950 (4.206)	0.66	8.162	62
SERLAB	-92.309 (-5.101)	18.908 (6.852)	-0.511 (-0.680)	0.45	6.549	57

where,

URB = percentage of population living in towns over 20,000 inhabitants;

SERLAB = share of services in total labour force;

lnY = natural logarithm of per capita income in US dollars of 1970;

lnN = natural logarithm of population levels in millions.

T-statistics are reported in parentheses.

The data for these regressions were taken from the following sources.

- GNP in US dollars at 1970 prices, Crafts, 'New estimates' 389.
- population, Mitchell, *European historical statistics*.
- urbanisation rates, De Vries, *European urbanisation*; P. Flora, *State, economy and society in Western Europe 1815-1975* (Frankfurt, 1987); Dutch rates were kindly provided by Edwin Hurlings and Jan-Pieter Smits.
- service employment, Flora, *State, economy and society*; C.H. Feinstein, *National income, expenditure and output of the United Kingdom, 1855-1965* (Cambridge, 1972); W.G. Hoffmann, *Das Wachstum der Deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin, 1965); W.A. Lewis, *Growth and fluctuations 1870-1913* (London, 1978); O. Marchand, and C. Thélot, *Population active, structure sociale, productivité et durée du travail depuis 200 ans*, (Paris, 1990); Mitchell, *European historical statistics*.

## NOTES

1. For an overview of the debate, see: E.J. Fischer, 'De geschiedschrijving over de 19e-eeuwse industrialisatie', in: W.W. Mijnhardt (red.), *Kantelend geschiedbeeld. Nederlandse historiografie sinds 1945* (Utrecht, 1983) 328-358, and J.L. van Zanden, 'Dutch economic history of the period 1500-1940: a review of the present state of affairs', *Economic and Social History in the Netherlands* 1 (1989) 9-29.

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3. Exponents of this view are not rare. Cf. the introduction of R. Sylla and G. Toniolo (eds.), *Patterns of European industrialization* (London, 1991) 2.
4. See P.K. O'Brien, and C. Keyder, *Economic Growth in Britain and France 1780-1914* (London, 1978); N.F.R. Crafts, 'Gross National Product in Europe 1870-1910: Some New Estimates', *Explorations in Economic History* 20 (1983) 387-401; R. Cameron, 'A new view of European industrialization', *Economic History Review* 38 (1985) 1-23.
5. S. Kuznets, *Modern Economic Growth. Rate, Structure and Spread* (New Haven, 1966).
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8. J.A. de Jonge, *De industrialisatie in Nederland tussen 1850 en 1914* (Amsterdam, 1968).
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10. J.M.M. de Meere, *Economische ontwikkeling en levensstandaard in Nederland gedurende de eerste helft van de negentiende eeuw* (Amsterdam, 1980).
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12. J.L. van Zanden, 'Economische groei in Nederland in de negentiende eeuw, enkele nieuwe resultaten', *Economisch- en sociaal-historisch jaarboek* 50 (1987) 51-76.
13. R.T. Griffiths and J.M.M. de Meere, 'The Growth of the Dutch National Economy in the 19th Century - Back to Basics?', *Tijdschrift voor Geschiedenis* 96 (1983) 563-572.
14. See Van Zanden 'Economische groei' 59.
15. E. Horlings, *The economic development of the Dutch service sector 1800-1850. Trade and transport in a premodern economy* (Amsterdam, 1995); J.L. van Zanden, *De economische ontwikkeling van de landbouw in de negentiende eeuw, 1800-1914* (Wageningen/Utrecht, 1985).
16. J.C.M. Jansen, *The development of Dutch industry 1800-1850*, (forthcoming).
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18. N.F.R. Crafts, 'Patterns of Development in Nineteenth Century Europe', *Oxford Economic Papers* 36 (1984) 438-458.
19. See appendix I for a full statement of sources and procedures.
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22. A.M. van der Woude, 'De alfabetisering', in: *Algemene Geschiedenis der Nederlanden* 7 (Haarlem, 1980) 257-264; R. Cameron, *Economische wereldgeschiedenis* (Utrecht, 1991) 244.

23. J. de Vries, *The Dutch rural economy in the Golden Age, 1500-1700* (New Haven/London, 1974).
24. J.L. van Zanden, *The rise and decline of Holland's economy 1350-1850* (Manchester, 1993) 151-165.
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28. The 'failure' historiography of both countries, which deals with the Dutch 'failure' to industrialise at the beginning of the nineteenth century and the British 'failure' to maintain its position as the world's industrial leader at the end of the nineteenth century, share more similarities. In both cases failing entrepreneurship was the first explanation given and the most fiercely debated one.
29. Chenery and Syrquin, 'Patterns', 452.
30. J. Mokyr, *Industrialisation in the Low Countries 1795-1850* (New Haven/London, 1976); Griffiths, *Industrial Retardation*; R.W.J.M. Bos, 'Industrialization and economic growth in the Netherlands during the nineteenth century: an integration of recent studies, *Acta Historiae Neerlandicae* 15 (1982) 21-58.
31. N.F.R. Crafts and M. Thomas, 'Comparative advantage in UK manufacturing trade, 1919-1935', *Economic Journal* 96 (1986) 629-645; Cameron, 'Economische wereldgeschiedenis', 221.
32. A. Burger, Wages, productivity and the growth of industry. A new comparative perspective on Dutch industrialisation in the nineteenth century, mimeographed, (Utrecht, 1994).
33. The high level of wages was the crucial factor in the western part of the country. The poorly developed transport infrastructure prevented a rapid development of industry in the low wage areas in the eastern part of the country.
34. Joh. de Vries, *De economische achteruitgang der Republiek in de achttiende eeuw* (Leiden, 1959).
35. I.J. Brugmans, *Paardenkracht en mensenmacht. Sociaal-economische geschiedenis van Nederland 1795-1940* (Den Haag, 1961) 286.

# IX

## THE CONTRIBUTION OF PHYSICAL AND HUMAN CAPITAL TO ECONOMIC GROWTH IN THE NETHERLANDS, 1850-1913

by

*Adrian Clemens, Peter Grootte and Ronald Albers<sup>1</sup>*

### *1. Introduction*

In theories of economic growth it is always a problem to find the right balance between intellectual appeal and empirical applicability.<sup>2</sup> In the last decade this balance seems to have shifted in two directions. On the one hand, theoretical rigour has gained a more prominent place. On the other hand, empirical shortcomings of standard neo-classical growth theory, which could not be overlooked anymore with the advent of large cross-country data sets, have induced the development of many strands of new growth models.

In this paper we will adopt some of the insights derived from growth theory in a long-run empirical analysis of economic growth which goes back to the mid-nineteenth century. We pay particular attention to the growth experience of a single country, the Netherlands, in the period 1850-1913. In our analysis we mainly focus on physical capital as a source of growth, but we also pay attention to human capital. In order to try to transcend ordinary cross country growth regressions, we will introduce and utilize our new set of annual data on physical and human capital stocks in the Netherlands in the nineteenth century. Starting from standard neo-classical growth theory, we will gradually progress to variants of new growth theory which particularly stress the importance of investment in machinery.

### *2. Data*

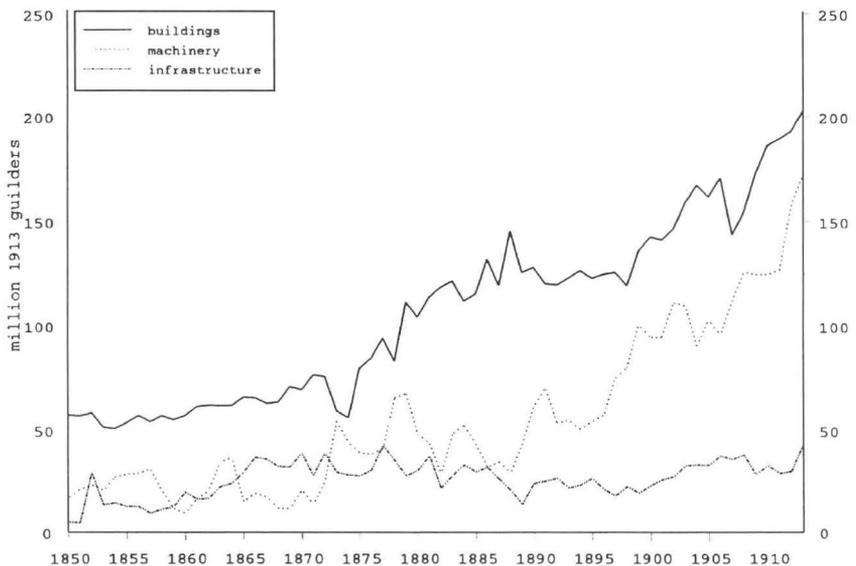
The series on physical and human capital stocks used here are the outcome of joint research on capital formation in the Netherlands in the period 1800-1913

conducted by Ronald Albers, Adrian Clemens, and Peter Groote.<sup>3</sup> The annual series on physical capital formation and capital stocks are subdivided by type of asset: machinery, buildings, and infrastructure. 'Machinery' includes equipment, cattle, vehicles, ships, etc. 'Buildings' includes both residential and non-residential buildings. 'Infrastructure' consists of transport networks, dykes, polders, telecommunications, and public utilities. This division by type of asset means, for example, for railways that only the permanent way is attributed to infrastructure; the rolling stock forms part of machinery, and stations are grouped with buildings.

For a significant part the series on machinery, buildings and infrastructure were constructed 'bottom up', that is from data assembled at the micro-level, usually the financial accounts of individual companies. To complement the estimates we used a variety of sources, most important of which are tax-data and government statistics. We applied the perpetual inventory method to calculate capital stocks from data on the flows of investment, retirements, and capital consumption.

Graph 1 shows gross fixed capital formation in machinery, buildings, and infrastructure in constant prices. Investment in machinery increased rapidly after 1895, which coincided with the first major phase of Dutch industrialization. This series also has the most volatile character. Capital formation in buildings is more stable, albeit with a rising trend, and predominantly mirrors popu-

Graph 1. *Gross fixed capital formation by type of asset, the Netherlands 1850-1913 (in millions of constant guilders of 1913)*



lation growth. Infrastructure, however, shows no clear trend, the most pronounced activity taking place in the period 1866-1888, mainly due to railway and canal building.

The gross capital stocks of the three types of assets naturally show a more gradual development (table 1). The stock of buildings remained the largest of the three, although its share declined gradually. Shortly before 1900 the gross capital stock of machinery overtook that of infrastructure.

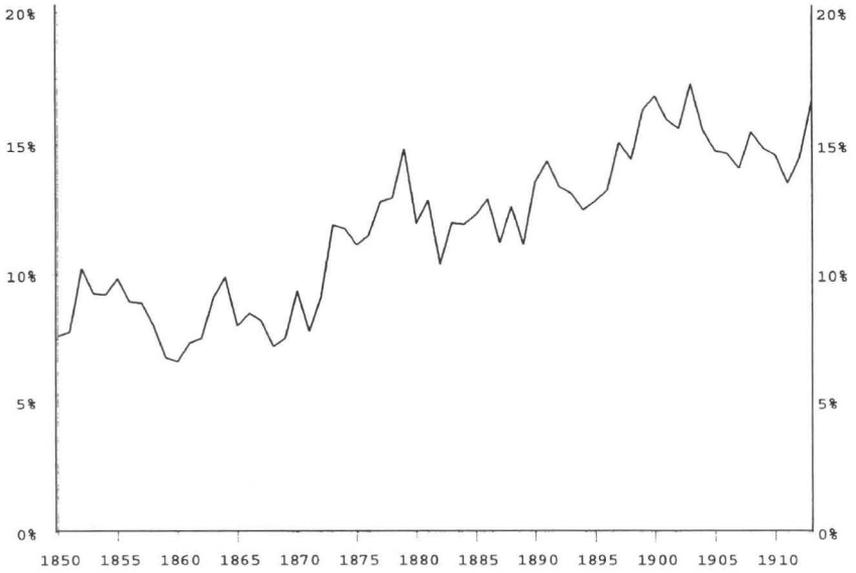
Table 1. *Development of the gross capital stock (constant prices; index, 1913 = 100). Share of each type of asset in the total stock, 1850-1913*

	total stock	share of:		
		machinery	buildings	infrastructure
1850	22.8	9.6%	77.6%	12.8%
1860	27.7	11.1%	75.6%	13.3%
1870	34.4	10.4%	72.8%	16.8%
1880	44.6	13.1%	69.0%	17.9%
1890	57.3	13.2%	70.2%	16.6%
1900	71.5	15.4%	69.8%	14.8%
1910	91.7	18.1%	68.3%	13.6%
1913	100.0	19.5%	67.4%	13.1%

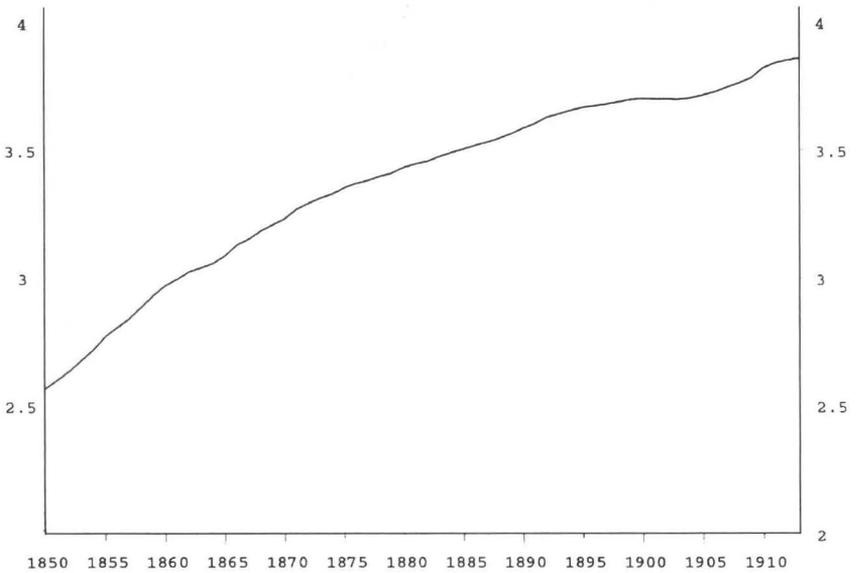
The GDP series used in this paper are the outcome of the research project 'Historical National Accounts of the Netherlands 1800-1913'.<sup>4</sup> These new annual data on Dutch national income enable us to calculate the aggregate gross investment ratio, which increased profoundly from 7.5% around 1850 to almost 17% in 1913 (graph 2). The late 1870s and the turn of the century stand out as periods of increased fixed investment activity relative to national income.

As far as we know, ours is the first attempt to construct a historical perpetual inventory estimate of the stock of human capital for the Netherlands. Our point of departure is that human capital does not exist in a vacuum, but is firmly tied to people. Assuming the lifetime of human beings (and therefore the lifetime of their human capital) to be finite, we can apply the perpetual inventory method to build a stock of human capital in essentially the same way as the stocks of physical capital. Our calculations are based on data on the total number of pupils receiving primary education. From these cumulative annual data we built a 'stock' of total years of schooling present in the working age population. An individual's human capital (six years of schooling) enters the stock

Graph 2. *Aggregate gross investment ratio, the Netherlands 1850-1913. Note: figures calculated from series in current prices*



Graph 3. *Stock of total years of schooling present in the working age population (12-65), per head of total population, The Netherlands 1850-1913*



when he/she finishes school, and leaves the stock at death or when he/she reaches the end of his/hers working life.

For the survival rate between the age of 12 and 65 we applied demographic key figures. Unfortunately, the data do not allow us to further differentiate these demographic figures, *e.g.* to take into account differences in the survival rate between social groups with different levels of human capital.<sup>5</sup> Also, the information available forced us to focus on formal education, and ignore, for example, learning by doing and on the job training. Graph 3 shows the development of the stock of human capital per head of total population.

### 3. Back to basics: capital as a source of growth

#### *Standard neo-classical growth model*

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$$Y = Ae^{\mu t} K^{\alpha} L^{\beta}$$

Y gross domestic product

K stock of capital (reproducible inputs)

L labour (non-reproducible inputs or inputs in fixed supply)

A constant, reflecting the technological starting position of society

$e^{\mu t}$  exogenous rate at which technology evolves

a output elasticity of capital;  $0 < \alpha < 1$ : decreasing marginal returns to capital

b output elasticity of labour;  $0 < \beta < 1$ : decreasing marginal returns to labour

$$\alpha + \beta = 1$$


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Note: a list of symbols can be found at the end of this paper

Capital has always held a prominent, but controversial position in the academic discussion on economic growth. Ever since Robert Solow's model of growth<sup>6</sup> became the standard, it has been considered a model satisfying in its simplicity, but unsatisfactory in some of its assumptions, conceptions, and empirical foundations. An unsatisfactory assumption concerns the implied constant returns to scale ( $a+b=1$ ). Conceptually it is frustrating that in the Solow model continuous per capita growth is only possible via some exogenous determinant, such as population growth or technological progress. Empirically the Solow model is unsatisfactory, because it predicts a convergence in the growth pattern of economies that does not seem to take place.

Endogenous growth theories may be said to exist by virtue of these conceptual and empirical defects of standard growth-theory.<sup>7</sup> These partly negative reasons for coming into being may explain why so many strands of new growth theory have been developed in a relatively short period. What they have in

common is some endogenous engine of growth, which offers an explanation of continuous growth from within the model. The formal expression may take many different forms, but it is still capital as a reproducible factor of production that plays the central role. In one of the first articles on new growth theory Romer abandoned the assumption of decreasing marginal returns to capital.<sup>8</sup> He assumed that spillovers from the 'stock of knowledge' would create constant returns to capital ( $\alpha=1$ ). This would also yield increasing returns to scale ( $\alpha+\beta>1$ ).

Other authors have tried to abstain from the rather uncomfortable need to assume spillover effects in order to arrive at a justification for constant marginal returns to capital. Many of them introduced new factors of production in the production function, *e.g.* human capital, research and development outlays, and formal education. These extensions make it possible to include constant returns to some concept of 'broad' capital in the growth model. This eventually led to Rebelo's formulation of endogenous growth, which may be said (although semantically odd) to have become a classic in new growth theory.<sup>9</sup>

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*Standard endogenous growth model*

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$$Y = A \tilde{K}$$

Y gross domestic product

$\tilde{K}$  stock of broad capital (all reproducible inputs)

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#### 4. Analysis

As stated in the introduction, our aim is to gain insight into the long-term dynamics of economic growth from different types of growth theory. We will adopt a standard neo-classical model, an augmented neo-classical model with human capital, and a variant of new growth theory which emphasizes the importance of machinery investment.

Abramovitz argues that physical capital played a more prominent role in the nineteenth century than today.<sup>10</sup> Technical progress had a strong capital-using bias. Only in the twentieth century did intangible (human) capital come at the forefront. Within the framework of neo-classical theory the role of physical capital can be analysed by means of growth accounting. When measuring over 'long swings'<sup>11</sup> in the nineteenth century, Abramovitz finds the contribution of physical capital to American economic growth to be far greater than the contribution of technical progress (measured as the residual after subtracting the contributions of capital and labour). After 1870 the accumulation of physi-

cal capital became less dominant a source of growth, but its contribution remained important until the turn of the century. Only then did the picture arise that is familiar from modern growth accounts: a contribution of physical capital to growth of about 20%.<sup>12</sup> When Abramovitz adopts a periodisation that stretches over 'long periods'<sup>13</sup> instead of 'long swings' his conclusion does not change: '... the sources of growth are quite at variance with the twentieth century results. It finds that the growth of capital intensity was a much larger source of labour productivity growth in the nineteenth century than in the twentieth.'<sup>14</sup>

We performed an analogous exercise in growth accounting to investigate whether the same conclusion can be drawn for the Netherlands in the period 1850-1913. We approximated the increase of the labour force by using the growth rate of the population. Capital and labour were weighted with their average shares in national income.<sup>15</sup> In dividing profit income between capital and labour, we opted for equal shares.<sup>16</sup> Table 2 presents the results.

Table 2. *Contributions to GDP growth, percentages per year, the Netherlands 1850-1913*

	Capital	Labour	Residual
1850-1913	42.7%	23.3%	34.0%
1850-1880	46.7%	15.8%	37.5%
1880-1913	45.2%	27.9%	26.9%

It is clear that the growth of the capital stock was the most important driving force behind the growth of GDP. This more or less confirms Abramovitz's view. The contribution of (raw) labour is in line with present-day results. The size of the residual, however, still leaves a considerable role for human capital, disembodied technical progress, better resource allocation, etc.

It may therefore be fruitful to include human capital accumulation in the growth accounts. We applied an augmented Solow model with human capital as an additional factor of production. In order to assess the weights for the factors of production we followed the same procedure as in the earlier growth account. The portion of profit income previously allocated to labour must now be assigned to human capital. In accordance with Mankiw, Romer, and Weil<sup>17</sup>, we determined the shares of raw labour and human capital on the basis of the wage differential between unskilled and skilled labour. The inclusion of human capital in the growth accounting does not change the general picture: it is still mainly physical capital which 'causes' economic growth in the nineteenth century (table 3). It appears that the contribution of human capital was more

important than that of raw labour. Furthermore, the introduction of human capital squeezes the residual.

Table 3. *Contributions of physical capital, human capital, labour, and the residual to GDP growth, percentages per year, the Netherlands 1850-1913*

	physical capital	human capital	raw labour	residual
1850-1913	42.7%	18.6%	11.6%	27.0%
1850-1880	46.7%	16.7%	7.9%	28.7%
1880-1913	45.2%	17.8%	13.9%	23.0%

If we extend the neo-classical framework in the direction of endogenous growth theories, one of the key insights is that capital accumulation influences technical progress, and thereby long-term growth. Considering the results of the growth accounting exercises performed earlier, which directed attention to physical capital, it seems fruitful to apply a variant of endogenous growth theory. This will enable us to better assess the insights that growth theory might add to historical analysis. Therefore, we will review Arrow's extension of the standard neo-classical growth model and Romer's further elongation of this into the realms of endogenous growth.<sup>18</sup> In these models physical capital still plays the leading part, but intangible capital, *i.e.* knowledge, is introduced as a force working against decreasing returns to physical capital. Arrow's basic statement is that labour productivity does not only depend on the size of the capital stock and an exogenously defined level of technology, but also on experience gained in the process of production. Investment generates changes in the environment of production that pose new problems. These problems are gradually solved by a mechanism of learning that is inherent in using the new machines and applying the new processes. This mechanism is referred to as 'learning by doing'. Also, changes in the environment may stimulate people to find new ways of further improving the process of production. These factors increase labour productivity over and above the effect of the investment itself. Consequently, part of the increase in labour productivity is no longer exogenous, but endogenous.

Arrow stays within the boundaries of the Solow model by maintaining the assumption that 'learning' is a public good. The stock of knowledge existing in the aggregate economy is nonrival and nonexcludable. Individual entrepreneurs may use it without costs and without depriving competitors the benefits of it. Therefore, labour productivity depends on experience gained from activities in the entire economy. The appliance of this knowledge may be re-

garded as an externality to the individual company. At the company level, standard neo-classical theory is still valid. At the aggregated level, the effects depend on the size of the externality compared to the diminishing returns to capital. In standard economic theory no *a priori* reasons exist for believing one or the other is the larger. It depends on one's position in the discipline, on the arguments raised, and on the purpose of the study whether it is assumed that the externalities or the diminishing returns are the more important. In Arrow's view, the spillovers from the stock of knowledge do not compensate for the diminishing returns to capital.

Romer took a small step that proved to be of importance. He assumed that the spillovers from the stock of knowledge are large enough to fully compensate for the decreasing marginal returns to capital. His arguments are partly based on historical experience. Growth rates were much lower in the past than they are at present. Thus, the process of economic growth seems to evolve in time. According to Romer technological development cannot be the only source of this, since poorer countries nowadays seem to grow slower than richer countries, although the technological possibilities open to them ought to be the same. The growth of the stock of knowledge that is still partly brought about unintentionally (as a side effect of investment) is larger than the growth of the capital stock because.<sup>19</sup> Decreasing marginal returns to physical capital are offset by these spillovers, and the process of economic growth has an endogenous component. The bigger stock of knowledge in the rich countries explains much of their better growth record relative to poorer countries.

In the views expressed above, whether in Arrow's version or in Romer's, the spillovers are interlinked with investment. It seems plausible that machinery investment is the key variable. Investment in infrastructural works and in buildings play a more modest role, since these capital goods are characterized by a much longer lifetime, large indivisibilities, and a slower rate of technical progress. Therefore, we expect the association between GDP growth and machinery investment to be stronger than between GDP growth and other types of investment. Of course, other reasons may be put forward to explain this. For example, the rate of embodied technical progress will also be greater in machinery than in infrastructure and buildings. The structural changes in the economy that have occurred since the Industrial Revolution may have increased the relative importance of machinery investment in economic growth. Yet these arguments only strengthen our case: machinery investment ought to show a stronger association with economic growth per capita than infrastructural or building investment. If this phenomenon is not discernible, doubts may be raised against the notion that learning by doing effects are an important factor in economic growth.

De Long and Summers tried to prove that the expected relationship between machinery investment and income growth does in fact exist.<sup>20</sup> We followed De Long's procedure in using new fixed capital formation ( $N$ ), *i.e.* gross fixed capital formation minus retirements, since we intend to measure the change in physical capital in use.<sup>21</sup> De Long regressed the average growth rate of per capita GDP [ $g(Y/P)$ ] on the average new investment ratio ( $N/Y$ ) with respect to machinery over 15-year periods. His results show a fairly strong association between GDP growth and machinery investment.

We slightly adjusted De Long's periodisation to follow the Dutch business cycle more closely.<sup>22</sup> Since 15-year periods leave us too few observations for statistical analysis we also adopted a 5-year periodisation. The positive effects of new investment will be distributed over a period longer than one year. This suggests the adoption of a distributed lag model. Experiments with such models did not yield unequivocally positive results, however. Consequently, we decided to follow De Long's procedure as closely as possible to enhance comparability of methods. Analysis of the time series properties of the new investment ratio with respect to machinery and the growth rate of GDP per capita showed that both series are stationary, thus permitting this regression analysis. Graph 4 shows the results of our calculations. Following De Long one would expect a strong positive association between growth in GDP per capita and the growth of the capital stock in machinery.<sup>23</sup> The relationship with other forms of capital formation should be less pronounced. The picture for the Netherlands in the nineteenth century, however, is unclear. Regressions with various specifications and over both long-run and short-run periods do not yield the close association one would expect according to De Long.<sup>24</sup> Perhaps even worse from De Long's point of view is that machinery investment does not perform significantly 'better' or 'worse' than capital formation in buildings and infrastructure. A typical multiple regression over 5-year periods reads as follows:

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$$g(Y/P) = 0.032 - 0.537 (N_M/Y) - 0.071 (N_B/Y) + 0.282 (N_I/Y)$$

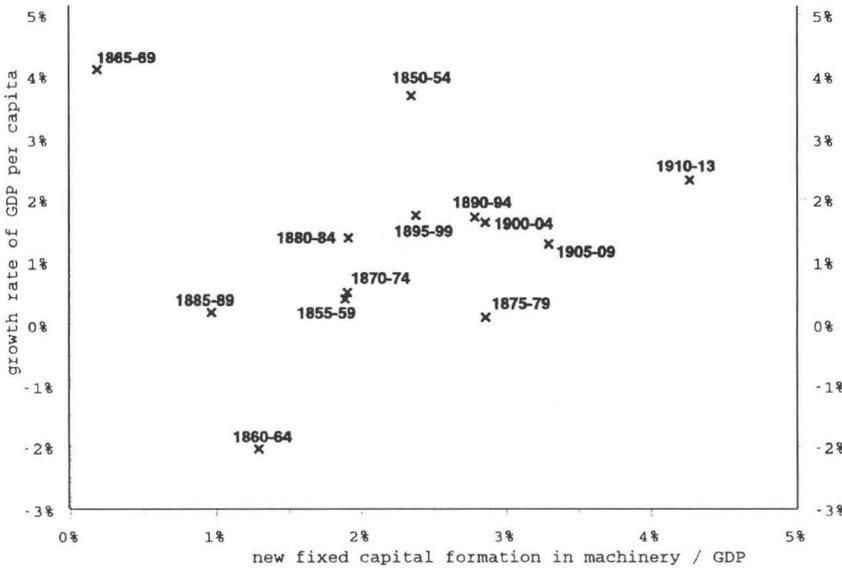
$$S.E. = 0.018 \quad 0.608 \quad 0.726 \quad 0.711 \quad R^2=0.018; d.f. 9$$


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Obviously, none of the coefficients on the components of total capital formation is statistically significant at the 5% level.

Various factors may be held responsible for this. In the first place, data related problems may have blurred the picture. In our opinion this is not very likely. We meticulously constructed the data ourselves on a disaggregated level, which enabled us to employ the graphs in a configuration tailored to the requirements of our analysis (see section 2). The final series, as a constituent part of gross domestic expenditure, were also cross-checked against indepen-

Graph 4. Relation between  $g(Y/P)$  and  $(N/Y)$ , machinery, the Netherlands 1850-1913



dent series of gross domestic product using the income and production approaches.<sup>25</sup> Moreover, it would require considerable and in our view implausible revisions of investment and GDP-estimates for the desired association to take shape.

In the second place, and more interestingly from an analytical point of view, the relationship between the variables may not be linear or stable over time. For the twentieth century, indications are that the relationship between investment in machinery and per capita GDP growth has indeed not been stable. Graph 5 presents the results of a recalculation of De Long's procedure with Maddison's standardised estimates of capital stocks.<sup>26</sup> We distinguish two regression lines, one for the pre-1950 data points (1870-1885, 1885-1900, 1900-1913, 1913-1929, 1929-1938, 1938-1950), and the other for the post-1950 observations (1950-1965, 1965-1980). This is comparable to introducing a dummy variable ( $D$ ) in the regression, which takes the value 1 for the period after 1950:

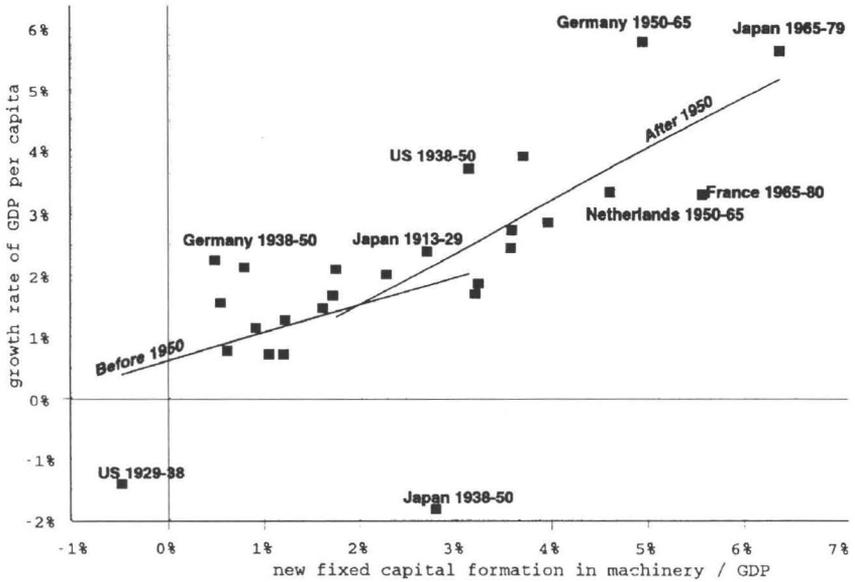
---


$$g(Y/P) = 0.006 - 0.008.D + 0.454 (N_M/Y) + 0.388 (N_M/Y).D$$

$$S.E. = 0.012 \quad 0.014 \quad 0.324 \quad 0.444R^2=0.551. \text{ d.f.: } 22.$$


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Graph 5. Relation between  $g(Y/P)$  and  $(N/Y)$ , machinery; sample of 6 countries, 1870–1980



In graph 5, the pre- and post-1950 period can be seen to differ markedly. Firstly, the individual data points for the post-war period are closer to the regression line. This can also be read from the  $R^2$  of the regression, which rises from a mere 0.11 for the pre-1950 period to a robust 0.59 for the post-1950 period. This means that in the post-war period new fixed capital formation in machinery is a much better explanatory variable of the growth of GDP per capita.

Secondly, pre-1950 observations give the new fixed capital formation ratio  $(N/Y)$  in machinery a coefficient of 0.454, whereas post-1950 graphs yield a much higher coefficient of 0.842. A possible explanation is that the Solow residual is both more important, and endogenously linked to machinery investment. This seems to be in line with our view that learning by doing, generated by machinery investment, has become more important a source of growth in the course of the twentieth century.

Since we do not find a clear association between machinery investment and per capita income growth before the 1880s, one may wonder whether the importance of machinery investment in economic growth diminishes when we recede even further back into the nineteenth century. This is exactly the pattern that can be observed in graph 4. If a (tentative) regression line is drawn for the period 1880–1913, the seven data points that comprise this period are

relatively close to the line, rendering an  $R^2$  of 0.72. Interestingly, the  $Y$ -coefficient or slope of the regression curve is 0.53, which is close to the slope of the international 1870-1950 regression line of graph 5. The data points for the preceding period, however, are randomly scattered. In the periods 1850-54 and 1865-69 GDP per capita growth was much stronger than was to be expected from machinery investment data; in contrast, the 1860-64 and 1875-79 growth rates are much lower than forecast by the regression.

More interesting than the obvious conclusion that history apparently matters, is the explanation of how it exactly matters. At first sight, the remarks expressed above may seem to contradict our earlier statement that fixed capital was more important a growth factor in the nineteenth century than nowadays. They do not, however. In the period 1850-1880 the economic characteristics of the Netherlands changed dramatically. Through heavy infrastructural investment a national railway network was created, and important inland shipping and harbour facilities were built or improved.<sup>27</sup> Infrastructural investment reached its peak in 1877, when it asked for 3.1% of national income, and 2.9% of the total labour force.<sup>28</sup> These infrastructural investments were capital intensive and capital using, and obviously had no prolific effects on total factor productivity through learning by doing. They did have, however, both short-run and long-run effects on machinery investment. In the short run, machinery investment was crowded out by infrastructural investment, which was financed largely through government channels. In the long run, however, infrastructural capital formation paid off, as increased market integration modernised the Dutch economy and enlarged the profitability of machinery investment.<sup>29</sup> Only after industrialisation took off after 1890 did machinery investment become the main source of growth, both directly through labour productivity gains and indirectly, for example through learning by doing.

### *5. Conclusions*

For the first time estimates of the stocks of physical and human capital in the Netherlands which stretch far back into the nineteenth century were used in an analysis of the long run characteristics of the process of economic growth. Exercises in growth accounting suggest that the dynamics of economic growth have evolved since the middle of the nineteenth century. For the twentieth century most growth accounts show a large 'residual', the exact meaning and contents of which are still subject of debate. For the Netherlands in the period 1850-1913 we found a relatively small residual; not the increase in total factor productivity, but physical capital turned out to be the most important contributor to economic growth. The application of an augmented Solow model with human capital as an additional factor of production did not radically

change the picture. While the contribution of human capital was larger than that of raw labour, physical capital remained the main driving force behind economic growth.

Our further analysis focused on disaggregated capital, since the central proposition we examined is that possible extra growth inducing effects, for example through learning by doing, are strongly connected with machinery investment. In this respect we comply with strands of modern growth theory which emphasize that endogenous determinants of economic growth are linked to physical capital through spillover effects from the stock of knowledge. However, this proposition could not be confirmed unequivocally. In the Netherlands the growth inducing behaviour of machinery investment only emerged in the last quarter of the nineteenth century. Not before heavy infrastructural investment had enabled market integration and industrialisation, did the relatively strong association between machinery investment and GDP-growth, so familiar to twentieth century economists, begin to take shape. A comparison with panel data for a sample of OECD countries showed that the link between machinery investment and economic growth intensified in the course of the twentieth century.

Recapitulating, not until the second half of the 1890s did an increase in new fixed capital formation in machinery induce a rise in per capita income growth. It became a dominating force in productivity growth only after the Second World War. Although investment in physical capital was relatively more important a determinant of growth in the nineteenth century, this mainly took the form of capital intensive and capital using structures, instead of technologically advanced, capital saving machinery and equipment. The relations between the determinants of growth themselves have a distinct historical dimension.

#### *List of symbols*

Y	gross domestic product
P	population
$K_j$	gross stock of physical capital of asset j
$N_j$	new fixed capital formation of asset j
L	labour
A	a constant, reflecting the technological starting position of society
$e^H$	exogenous rate at which technology evolves
$\alpha$	output elasticity of capital
$\beta$	output elasticity of labour

subscript  $j$  denotes types of assets:

M machinery

B buildings

I infrastructure

subscript  $t$  denotes time (years)

prefix  $g$  denotes annual compound growth rate

## NOTES

1. University of Groningen, Faculty of Economics, P.O. Box 800, 9700 AV Groningen, the Netherlands. E-mail: R.M.Albers@eco.rug.nl or P.D.Groote@frw.rug.nl. An earlier version of this paper was published as a research memorandum of the Groningen Growth and Development Centre (GD 12), University of Groningen, October 1994. This paper is based on research sponsored by the Faculty of Economics of the University of Groningen, and by the Foundation for Economic, Social, and Spatial Sciences (ESR), which is part of the Netherlands Organization for Scientific Research (NWO). For helpful comments, we thank Jan Jacobs, Prof. Dr. W.H. Buiter, participants of the European Historical Economics Society's Summer School 1994 (Florence), especially Prof. Dr. Alan Taylor (Northwestern University), and of the Quantitative Economic History Conference 1995 (Cambridge U.K.). Of course, the usual disclaimer holds.
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11. The term is Abramovitz's (M. Abramovitz, 'The search', table 2). He discerns the following 'long swings': 1800-1835, 1835-1855, 1855-1871, 1871-1890, 1890-1905, 1905-1927, 1929-1948, 1948-1966, 1966-1989. This seemingly odd

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16. D. Pilat (1993), *The economics of catch up: the experience of Japan and Korea* (Groningen, 1993) 50.
17. N.G. Mankiw, D. Romer, and D.N. Weil, 'A contribution to the empirics of economic growth', *Quarterly Journal of Economics*, 107 (1992) 417.
18. K. Arrow, 'The economic implications of learning by doing', *Review of Economic Studies*, 29 (1962) 155-173; P.M. Romer, 'Increasing returns'.
19. In fact, Romer also introduces forms of knowledge that are produced intentionally. At least partly, these must be excludable and rival. Yet, the form of knowledge produced as a side effect of economic activity (*i.e.* through the learning by doing mechanism) is still nonrival.
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23. De Long, 'Productivity growth', 310.
24. De Long, 'Productivity growth', 307-324.
25. Buyst, Smits and van Zanden, 'National accounts', 53-76.
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growth after the total post war reconstruction of the capital stock. For the same reason one might wish to exclude Germany 1950-65.

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28. Groote, *Kapitaalvorming in infrastructuur*, 68, 71.
29. J.E. Sturm, J. Jacobs, and P. Groote, *Productivity impacts of infrastructure investment in the Netherlands in the second half of the nineteenth century (1853-1913)*, (Groningen, 1995).



# X

## ACCOUNTING FOR ECONOMIC GROWTH IN THE NETHERLANDS SINCE 1913

by

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### *1. Introduction*

The development of the Dutch economy during the twentieth century has been characterised by major changes in structure and substantial variations in growth rates. Some of these changes are similar to those in many other countries in Northwest Europe, such as the rapid increase in per capita income and productivity during the 1950s and 1960s. However, other aspects of Dutch economic growth during this century are less common, for example its relatively good performance during the years of World War I, the dismal performance during the 1930s, the relatively high level of labour productivity, the decline in the comparative level of per capita income compared to neighbouring countries during the 1980s and the recent acceleration in per capita income growth.

This paper applies a growth accounting approach to decompose the growth of real GDP between 1913 and 1994 into the contribution of labour, capital input and productivity growth. The growth accounting approach departs from the concept of a production function, in which the rise in real output is related to the growth in the number of persons employed, hours worked, the non-residential capital stock and the stock of human capital which originates from investments in education and research and development.

In an earlier article we also included a growth accounting scheme for the Netherlands, but it only went back to 1950 and was of a cruder nature than what we provide here.<sup>1</sup> Maddison (1991) applied a growth accounting approach for six countries, including the Netherlands, which included a benchmark year estimate for 1913.<sup>2</sup>

In this article we provide growth accounting estimates on an annual basis since 1913. We partly rely on existing estimates, such as those on population and GDP growth since 1921. In other cases we apply new estimates, for example for GDP from 1913 to 1921, and employment and the non-residential capital stock for the whole period.

We emphasise from the outset that our estimates are still of a tentative nature, but in our view these are the best which are available at present. The series which are required for a full scale growth accounting study still suffer from some important deficiencies. For example, until very recently there was hardly any quantitative information on the growth of the Dutch economy during the period 1913 to 1921 except a crude estimate of the growth of real national income from the Dutch Central Bureau of Statistics. We now make use of revised, but as yet unpublished, estimates on GDP which have been constructed in the framework of the project on the reconstruction of the historical national accounts of the Netherlands. The new estimates on the capital stock from Groote, Albers and De Jong require further scrutiny, in particular on the assumptions on asset lives and retirement patterns of the stock.<sup>3</sup> We also include in our estimates of intangible capital an estimate of the R&D stock, but only from 1950 onwards. Finally, the national accounts estimates on GDP and employment for the war-period (1940-1945) as well as the 1950s and 1960s require substantial revision.<sup>4</sup> We attach three appendices to this paper explaining our sources and procedures, and we invite other scholars to improve on these series where possible.

Section 2 presents key measures on growth and comparative levels of per capita income and labour productivity for the economy as a whole and major sectors, which are compared with the average for eleven Northwest European countries and with the United States.<sup>5</sup> Section 3 quantifies the growth of labour and capital input, the latter being divided up into an estimate of physical and human capital input. It then goes on to deal with the change in total factor productivity. Here we also consider to what extent recent insights from the 'new growth' literature affect our view of the growth path of the Dutch economy. Section 4 discusses some additional factors explaining the comparative performance of the Dutch economy, which include the productivity performance by sector of the economy, the labour market situation in the Netherlands, capital intensity and factors relating to human capital and research and development. Section 5 summarises some of the main points which in our view have determined the growth process.

## 2. Growth performance in an international perspective

Between 1913 and 1994 the Dutch economy experienced a somewhat faster growth of real GDP, but a somewhat slower growth in per capita income and labour productivity than on average in Northwest Europe. Table 1 shows that the annual compound growth rate of real GDP between 1913 and 1994 was 3.0 for the Netherlands compared to 2.8 per cent for Northwest Europe. In contrast GDP per capita in the Netherlands grew at 1.8 per cent on average compared to 2.0 per cent for Northwest Europe. Labour productivity grew at 2.6 per cent in the Netherlands versus 2.7 per cent in Northwest Europe.

Table 1. *Population, Gross Domestic Product, GDP per Capita and GDP per Hour Worked, 1913-1994 (unweighted average of annual compound growth rates)*

	Population			Gross Domestic Product			GDP per Capita			GDP per Hour Worked		
	Nether-lands	NW-Europe <sup>a</sup>	United States	Nether-lands	NW-Europe <sup>a</sup>	United States	Nether-lands	NW-Europe <sup>a</sup>	United States	Nether-lands	NW-Europe <sup>a</sup>	United States
1913-1994	1.14	0.59	1.22	2.99	2.80	3.05	1.83	2.00	1.80	2.55	2.67	2.19
1913-1929	1.47	0.54	1.42	3.66	2.16	3.10	2.16	1.42	1.66	3.23	2.14	2.43
1913-1921	1.46	0.39	1.39	2.64	-0.43	1.44	1.16	-1.04	0.05	3.32		
1921-1929	1.48	0.69	1.45	4.69	4.83	4.79	3.17	3.95	3.29	3.14		
1929-1947	1.19	0.59	0.94	0.52	1.37	2.37	-0.66	0.49	1.42	0.36 <sup>b</sup>	1.54 <sup>b</sup>	2.51 <sup>b</sup>
1929-1938	1.23	0.54	0.73	0.33	1.54	-0.59	-0.89	0.80	-1.31	0.26	1.28	1.55
1938-1947	1.15	0.63	1.16	0.72	1.20	5.42	-0.43	0.18	4.22	0.43 <sup>b</sup>	1.74 <sup>b</sup>	3.24 <sup>b</sup>
1947-1973	1.29	0.83	1.48	5.07	4.86	3.94	3.73	3.74	2.43	4.28 <sup>c</sup>	4.41 <sup>c</sup>	2.74 <sup>c</sup>
1947-1960	1.36	0.87	1.72	5.30	5.20	3.54	3.89	3.85	1.78	4.15 <sup>c</sup>	3.90 <sup>c</sup>	2.54 <sup>c</sup>
1960-1973	1.22	0.79	1.23	4.83	4.52	4.35	3.57	3.63	3.08	4.39	4.80	2.90
1973-1994	0.65	0.36	1.01	2.07	2.00	2.49	1.42	1.59	1.47	2.38	2.32	1.08
1973-1979	0.73	0.21	1.01	2.68	2.26	2.83	1.93	2.05	1.80	3.45	2.81	1.54
1979-1987	0.55	0.24	1.01	1.22	2.01	2.56	0.67	1.74	1.53	2.56	2.16	0.82
1987-1994	0.69	0.61	1.00	2.54	1.76	2.13	1.83	1.13	1.12	1.50	2.10	1.00

<sup>a</sup> Includes Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, Switzerland and the UK

<sup>b</sup> End year is 1950

<sup>c</sup> Beginning year is 1950

Sources: Population, GDP, GDP per capita and productivity for the Netherlands, see Appendix Tables A and C. Northwest Europe (except Netherlands) and USA from: A. Maddison, *Dynamic Forces in Capitalist Development* (Oxford, 1991); A. Maddison, *Monitoring the World Economy, 1820-1992* (Paris, 1995) and A. Maddison, 'Macroeconomic Accounts for European Countries', in B. van Ark and N.F.R. Crafts (eds.), *Quantitative Aspects of Postwar European Growth* (Cambridge, 1996). With 1992-1994 updates on working hours from OECD, *Employment Outlook*, July 1995.

Table 2. *GDP per Capita and GDP per Hour Worked, 1913-1994*

	Netherlands as a % of NW-Europe <sup>a</sup>		Netherlands as a % of the USA	
	GDP per Capita	GDP per Hour	GDP per Capita	GDP per Hour
1913	110	124	71	73
1929	123	147	77	83
1938	106	134	80	74
1950	102	115	59	53
1960	100	118	69	62
1973	100	112	74	75
1979	100	114	74	82
1987	91	118	69	95
1994	96	113	73	98

<sup>a</sup> Includes Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, Switzerland and the UK

Note: In contrast to Maddison, *Monitoring the World Economy*, who uses Geary-Khamis PPPs, GDP is converted by multilateral EKS PPPs for OECD countries in 1990 from OECD, *Purchasing Power Parities and Real Expenditures: EKS Results, 1990* (Paris, 1992).

Sources: See table 1.

Table 2 shows that the Dutch advantage in the level of per capita income turned from a surplus of 10 percentage points over Northwest Europe in 1913 into a shortfall of 9 percentage points in 1987. The Dutch productivity advantage over Northwest Europe was 24 percentage points in 1913 but only 13 percentage points in 1994. Compared to the United States, the Dutch economy showed only a slight improvement in terms of per capita income but a very large improvement in terms of labour productivity.

The divergence between the comparative performance in terms of GDP and per capita income (and productivity) growth is due to one of the most constant factors of Dutch economic growth during the twentieth century, namely the rapid growth of the population. The annual compound growth rate of the population in the Netherlands for the period 1913 to 1994 as a whole was 1.1 per cent compared to 0.6 per cent for Northwest Europe. The Dutch population growth was therefore only marginally lower than the population growth in the United States.

Table 1 shows that the comparative performance of the Netherlands differs substantially over the subperiods. During the period 1913 to 1929 the Dutch economy fared substantially better than that of Northwest Europe. This can mainly be ascribed to the fact that the Netherlands stayed out of the First World War and actively benefitted from its neutrality. From 1913 to 1921 output rose at 2.6 per cent a year in the Netherlands whereas it declined at 0.4 per cent on average for Northwest Europe as a whole. By 1929 the Dutch economy had reached a per capita income level of 23 per cent above the Northwest European average, and a productivity level which was 47 per cent higher than in Northwest Europe.

Between 1929 and 1950 the Dutch advantage in per capita income and productivity over Northwest Europe virtually disappeared (see table 2). During the 1930s the economy was severely hit by the depression. The Netherlands stuck to the gold standard until 1936, which seriously affected competitiveness on the world market. Per capita income during these years declined in absolute terms and productivity growth was very slow. During the period 1940-1945 the Dutch economy was negatively affected by the war and the German occupation, which explain the further decline in per capita income of 0.4 per cent a year between 1938 and 1947.<sup>6</sup>

Between 1947 and 1973 the Dutch economy grew somewhat faster than in the other Northwest European countries, but because of the rapid rise in population and employment, per capita income and productivity did not accelerate beyond the Northwest European growth rate. The period after 1973 showed a strong slowdown in growth, but in contrast to Northwest Europe as a whole, the slowdown was particularly severe during the first half of the 1980s rather than during the 1970s. Since 1987 the Netherlands has shown a significant acceleration in real GDP and per capita income growth, but productivity growth has slowed down even further.<sup>7</sup>

### *3. Accounting for output, factor inputs and productivity*

#### *Real Output*

Table 3 shows that the Netherlands has had two periods of rapid growth in real GDP since 1913. The first was the period from 1921 to 1929, and the second from 1947 to 1973. In contrast, real output growth was extraordinary slow during the period 1929 to 1938 and from 1979 to 1987.

The table also shows the corresponding estimates of GDP in current prices and the implicit deflator. On average, prices have risen at 4 per cent over the period as a whole. The period 1921-1938 has been a deflationary period. Prices rose relatively rapidly between 1913 and 1921 (9 per cent per year on average), between 1960 and 1973 (6.5 per cent) and between 1973 and 1979 (7.4

Table 3. *Annual Compound Growth Rates of GDP in Current and Constant Prices and the GDP Deflator, 1913-1994*

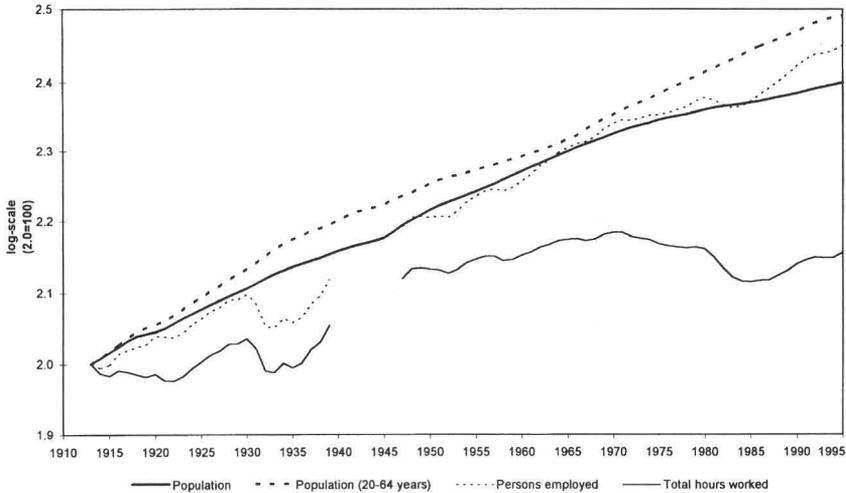
	Real Gross Domestic Product	Gross Domestic Product in Current Prices	GDP Deflator
1913-94	2.99	7.13	4.02
1913-29	3.66	6.69	2.92
1913-21	2.64	11.95	9.08
1921-29	4.69	1.67	-2.89
1929-47	0.52	4.00	3.46
1929-38	0.33	-1.92	-2.24
1938-47	0.72	10.27	9.49
1947-73	5.07	10.50	5.17
1947-60	5.30	9.33	3.82
1950-60	4.61	8.44	3.66
1960-73	4.83	11.69	6.54
1973-94	2.07	6.09	3.93
1973-79	2.68	10.24	7.36
1979-87	1.22	4.24	2.98
1987-94	2.54	4.73	2.14

Source: Real GDP, see table 1. GDP in current prices 1913-1921 provided by J.P. Smits; 1921-1948 from C.A. van Bochove and T.A. Huitker, 'Main National Accounting Series, 1900-1986', *CBS Occasional Paper, No. 17* (CBS, The Hague, 1987); from 1948 onwards from national accounts.

per cent). Price increases have been very moderate since 1979 and in particular since 1987.

#### *Labour Input*

Diagram 1 shows that the rapid growth of the population in the Netherlands was accompanied by a rapid increase in employment except between 1913 and 1929 and between 1979 and 1987. Especially during the second half of the 1930s and since the mid 1980s employment grew faster than the population. However, much of that acceleration in the growth of persons employed

Diagram 1. *Growth of Labour Supply, Netherlands, 1913-95 (1913 = 100)*

was no more than a catch-up process to account for the continuously rising share of the population of working age (between 20 and 64 years old) in particular since the mid 1960s.

The rise in total labour input, that is the total number of hours worked, was much slower than that of persons employed because of the continuous decline in the number of working hours per person throughout the century. Diagram 1 shows that the total number of hours worked in the Netherlands fell somewhat between 1913 and the mid 1920s, dropped rapidly during the mid 1930s and showed a continuously falling trend from the mid 1960s until the mid 1980s. Since 1987 the total number of hours has slightly increased.

The two factors associated with the trends in employment and working hours are the relatively late rise in the participation of women in the labour force, and the decline in the number of hours worked per person. In 1950 the average participation rate, defined as the share of the labour force in the total population aged from 15 to 64 years, was 76 per cent for the eleven Northwest European countries; by 1994 it was 72.5 per cent.<sup>8</sup> Table 4 shows that the corresponding figures for the Netherlands were much lower. Labour force participation declined between 1913 and 1960, but increased between 1960 and 1994 primarily because of a rapid rise in the proportion of women in the labour force by 18 percentage points from 22.3 to 40.7 per cent. During the same period, the participation rate of men dropped due to the introduction of early retirement schemes and the rapid increase in the number of people who received disability benefits, in particular during the 1970s and 1980s.

Table 4. *Shares of Population in Working Age, Labour Force Participation and Female Participation in Labour Force, Netherlands, 1913-1994*

	Population 20-64 years as % of Total Population	Labour Force as % of Total Population 15-64 years	Female Labour Force as % of Total Labour Force
1913	50.5	65.0	23.9 <sup>a</sup>
1921	51.8	64.4	
1929	53.5	63.3	24.0 <sup>b</sup>
1938	55.5	61.9	
1950	55.0	61.7	24.4
1960	53.1	60.6	22.3
1973	54.5	62.4	26.6
1979	56.7	62.2	29.6
1987	60.5	64.1	37.3
1994	62.5	70.2	40.7

<sup>a</sup> 1909

<sup>b</sup> 1930

Source: See appendix table A.2 and CBS, *Vijfennegentig jaren statistiek in tijdreeksen, 1899-1994* (Den Haag, 1994).

Annual hours worked per person employed in the Netherlands fell dramatically between 1913 and 1921. The standard working week declined from about 60 hours in 1916 to 48 hours in 1920, and then remained fairly constant until 1960. From 1960 to 1975 a further decline from 48 to 40 hours per week occurred, explaining the decline by 300 hours per person per year over that period, which was not very different from that in other Northwest European countries. However, the 25 per cent fall in working hours per person in the Netherlands between 1973 and 1994 was much bigger compared to the average decline of 12 per cent for Northwest Europe.<sup>9</sup> This was partly due to a slightly higher sickness rate in the Netherlands compared to surrounding countries. However, more important was the greater incidence of part-time work of men and in particular women. In 1992 almost three quarters of jobs of less than 35 hours per week were held by women. In addition, agreements on worktime sharing schemes between Dutch government, employers and unions during the 1980s led to a reduction of the standard working week to 38 hours.

*Input of Tangible and Intangible Capital*

Table 5 and diagram 2 show the development of the physical capital stock, excluding dwellings, since 1913. The table also includes estimates of capital intensity and the capital output ratios. The new capital stock estimates are obtained from Groote, Albers and De Jong<sup>10</sup>, and are based on the perpetual

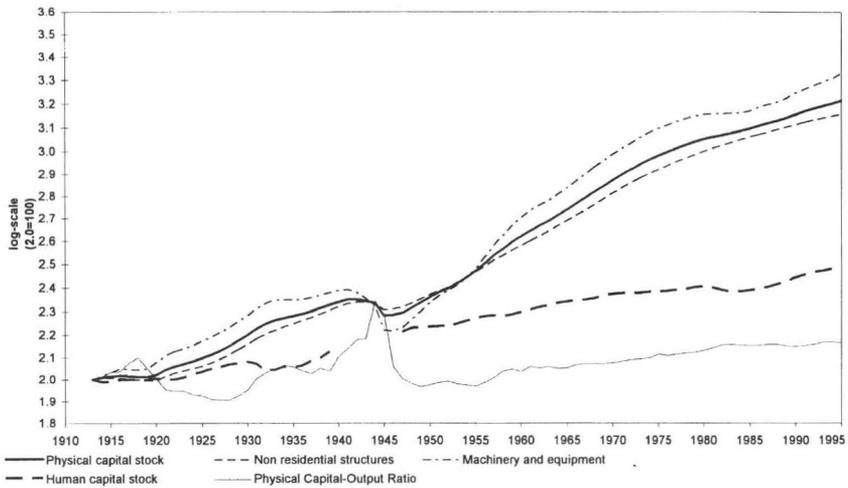
Table 5. *Annual Compound Growth Rates of Non-Residential Capital Stock, Capital Intensity and Capital-Output Ratios, 1913-1994*

	Non Residential Capital Stock			Change in Capital Stock per Hour	Change in Capital- Output Ratio
	Total	Structures	Equipment		
1913-94	3.48	3.33	3.79	3.05	0.48
1913-29	2.56	1.97	3.78	2.13	-1.06
1913-21	1.27	0.40	3.14	1.94	-1.34
1921-29	3.87	3.57	4.42	2.32	-0.79
1929-47	1.54	2.37	-0.33	0.37	1.01
1929-38	3.62	4.00	2.92	3.55	3.28
1938-47	-0.51	0.77	-3.48	-2.72	-1.21
1947-73	5.91	5.12	7.61	5.38	0.80
1947-60	5.92	4.70	8.73	5.31	0.58
1950-60	6.09	4.86	8.77	5.63	1.42
1960-73	5.90	5.54	6.50	5.45	1.02
1973-94	2.91	3.00	2.76	3.22	0.82
1973-79	3.85	4.00	3.60	4.34	1.14
1979-87	2.31	2.87	1.35	3.66	1.07
1987-94	2.80	2.31	3.67	1.76	0.26

Notes: The estimates for the capital stock are based on the perpetual inventory method, using assumptions on asset lives and scrapping which are standardised across OECD countries and obtained from A. Maddison, 'Standardised Estimates of Fixed Capital Stock: A Six Country Comparison', in A. Maddison, *Explaining the Economic Performance of Nations. Essays in Time and Space* (Aldershot, 1995).

Source: See P.D. Groote, R.M. Albers and H.J. de Jong, 'A Standardised Time Series of the Stock of Fixed Capital in the Netherlands, 1900-1995', *Research Memorandum GD-25* (Groningen Growth and Development Centre, 1996) and appendices A to C.

Diagram 2. *Growth of Human and Physical Capital Stock and Capital-Output Ratio (1913 = 100; R&D Stock: 1950 = 100)*



inventory method, making use of standardised assumptions on service lives of assets and scrapping patterns across OECD countries (see appendix C).

Non-residential capital stock between 1913 and 1994 increased at an average annual rate of 3.5 per cent. Between 1913 and 1929 it rose at a rate of 2.6 per cent per year, and it grew particularly rapidly from 1921 to 1929. The latter period was one of substantial industrial progress in the Netherlands (see also below). During the depression years of the 1930s the capital stock continued to increase rapidly, but in contrast to most other periods, the rate of growth in structures exceeded that of machinery and equipment. Between 1938 and 1947 there was a certain amount of net capital destruction at 0.5 per cent per year on average, but much more for machinery and equipment (-3.5 per cent per year). This can be ascribed to war damage and delayed replacement of machinery and structures during the war-years. However, the estimates of war damage are substantially lower compared to earlier figures. According to official government estimates immediately after the war, 28 per cent of industrial capital goods and 18 per cent of agricultural capital stock was destroyed. According to van Zanden and Griffiths the destruction of industrial capital goods accounted for 17 per cent and agricultural stock for 9 per cent of the prewar stock.<sup>11</sup> The present estimates suggest that the 1946 stock of gross non-residential capital was only 7 per cent below the stock in 1938. Groote, Albers and De Jong suggest that the war damage due to destruction was 8.6 per cent of the

1938 stock.<sup>12</sup> These findings also show that the capital stock had again reached the level of 1938 by 1948.

For the period 1913 to 1950 as a whole we find a compound growth rate of non-residential capital stock of 2.3 per cent. This is close to Maddison's proxy estimate of 2.4 per cent, which he arrived at by simply assuming the capital stock to move parallel to real GDP.<sup>13</sup>

During the early postwar decades, growth of the non-residential capital stock accelerated strongly, especially in machinery and equipment, but growth slowed down after 1973 and even more so after 1979. Since 1987 the growth in machinery and equipment has accelerated again.

Table 5 shows that the movement of the capital-output ratios has not been constant during this period (see also diagram 2). For the period as a whole it rose at 0.5 per cent a year. It declined during the period of rapid growth from 1913 to 1929, but it increased during the other rapid growth period from 1947 to 1973. During the first half of the thirties the capital-output ratio showed an excessive increase due to the decreasing level of GDP. Since 1973, the capital-output ratio has continued to increase, even though the rise has slowed down since 1987.

The movement of the capital stock per hour worked gives an indication of the rate of capital deepening of the economy. For the period as a whole we found an annual compound growth rate of 3.1 per cent a year, but it was substantially lower before World War II (except between 1929 and 1938, when unemployment rose quickly), and higher since 1947 (except for the latest period when employment increased rapidly). The rapid growth of the capital stock after 1945 went together with a significant increase in capital intensity. In contrast to what has been suggested earlier, also by ourselves<sup>14</sup>, we find that capital deepening already started during the 1950s and not only since 1960 when real wages began to rise.

The recent literature on economic growth has emphasised the importance of investments in intangible capital, which includes investment in education ('human' capital) as well as in research and development, in accounting for economic growth.<sup>15</sup> Estimates on the amount of human capital that is included in labour are difficult to obtain over long periods. The best proxy presently available is to measure the number of years of schooling of the population. We make use of Maddison's estimates for 1913, 1950, 1973 and 1992 of the average number of years of primary, secondary and tertiary schooling per head of the population.<sup>16</sup> After an adjustment for the increasing share of secondary and tertiary education (using weights of 1 for primary education, 1.4 for secondary education; and 2 for tertiary education), it appears that the human capital content of the population improved at almost one per cent per year on average over the century (see table 6). The total stock of human capital, i.e. the weighted trend of education per person adjusted for the trend in the total number of

Table 6. *Annual Compound Growth Rates of Education per Person and Total Stock of Human Capital, 1913-1992*

	Total Number of Years of Primary, Secondary and Tertiary Education per Person (15-64)	Weighted for Change in Composition <sup>a</sup>	Total Employment Including Schooling	Total Labour Input Including Schooling
1913-92	0.75	0.93	2.23	1.37
1913-50	0.55	0.64	1.93	1.47
1950-73	0.79	1.03	2.49	1.46
1973-92	1.08	1.39	2.50	1.06

<sup>a</sup> The weights for secondary education were 1.4 times primary education and for tertiary education 2 times primary education. The increments in the number of years of education per person is multiplied by 0.6 to account for the part of educational improvements which is assumed to have no effect on growth of GDP.

Sources: See Appendix C. Total Stock derived by correcting for the growth rate of employment with and without an adjustment for the fall in working hours.

hours, increased at 1.4 per cent a year between 1913 and 1992, and was slightly higher for the period before 1973 than since, which was caused by the decline in the total number of hours worked.

Another component of intangible capital concerns investment in R&D. A recent study of the Dutch Central Planning Bureau gives estimates of the investment in research and development by the private sector, public research institutes and universities since 1932.<sup>17</sup> We converted the R&D investment into 1990 guilders, and cumulated these assuming a service life of 15 years for each investment in R&D. During the period 1950-1973 the R&D stock grew at an exceptionally rapid rate of 12 per cent a year on average, but it needs to be emphasised that it started from very low levels at the end of the war. In 1950 the R&D stock was less than 10 per cent of the replacement value of the stock of machinery, which had gone up to almost 25 per cent by 1973. The R&D stock has grown more slowly since 1973, and in particular since 1987 (see also below).

#### *Labour Productivity and Total Factor Productivity*

Table 7 and diagram 3 show the development of labour and total factor productivity. Throughout the period under consideration labour productivity

Table 7. Annual Compound Growth Rate of Real GDP, Factor Inputs and Total Factor Productivity, Netherlands, 1913-1994

	Gross Domestic Product	Persons Employed	Hours per Person	Labour Productivity		Human Capital Stock	Physical Capital Stock	Stock of Research and Development and R&D	Total Factor Productivity		
				GDP per Person Employed	GDP per Hour Worked				without human capital and R&D	with human capital	with human capital and R&D
1913-1994	2.99	1.27	-0.83	1.70	2.55	1.38	3.48	—	1.59	1.21	—
1913-1929	3.66	1.31	-0.88	2.32	3.22	1.06	2.56	—	2.35	2.13	—
1913-1921	2.64	1.12	-1.76	1.50	3.29	-0.03	1.27	—	2.47	2.26	—
1921-1929	4.69	1.51	0.00	3.14	3.14	2.16	3.87	—	2.22	1.99	—
1929-1947	0.52	1.30	-0.13	-0.76	-0.64	1.81	1.54	—	-0.46	-0.76	—
1929-1938	0.33	0.14	-0.08	0.18	0.26	0.70	3.62	—	-1.20	-1.44	—
1938-1947	0.72	2.46	-0.18	-1.70	-1.53	2.93	-0.51	—	0.28	-0.03	—
1947-1973	5.07	1.40	-0.89	3.61	4.54	1.49	5.91	11.79	2.72	2.33	1.74
1947-1960	5.30	1.15	-0.57	4.11	4.70	1.52	5.92	12.41	2.83	2.47	1.85
1950-1960	4.61	1.18	-0.73	3.39	4.15	1.47	6.09	12.35	2.14	1.75	1.13
1960-1973	4.83	1.66	-1.21	3.12	4.39	1.46	5.90	11.18	2.61	2.19	1.63
1973-1994	2.07	1.05	-1.33	1.01	2.38	1.11	2.91	3.18 <sup>a</sup>	1.40	0.82	0.67
1973-1979	2.68	0.92	-1.38	1.74	3.16	0.88	3.85	4.79	1.93	1.35	1.11
1979-1987	1.22	0.56	-1.85	0.66	2.56	0.03	2.31	2.54	1.42	0.87	0.74
1987-1994	2.54	1.73	-0.69	0.79	1.50	2.55	2.80	2.29 <sup>b</sup>	0.92	0.31	0.20

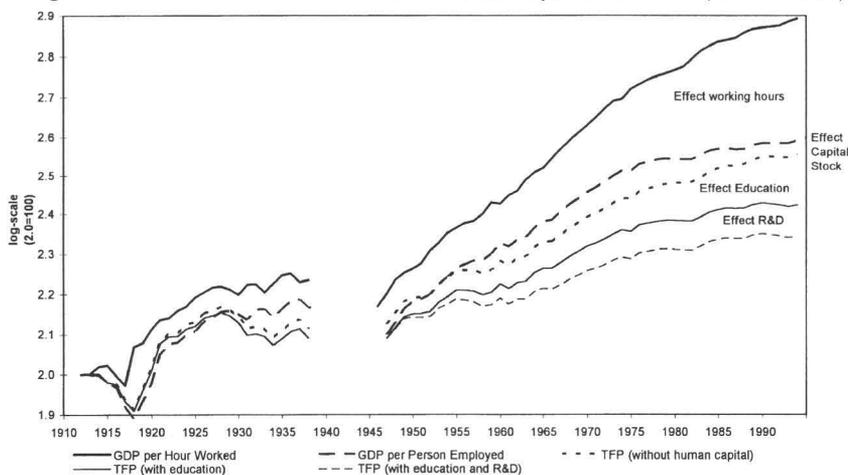
<sup>a</sup> 1973-92; <sup>b</sup> 1987-92

Note: 'Human capital stock' is the average number of years per person, weighted for composition, and adjusted for the trend in labour input. TFP 'without human capital and R&D' only takes into account total hours worked and the non-residential capital stock using factor shares as weights. TFP 'with human capital' takes into account total hours worked and 0.6 of the rise in total years of education (adjusted for the trend in working hours) which are weighted at the labour share, and the non-residential capital stock weighted at the capital share. TFP 'with human capital and R&D' is derived as TFP 'with human capital' with taking into account the change in the R&D stock using a weight of 0.05 on top of the average factor share. The latter weight is based on a calculation of the TFP elasticity to domestic R&D (0.07) from B. Minne, 'Onderzoek, ontwikkeling en andere immateriële investeringen in Nederland', *Onderzoeksmemorandum No. 116* (Centraal Plan Bureau, 1995), 76. The TFP indices are calculated according to a translog index, using average factor share for each current year and the preceding year.

Sources: see Appendix Tables A to D.

growth in terms of GDP per hour has been more rapid than that of GDP per person employed due to the decline in the number of hours worked per person. Table 7 shows that the gap grew especially large during the period 1913 to 1921 and from 1960 to 1987. Labour productivity grew most rapidly during the period 1947 to 1973, followed by the period 1913 to 1929 and only then by the period 1973 to 1994. In fact, labour productivity growth since 1987 has been less than half that of the productivity growth during the period 1913-1921 when the rise in GDP was approximately the same.

Diagram 3. *Labour and Total Factor Productivity, Netherlands (1913 = 100)*



Total factor productivity calculations can be made on the basis of dividing the growth in output by a weighted average of the growth rates of the individual inputs. Table 7 and diagram 3 show three concepts of total factor productivity. The first two are essentially based on a traditional 'Solow' model, which assumes that the economy is characterised by constant returns to scale.<sup>18</sup> Assuming a perfect market, this implies that the weights for labour and capital input can be approximated by the share of labour and capital compensation in total GDP at factor cost. Appendix Table C shows that, after adding an imputed compensation for labour by self employed persons, the factor share of labour rose from 50 per cent in 1913 to 65 per cent in 1938, and to its highest level of 72 per cent in 1978. Since then the labour compensation share declined to around 66 per cent since the mid 1980s. Using factor shares as weights, value added per combined unit of labour and physical capital increased at 1.6 per cent over the period 1913 to 1994 as a whole. This is about 1 percentage point slower than the growth of GDP per hour worked, which accounts for the contribution of physical capital to growth. The contribution of the accumula-

tion of human capital accounts for another 0.4 percentage points. Most striking is that the differences between the TFP growth rates for the period since 1973 and the periods 1913-1929 and 1947-1973 are much bigger with than without the adjustment for human capital investment. Compared to the period 1913 to 1929, the TFP growth rate with education for the period 1973-1994 was less than half, and compared to the period 1947 to 1973 it was only one third.

The third concept of TFP can be related to recent models of economic growth which relax the assumption on constant returns to scale. The assumption is that in particular technical change creates significant spillover effects so that the economy can continue along a path of continuous growth instead of reaching a 'steady state' as predicted by the traditional models.<sup>19</sup> One version assumes that such increasing returns originate primarily from investment in R&D, and that the effect on the growth of output can be determined on the basis of the output elasticity of investment in R&D. Using Minne, the effect of the accumulation of R&D on output was put at 5 per cent, which was added on top of the factor shares for labour and capital mentioned above.<sup>20</sup> Table 7 shows that the investment R&D accounted for another 0.6 percentage points of the TFP growth from 1947 to 1973 and 0.15 percentage points of TFP growth from 1973 to 1994.

#### *4. Explaining Underlying Causes of Variation in Growth Performance*

In this section we will take a closer look at factors which may explain the variation in the long term performance of the Dutch economy. Below we focus on the behaviour of structural factors such as on employment shares, productivity, labour, capital investment and investment in human capital and R&D, and put it where possible in a comparative long run perspective.

##### *Sectoral Performance*

The productivity record for the economy as a whole can be related to the comparative performance of the individual sectors of the economy and to changes in the output and employment shares of these sectors in the total economy. Table 8 shows the change in the employment structure of the Dutch economy during the twentieth century. Table 9 presents real output and productivity growth rates for two commodity sectors, agriculture and manufacturing, since 1913.

Productivity in agriculture has risen throughout the period, and growth was especially rapid during the period 1950 to 1973. During this period the number of regular workers in agriculture declined from almost 600 thousand to less than 300 thousand. At the same time, the production process in agricul-

Table 8. *Sectoral Shares of Employment in the Total Economy of the Netherlands, 1909-1992, in percentages*

	Agri- culture	Manufac- turing	Other Industry	Market Services	Non-Market Services
1909	28.4	24.2	9.5		37.9
1920	23.7	24.8	9.2		42.3
1938	20.2	24.2	8.1		47.5
1950	13.5	27.9	11.1	26.1	21.4
1960	9.5	29.2	11.7	28.9	20.7
1973	5.2	26.0	11.1	31.1	26.8
1979	5.0	21.8	10.7	33.2	29.9
1987	4.9	18.6	7.4	35.1	34.0
1992	4.4	17.7	7.1	37.9	32.9

Note: labour input 1909-1920 refers to labour force; since 1938 to persons employed, except services (1950 and 1960) which refers to 'manyears'.

Source: 1909 from CBS, *Vijfennegentig jaren statistiek in tijdreeksen* (Voorburg, 1994) 1920 from G.P. den Bakker and W. van Sorge, 'Het onbenut arbeidsvolume in het Interbellum', *Economisch- en Sociaal-Historisch Jaarboek*, vol. 54, (1991) 212-240; 1938 from G.P. den Bakker, J. de Gijt and S.J. Keuning, 'An Historical Social Accounting Matrix for the Netherlands', *Review of Income and Wealth*, vol. 40, no. 2, June 1994, 175-190 and G.P. den Bakker and J. de Gijt, *Labour force data in a national accounting framework*. (Paper presented to the IARIW 23rd General Conference, New Brunswick, Canada, 1994); 1950-1992 from B. van Ark, 'Sectoral National Accounts and Structural Change in Europe, 1947-1992', *Research Memorandum GD-23* (Groningen Growth and Development Centre, 1995). To appear under the same title in B. van Ark and N.F.R. Crafts (eds.), *Quantitative Aspects of Postwar European Growth*, CEPR, (Cambridge, 1996).

ture strongly intensified and labour productivity increased by almost 7 per cent. Since 1973 the fall in the agricultural employment share was much more moderate even though real output growth accelerated compared to the earlier period.

Although the share of the manufacturing sector in total employment remained rather stable during the prewar period and rose only slightly during the 1940s and 1950s, this sector was a driving force behind the growth of output and productivity throughout the period. Large branches within manufacturing were food processing (food products, beverages and tobacco products), textiles, metal products and engineering. During the 1930s the latter two branches, which produced mainly capital goods, were hit severely by the depression. Nevertheless, the period 1929-1938 witnessed an overall growth of output and productivity. Even for the 1938-1950 period as a whole output volumes in manu-

Table 9. *Real Output and Labour Productivity Growth in Agriculture and Manufacturing, 1913-1992, annual compound growth rates*

	Real Value Added		Real Value Added per Person Employed	
	Agriculture	Manufacturing	Agriculture	Manufacturing
1913-1929	2.1	4.9	1.8	2.7
1913-1921	1.0	3.1	0.7	2.1
1921-1929	3.2	6.8	2.8	3.3
1929-1950	1.1	2.2	1.1	0.4
1929-1938	1.3	2.5	1.0	1.8
1938-1950	0.9	2.0	1.2	-0.6
1950-1973	3.2	6.9	6.5	6.2
1950-1960	3.5	7.6	6.0	5.9
1960-1973	3.0	6.4	6.9	6.4
1973-1992	4.3	1.3	4.0	2.1
1973-1979	3.6	0.0	3.3	1.9
1979-1987	4.2	1.6	3.8	3.0
1987-1992	5.2	2.3	5.1	1.1

Sources and Notes: 1950-1992 from van Ark, 'Sectoral National Accounts'; 1913-1950: for manufacturing from H.J. de Jong, *De ontwikkeling van de Nederlandse industrie, 1913-1965* (Ph.D. thesis, forthcoming); 1913-1921: agricultural output provided by J.P. Smits; agricultural output 1921-1950 from C.L.J. van der Meer and S. Yamada, *Japanese Agriculture. A Comparative Economic Analysis* (Routledge, 1990) and M. Knibbe, *Agriculture in the Netherlands 1851-1950* (Amsterdam, 1993); agricultural employment are regular workers from C.L.J. van der Meer, 'Employment and Labour Input in Dutch Agriculture 1849-1986', *Research Memorandum No. 221* (Institute of Economic Research, University of Groningen, 1987).

facturing rose, but productivity performance was negative. This can be ascribed to specific war-circumstances, such as obsolescence of machinery and equipment and lack of materials. At the same time, however, the relative price of labour was low, which may have stimulated labour intensive work practices shortly after the war.

During the 1950s and 1960s growth rates of real output and productivity in manufacturing were very high. From 1965 onwards, however, employment in manufacturing declined in absolute as well as in relative terms, particularly in 'traditional' industries like textiles and shipbuilding. Only in typical processing industries, such as basic chemicals, employment increased. After 1973 labour productivity growth slowed down to an average of 2.1 per cent per year.

Table 10. *Value Added per Person Employed in Agriculture and Manufacturing, 1913-1992, (Netherlands as a % of UK for 1913-38; Netherlands as % of Germany/France/UK and of the USA for 1950-92)*

	France/Germany/UK=100 <sup>a</sup>		United States=100	
	Agri- culture	Manufac- turing	Agri- culture	Manufac- turing
1913		78 <sup>a</sup>		
1921		104 <sup>a</sup>		
1929		91 <sup>a</sup>		
1938		89 <sup>a</sup>		
1950	145	93	33	38
1960	167	102	40	56
1973	173	123	65	82
1979	169	116	74	87
1987	154	126	70	83
1992	149	116	80	84

<sup>a</sup> Netherlands as % of the UK only

Sources: The figures for the period 1913-1938 are based on two productivity comparisons between Netherlands and the UK for the years 1913: A. Burger, 'A Five-Country Comparison of Industrial Labour Productivity 1850-1990', paper presented at seminar 'Comparative Historical National Accounts for Europe in the 19th and 20th Centuries' (N.W. Posthumus Institute, Groningen, 1994) and 1935: H.J. de Jong, *De ontwikkeling van de Nederlandse industrie, 1913-1965* (Ph.D. thesis, forthcoming). The comparative productivity levels (1950-1992) are based on binary comparisons between each country and the United States. The average productivity for France, Germany and the UK is an unweighted average. See A. Maddison and B. van Ark, 'The International Comparison of Real Product and Productivity', *Research Memorandum GD-6* (Groningen Growth and Development Centre, 1994) and Van Ark, 'Sectoral National Accounts'.

The main expansion in employment shares has taken place in the services sector, namely from 38 per cent of employment in 1913 to over 70 per cent in 1992. Both market services (transport and communication, distribution and the financial sector) and non-market services (mainly health care, education and government) accounted for this rising share. However, the increase in productivity in the services sector was much slower than in agriculture and industry, which explains the lower productivity growth rates for the economy as a whole.<sup>21</sup>

Another way to look at sectoral performance is to compare the level of output per person employed with that of neighbouring countries and with the United States. Table 10 confirms the view already outlined in table 2, showing relatively high productivity levels for the Dutch economy as a whole. The productivity advantage was biggest in the agricultural sector. After 1945 Dutch agriculture strongly specialised in relatively intensive activities such as cattle breeding, pigsfarming, poultry and horticulture.

Already before the Second World War comparative productivity in manufacturing was relatively high. In 1921 manufacturing output per person was on par with the UK level, and during the next two decades it stayed only about 10 per cent below the UK level. The relatively good productivity performance in manufacturing during the 1930s was primarily due to a process of efficiency improvement rather than output expansion. Labour cost were comparatively high during the 1920s and 1930s, supported by the gold standard on which the guilder was based until 1936. As a result employers economised on labour to minimise losses, which led to a rise in average output per worker.

After the war Dutch relative productivity in manufacturing strongly improved. The performance is even better on the basis of output per hour worked, as the average number of hours per person employed in manufacturing was lower than in surrounding countries. Much of the recent labour productivity advantage in manufacturing can be explained by its relatively strong concentration in capital intensive industries, in particular in basic chemicals.<sup>22</sup>

#### *Labour costs*

In section 3 we have seen that participation rates of the labour force have been relatively low in the Netherlands, at least until the 1980s. Apart from a relatively large number of people who were not part of the labour force, there have also been many involuntarily unemployed in the Netherlands. As shown in the first two columns of table 11, the unemployment rate in the Netherlands has been high compared to other countries during the 1930s, but in particular since 1973. Among other things the rapid growth of the Dutch population (as shown in table 1) put considerable pressure on the labour market during times of sluggish growth.<sup>23</sup>

Table 11. *Average Unemployment Rates and Growth of Real Wages in the Netherlands and Northwest Europe, 1913-1994*

	Average Unemployment as % of Labour Force		Rate of Growth of Real Gross Hourly Wages	
	Netherlands	NW-Europe	Netherlands	NW-Europe
1913-1929	2.9		1.8	1.7
1913-1921	3.3		2.8	2.8
1921-1929	2.4	4.4	0.8	0.6
1929-1950			-0.1	0.9
1929-1938	8.0	7.2	0.2	0.7
1938-1950			-0.3	1.2
1950-1973	2.2	2.1	6.2	5.0
1950-1960	2.5	2.6	4.4	4.0
1960-1973	1.8	1.7	7.6	5.9
1973-1994	7.7	5.6	1.7	2.2
1973-1979	5.6	3.5	4.1	4.2
1979-1987	9.6	6.1	1.2	1.4
1987-1994	7.6	6.7	0.2	1.4

Note: NW European average for unemployment are unweighted averages for 11 countries mentioned in table 1; real gross wages (i.e. mostly hourly compensation of employees including tax and premiums paid by employees and employers deflated by the consumer price index) are unweighted averages for to Belgium, Denmark, France, Germany, Netherlands, Norway, Sweden and the UK. Real wages for the period 1913-50 are mostly industrial wages.

Sources: unemployment rates from Maddison, *Dynamic Forces* except for 1913-1921 from R.J. van der Bie, *Een doorlopende groote roes. De economische ontwikkeling van Nederland* (Amsterdam, 1995). Wages: 1913-38 for NW-Europe from J.G. Williamson, 'The Evolution of Global Labor Markets since 1830: Background Evidence and Hypotheses', *Explorations in Economic History*, vol. 32, no. 2, April (1995) pp. 141-196; 1913-50 for the Netherlands from P. Schrage, E. Nijhoff en P. Wielsma, 'Inkomensontwikkeling van werkenden en werklozen in Nederland, 1913-1939', *Tijdschrift voor sociale geschiedenis*, vol. 15 (1989) pp. 347-394 and CBS, *Vijfennegentig jaren statistiek in tijdreeksen, 1899-1994* ('s-Gravenhage, 1994); 1950-94 from US Dept. of Labor, 1995.

The open nature of the Dutch economy made wage constraints one of the major issues throughout this century. Already during the 1930s, wage restraint was seen as an important instrument to keep cost and price levels down. The

policy to stick to the gold standard required domestic deflation to maintain international competitiveness. Indeed the rise in real wages during the period 1929-1938 was somewhat slower than in other northwest European countries, although it was not enough to offset the negative effects of an overvalued currency on the competitiveness of the Dutch economy. The policy of wage restraint was very successful in the years immediately after the war. Real wages declined from 1938 to 1950 by 0.3 per cent per year on average.<sup>24</sup> The low wage levels are an important factor explaining the low levels of labour productivity immediately after the war. Labour was cheap and abundant, and there was no incentive for employers to economise on this production factor, unlike the situation in the thirties. Furthermore, international competitiveness was strengthened by a twofold devaluation of the guilder vis-à-vis the dollar, in 1944 and 1949.

Table 11 shows that wage restraint policies during the first two decades after 1950 did not result in comparatively lower rates of real wage increases. Dutch real wages increased at a rate just above the Northwest European average during the 1950s and surged ahead of the Northwest European average during the 1960s. On the other hand the reduction in wage growth after 1979 is remarkable. During the most recent period, 1987 to 1994, real wage growth in the Netherlands was only 0.2 per cent compared to 1.4 per cent for Northwest Europe, which substantially strengthened the cost competitiveness of the Dutch economy.<sup>25</sup>

#### *Capital Intensity and Total Factor Productivity*

Capital formation is a necessary condition for economic growth. In recent models of economic growth it has received renewed attention, given the recognition of possible increasing returns on investment, in particular in human capital such as education and R&D. Table 12 shows that non-residential capital has accounted for by far the largest share of investment. In 1921 the share of investment in non-residential capital was as high as 18.5 per cent of GDP, compared to a mere 2.8 per cent for investment in human capital. The ratio of investment to GDP then fell back to 12 per cent in 1947, rose again to 17 per cent in 1960 and stabilised at 15 per cent of GDP since the late 1970s. In contrast, the GDP-intensity of investment in education and R&D have shown a continuous rise until the late 1970s. In 1979 the investment-output ratio of education and R&D together was over half that of the physical investment output ratio.

Table 12. *Intensity of Investment in Non-Residential Capital Stock, Education and R&D, and the Stock of R&D, Netherlands 1913-1992*

	Intensity (Investment as % of GDP)			Stock (1990 mln. DFL)	
	Non-residential Capital	Education	Research and Development	Non-residential Capital	Research and Development
1913	12.8			97,841	
1921	18.5	2.8 <sup>a</sup>		108,197	
1929	14.6	3.5 <sup>a</sup>		146,565	
1938	13.5	3.3 <sup>a</sup>	0.2	201,849	
1947	11.8	2.6 <sup>a</sup>	0.5	192,833	778
1960	17.3	4.5 <sup>a</sup>	1.5	407,059	4,189
1973	16.1	6.6	1.9	857,484	19,166
1979	14.8	6.5	1.9	1,075,500	75,977
1987	15.2	5.2	2.3	1,290,972	123,005
1992	15.0	4.6 <sup>b</sup>	1.9	1,492,323	137,736

<sup>a</sup> includes fixed investment (mainly structures) in education.

<sup>b</sup> 1991

Note: Investment in education from 1921 to 1960 includes fixed investment, and from 1973 onwards only current expenses. Research and Development refers to R&D by private firms, (semi-)public research institutes and universities. R&D stock is obtained on the basis of cumulating investment in R&D from 1931 onwards (deflated at GDP deflator) assuming a 'service life' of 15 years.

Sources: Investment in non-residential capital stock from Groote, Albers and De Jong, 'A Standardised Time Series' Investment in education and R&D from Minne, 'Onderzoek, ontwikkeling'. For calculation methods of stock see appendix B.

Table 13 shows that our estimates suggest a relatively high level of capital intensity in the Netherlands compared to other countries. In 1913 the replacement value of the capital stock per working hour in the Netherlands was 1.65 the level in the UK, though it was only 36 per cent of the level of capital intensity in the USA. In 1950 capital intensity in the Netherlands was still some 30 per cent above the average for France, Germany and the UK, but it declined over time because of the rapid increase in capital intensity in particular in France and Germany.

Table 13. *Capital Intensity and Total Factor Productivity as a Percentage of the Average for France/Germany/UK (before 1950: only UK) and the United States, 1913-1992*

	Capital Stock per Hour Worked		GDP per Hour Worked		Total Factor Productivity	
	as % of France/Germany/UK <sup>a</sup>	as % of USA	as % of France/Germany/UK <sup>a</sup>	as % of USA	as % of France/Germany/UK <sup>a</sup>	as % of USA
1913	166 <sup>a</sup>	36	88 <sup>a</sup>	73	75 <sup>a</sup>	99
1929	170 <sup>a</sup>	36	116 <sup>a</sup>	83	99 <sup>a</sup>	113
1938	214 <sup>a</sup>	38	109 <sup>a</sup>	74	87 <sup>a</sup>	99
1950	131	34	115	53	106	74
1960	153	47	114	62	100	78
1973	132	71	108	75	99	83
1979	124	80	107	82	101	88
1987	122	95	110	95	104	96
1992	115 <sup>b</sup>	93	106	97	102	99

<sup>a</sup> only UK; <sup>b</sup> France and Germany refer to 1991.

Note: For the calculation of TFP levels, we made use of proximate shares for labour and capital, i.e. 0.7 and 0.3 respectively.

Sources: Capital stock figures for the Netherlands from Groote, Albers and De Jong, 'A Standardised Time Series'; see also appendix B. For France, Germany, UK and USA from Maddison, 'Standardised Estimates'. GDP per hour, see table 2.

The exceptionally high level of capital intensity in the Netherlands deserves some further consideration. One area of concern might be the measurement procedure of the capital stock. In developing the capital stock estimates according to the perpetual inventory method, Groote, Albers and De Jong followed Maddison<sup>26</sup> in assuming that non-residential structures last 39 years and machinery and equipment last 14 years. These were standardised estimates which were assumed to be the same across the six countries in Maddison's sample (France, Germany, Japan, Netherlands, UK and USA). The comparative figures for capital intensity would be affected if the actual lifetime of assets differs across countries. Further research will be required to assess the evidence on asset lives.

Unfortunately it is not possible to make reliable comparisons of capital intensity across countries for the pre-1950 period on the basis of alternative measures. From the scanty evidence we have, we may conclude that the Dutch manufacturing sector has been characterised by branches with a relatively high

capital intensity. For example, evidence from the Dutch *Census of Establishments* (1930) and the *British Census of Production* of 1930 reveal higher levels of installed horse-power per worker in most Dutch manufacturing branches compared to British, especially in food processing.<sup>27</sup> After 1960 the nature of Dutch manufacturing changed extremely fast through the upsurge of very capital intensive branches like basic chemicals and oil refineries and the simultaneous decline of labour intensive branches like textiles. Clearly, a further breakdown of capital stock aggregates is required to get a better insight in (the change in) capital intensities between branches.

The high comparative level of capital intensity finds its counterpart in high levels of value added per person. To measure the effect of changes in capital intensity on labour productivity over time and between countries, one requires estimates of total factor productivity. This is shown in columns 5 and 6 of table 13. Here we can see that the Dutch productivity levels compared to the neighbouring countries are lower than the comparative levels of labour productivity shown in columns 3 and 4. In 1913 the TFP level of the Dutch economy was at 75 per cent of the UK level, which went up to 99 per cent in 1929. After the Second World War, the Dutch TFP level was somewhat above the average of France, Germany and the UK, but was otherwise fairly similar during the subsequent period.

The explanation for the comparatively high level of capital intensity in the Netherlands remains an important issue for further research. In the long term, relative factor prices may have pushed the economy onto a path of capital deepening, but the relation with relative wage levels needs further clarification. Van Zanden and Griffiths, for example, suggested that the abundant supply of labour during the 1950s held wages down.<sup>28</sup> Employers therefore earned large profits which were reinvested, leading to a fall in the age of the capital stock and larger capital intensity. However, these causal links presuppose a consensus among employers and trade unions to exercise restraint in wage demands and make profits available for reinvestment. This may have been characteristic for the 1950s, but it cannot be extrapolated to the whole period studied. Furthermore, labour relations in the Netherlands were not very different from other Northwest European countries.

We therefore believe that the relation between low labour costs and rapid increases in capital was a rather unique event of the early postwar period. By the end of the 1950s and especially during the 1960s real wage levels increased very rapidly, giving rise to further capital-deepening investment substituting labour for capital. The same process can be observed following the increase in hourly wages around 1920.

*Human capital and Research and Development*

As mentioned above, investments in human capital and research and development have become more important throughout the period of economic growth in the Netherlands since 1913, but in particular since World War II. Table 14 shows the strong rise of enrollment in secondary and higher education during the postwar period. An important feature of the Dutch education system is its early emphasis on vocational education. Already in 1938 more than 6 per cent of the population in the age group 0-19 years was enrolled in vocational education. This percentage increased rapidly after the Second World War, although there was an important shift from lower to medium vocational schooling during the 1980s. Presently most pupils stay in full-time schooling until their twenties. This implies that a relatively large part of the population has high and relatively broad vocational qualifications at the moment they enter the labour force. In this respect, Dutch manufacturing employees are even better qualified than those in Germany, as vocational skills in the latter country are primarily concentrated in the lower intermediate segment.

Table 14. *Pupils in General and Vocational Education as % of Population 5-24 Years Netherlands, 1909-1991*

	General Schooling			Vocational Schooling		
	Primary Schooling	Secondary Schooling	Universities	Lower	Medium	Higher
1909	38.7					
1920	37.7			2.7	1.1	
1930	38.8	4.0	0.4	4.1	1.2	
1938	35.8	5.5	0.4	4.1	1.4	
1947	35.1	7.3	0.8	6.0	1.9	
1960	35.6	12.6	1.0	13.0	1.6	1.6
1973	31.1	16.8	2.4	11.9	3.2	3.1
1979	29.0	19.2	3.2	11.5	4.0	4.2
1987	32.4	19.3	4.1	6.8	11.3	4.9
1991	33.9	18.8	4.6	5.5	12.2	6.1

Note: Nurseries are excluded from primary education. Secondary general education includes special schools. From 1960 onwards vocational education includes parttime education.

Source: CBS, *Vijfennegentig jaren statistiek*.

Table 15 shows the change in the distribution of educational achievements of the Dutch labour force since 1960. Between 1960 and 1971, a shift took place from employees with only basic education to those with lower intermediate education. During the 1970s and 1980s, a rapid shift occurred towards upper intermediate and higher education. Workers with technical skills contribute significantly to the quality of the manufacturing labour force in terms of flexibility (i.e. the ability of workers to perform a large range of activities) and reliability (i.e. their ability to increase the quality of products and the production process), which in turn has a positive effect on productivity.<sup>29</sup>

Table 15. *Educational Distribution of the Dutch Labour Force, 1960, 1971 and 1987*

	1960	1971	1987
Only basic education	56	40	17
Lower intermediate education	33	40	23
Upper intermediate education	7	12	40
Higher education	3	9	21

Note: lower intermediate education is lower vocational education and lower secondary education (MULO and MAVO). Upper intermediate education is intermediate vocational and higher secondary education (HBS, Gymnasium, HAVO, MBO and VWO). Higher education is higher vocational education (HBO) and university.

Source: 1960 and 1971 from population census; 1987 from CBS, revised estimates of the 'Enquête Beroepsbevolking 1987' in CBS, *Sociaal-Economische Maandstatistiek*, 1990, no. 4.

There has been some evidence that the Dutch activities in technological inventions were still rather small at the beginning of the century<sup>30</sup>, but table 12 suggests that R&D intensities increased in course of the century, even though they remained lower than in other countries. For example, in 1981 the average R&D intensity for six Northwest European countries (France, Germany, Netherlands, Norway, Sweden and the UK) was 2.4 per cent compared to 2.0 per cent for the Netherlands.

The impact of the relatively low expenditure on R&D on output growth in the Netherlands should not be exaggerated for a number of reasons. Firstly, part of the lower level of R&D intensity for the Netherlands is due to smaller expenses on the military sector than, for example, France and the UK. Sec-

only, much of the Dutch R&D expenditure has been spent on basic science rather than on applied research, and was to a large extent absorbed by academic institutions instead of by firms. Thirdly, business expenditure itself was concentrated in industries which were of a relatively low- or medium-tech nature, reflecting the composition of Dutch manufacturing output.<sup>31</sup> Fourthly, about 70 per cent of business expenditure on R&D was concentrated in the five largest firms in the Netherlands. It were these firms which were primarily responsible for the recent decline in business R&D, as their share in 1992 had declined to about 55 per cent of business R&D. Finally, much of the technology used in the Netherlands is imported rather than developed through domestic R&D. This becomes clear, for example, from the increase in the ratio of expenditure on licenses to expenditure on domestic R&D from 23 per cent in 1970 to 47 per cent in 1991. A test on the elasticity of total factor productivity with respect to the investment in domestic R&D versus the investment in foreign R&D suggests for the Netherlands an elasticity of only 0.07 for domestic R&D versus 0.15 for foreign R&D.<sup>32</sup> The effect on Dutch productivity growth was the greatest for R&D expenditures in the USA (0.077) followed by Germany (0.04). In conclusion, during the most recent decades investment in R&D in foreign countries had a greater effect on productivity growth in the Netherlands than investment in the country itself.

The evidence so far suggests that human capital and R&D were not the decisive factors in explaining the relatively good productivity performance of the Dutch economy, even though high skills are a necessary requisite for good productivity performance in typical process industries such as chemicals. The clue for the rapid growth of labour productivity and the relatively high levels of value added per hour in the Netherlands since 1913 can be found in the relatively high levels of capital per hour worked. Table 13 shows that the level of total factor productivity in the Netherlands was not substantially higher than the average for France, Germany and the UK.

### *5. The Main Features of Dutch Economic Growth Since 1913*

The major aim of this paper has been to detect the major forces behind the economic growth process in the Netherlands since 1913. We began by showing that in comparison to other countries in Northwest Europe, the level and growth of labour productivity in the Netherlands has been relatively high. Growth of per capita income has been slower, and the comparative per capita income level even fell behind the Northwest European average in the 1980s. In contrast to what is generally suggested, when looking at the century as a whole, the Dutch economy has not shown a very strong catch-up on the US

level in terms of per capita income though it did in terms of labour productivity.

As suggested in earlier studies, including our own<sup>33</sup>, this paper confirms that the rapid growth of the population has been one of the fundamental forces underlying the rate of growth and change in structure of the Dutch economy during the twentieth century. Van Zanden and Griffiths stressed that high population growth stimulated infrastructural outlays, generated a relatively elastic and well-trained labour supply and a relatively large domestic market. Of course this is only part of the story. During periods of depression or stagnation, such as during the 1930s and the early 1980s, the large supply of labour acted as a drag on the economy, causing high unemployment levels and stagnating overall productivity performance.

Apart from the population factor, this paper shows that there were other forces explaining the growth performance of the Dutch economy which changed over time. During the period of the First World War and the early 1920s the Netherlands could take a lead over most of the Northwest European countries because the country had not been directly involved in the hostilities, and even benefitted from its position as a neutral country. The reduction in hours worked per person employed between 1913 and 1921 was compensated for by substantial productivity increases. The Dutch economy grew especially rapidly during the 1920s. The capital stock increased rapidly and productivity growth rates were similar to those experienced during the early post-World War II period.

This favourable development came to an end by the first half of the 1930s because of the world economic depression. Decreasing aggregate demand and a combination of inconsistent policies (monetary policy was directed at deflation whereas many domestic sectors were protected through import restrictions, keeping up output prices) led to a decline in real output and a simultaneous rise in cost levels. Combined with an ever increasing population this resulted in a negative growth of GDP per capita. As firms faced stagnating and falling demand, cost levels had to be reduced by efficiency gains. For instance, productivity in manufacturing increased still further, which suggests a process of rationalisation and even capital deepening.

The main effect of the Second World War from an economic point of view was that it created a large disparity between the stock of capital and the size of the population. During the period 1938-1947 the Dutch population increased roughly at 1.2 per year on average but the capital stock fell by 0.5 per cent per year. This was unlike previous periods during which the capital stock increased much faster than the population. Relative prices of capital and labour changed substantially compared with the prewar situation. Between 1938 and 1950 real wages fell by 0.3 per cent per year on average. In 1947 the level of labour productivity, which had fallen continuously during the war years, was

only 90 per cent of the 1938 level. The scope for labour productivity increases was therefore very high after 1945.

During the 1950s growth was based on a rise in investment and technological change (TFP increased at between 1.1 and 2.1 per cent per year on average, depending on the TFP concept chosen) and expanding labour input which was employed at relatively low costs. Investment in physical capital continued to increase rapidly during most of the 1960s and the 1970s. The rising labour cost during the 1960s was associated with a strong fall in total hours worked, a fall in labour force participation rates and a rapid decline in annual working hours per person. During the 1970s the fall in total hours continued, but a moderate turnaround occurred during the 1980s mainly because of a rapid rise in part-time (female) labour. On the other hand early retirement schemes and generous social security schemes prevented labour input from expanding faster. These developments led to the expansion of the non-active population of working age.

By maintaining relatively high levels of labour productivity in combination with a significant reduction in real wage increases since the early 1980s, the Dutch economy remained competitive. The high productivity levels were partly associated with the high level of vocational education of the Dutch labour force, but can be mainly explained by the capital-intensive nature of the Dutch economy compared to neighbouring countries. In terms of total factor productivity performance, the Dutch performance has not been exceptionally high.

The analysis in this paper, which covers some 80 years of economic growth in the Netherlands, clearly shows that economic retardation since 1973 cannot be seen as a return to a 'normal' growth path following the 'golden years' of the period 1947-1973. The estimates for the Netherlands suggest that if one leaves out the dismal performance of the Dutch economy during the period 1929 to 1938, post-1973 growth was much worse than pre-1929 growth. Growth rates of real GDP, per capita income and productivity were all lower since 1973 than during the period 1913-1929. We also found that in contrast to the period 1921-1929, the capital-output ratio rose very rapidly during the period 1973-1987.

The second half of the 1980s and early 1990s have been characterised by some reforms in economic policy in the Netherlands. The growth of real wages was reduced more than in previous decades, and the social security system has undergone various changes with the aim to reduce the ratio of the non-active to the active population. Due to such measures and the rise in the share of the population of 20-64 year old, the Dutch economy will continue to face an increase in labour supply in coming years. GDP will therefore need to accelerate further or factor resources must be used more efficiently in order to prevent the growth rate of per capita income from slowing down in the long term.

## NOTES

- \* This paper departs from, and makes extensive use of an earlier paper by B. van Ark, J. de Haan and H.J. de Jong, "Characteristics of Economic Growth in the Netherlands during the Post-War Period", *CEPR Discussion Paper Series No. 932*, Centre for Economic Policy Research, April 1994. A slightly revised version of that paper will appear under the same title in N.F.R. Crafts and G. Toniolo, eds., *Economic Growth in Europe Since 1945*, Centre for Economic Policy Research, Cambridge University Press, 1996. We received useful comments on an earlier draft from participants at the Economic and Social History Seminar at the University of Groningen. We are also grateful for comments from Ronald Albers, Peter Groote, Angus Maddison and Jan Luiten van Zanden. We would like to acknowledge Jan Pieter Smits for providing us with the reestimated GDP growth figures for the period 1913-1921. Gert den Bakker and Jan Jonker (CBS) kindly provided us with additional data on employment since 1950. Of course, we remain responsible for the way we used the various estimates in this paper.
1. B. van Ark, J. de Haan and H.J. de Jong, 'Characteristics of Economic Growth in the Netherlands during the Post-War Period', *CEPR Discussion Paper Series No. 932*, Centre for Economic Policy Research, April 1994. To appear under the same title in N.F.R. Crafts and G. Toniolo, eds., *Economic Growth in Europe Since 1945*, Centre for Economic Policy Research, Cambridge University Press, 1996.
  2. A. Maddison, *Dynamic Forces in Capitalist Development*, (Oxford, 1991). In a recent paper, Maddison (A. Maddison, 'Macroeconomic Accounts for European Countries', in B. van Ark and N.F.R. Crafts (eds.), *Quantitative Aspects of Post-war European Economic Growth*, CEPR, Cambridge University Press, 1996) has provided revised growth accounting estimates for the Netherlands for the period since 1950. The period was then subdivided into two subperiods, i.e. 1950-1973 and 1973-1992.
  3. P.D. Groote, R.M. Albers and H.J. de Jong, 'A Standardised Time Series of the Stock of Fixed Capital in the Netherlands, 1900-1995', *Research Memorandum GD-25*, Groningen Growth and Development Centre, 1996.
  4. Recently the Dutch Central Statistical Bureau has begun revising the national accounts for the 1950s and 1960s to the post-1969 accounts.
  5. We take Northwest Europe (which consists of Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, Switzerland and the UK) rather than 'OECD Europe' as our reference group. It bears out more clearly the change in the relative performance of the Netherlands to countries in the same per capita income-league.
  6. Labour productivity growth was also negative at -1.5 per cent a year on average between 1938 and 1947 (see table 7).
  7. See B. van Ark and J. de Haan, 'Enhancing Growth through Structural Reform', *SOM Research Reports* (University of Groningen, 1996) for a more detailed discussion of the comparative economic performance of the Netherlands since 1960.
  8. 1950 from A. Maddison, *Dynamic Forces in Capitalist Development*, (Oxford, 1991), tables C.3 and C.4; 1992 from OECD, *Employment Outlook*, July 1995.

9. See Maddison, *Dynamic Forces*; A. Maddison, *Monitoring the World Economy, 1820-1992*, (Paris, 1995); Maddison, 'Macroeconomic Accounts' and OECD, *Employment Outlook*, July 1995.
10. Groote, Albers and De Jong, 'A Standardised Time Series'.
11. J.L. van Zanden and R.T. Griffiths, *Economische geschiedenis van Nederland in de 20e eeuw* (Utrecht, 1989).
12. See also A. Maddison, 'Standardised Estimates of Fixed Capital Stock: A Six Country Comparison', in A. Maddison, *Explaining the Economic Performance of Nations. Essays in Time and Space* (Aldershot, 1995), who questions the unduly high percentage mentioned in the literature and assumed war damage to have been 10 per cent of pre-1946 investment. The estimates of Groote, Albers and De Jong show that most of the decline took place in 1944 and 1945. (Groote, Albers and De Jong, 'A Standardised Time Series').
13. Maddison, *Dynamic Forces*, 140.
14. See Van Ark, De Haan and De Jong, 'Characteristics' and Van Ark and De Haan, 'Enhancing Growth'. Our present estimates show a more rapid rise in capital intensity during the 1950s compared to the 1960s, because of an upward adjustment in the growth rate of the capital stock during the 1950s and an upward adjustment in the growth of employment during the 1960s. See appendices B and C.
15. See, for example, R.E. Lucas, 'On the Mechanics of Economic Development', *Journal of Monetary Economics*, vol. 22, (1988) 3-42 and F. Mankiw, D. Romer and D. Weil, 'A Contribution to the Empirics of Economic Growth', *Quarterly Journal of Economics*, vol. 107 (1992) 407-438. See J.W. Kendrick, *The Formation and Stocks of Total Capital*, NBER, (New York/London, 1976) for an empirical approach in estimating the tangible and intangible stock of capital.
16. Intermediate years were obtained by interpolation. See R.M. Albers, P.D. Groote and A. Clemens, 'Can Growth Theory Contribute to Our Understanding of Nineteenth Century Economic Dynamics?', *Research Memorandum GD-12*, Groningen Growth and Development Centre, 1994 (Also to appear in *De Economist*, 1996) for a calculation of stock of human capital on the basis of an accumulation of past enrollment in primary education. Their 1913 estimate shows a level of 3.9 years of primary education per head of the population, which suggests 6.4 years per head in the age category of 15-64 year. This is more than Maddison's estimate of 5.3 years of primary education, Cf. A. Maddison, 'Growth and Slowdown in Advanced Capitalist Economies: Techniques of Quantitative Assessment', *Journal of Economic Literature*, vol. XXV, June 1987, 649-698; Maddison, *Dynamic Forces* and Maddison, 'Macroeconomic Accounts'.
17. See B. Minne, 'Onderzoek, ontwikkeling en andere immateriële investeringen in Nederland', *Onderzoeksmemorandum No. 116*, Centraal Plan Bureau, 1995). He suggests there has been very little investment in R&D before 1932 (see pp. 131-136), but other evidence suggests a substantial rise in the number of scientists working in laboratories of industrial firms during the first half of the century.
18. See: R.J. Barro and X. Sala-i-Martin, *Economic Growth* (1995, chapter 1) for a discussion of the traditional Solow-Swan model. See also M. Rensman, 'Economic Growth and Technological Change in the Long Run', *SOM Research Pa-*

- pers* (Groningen, 1996) for a discussion of growth models in relation to the measurement of economic growth.
19. See, for example, P.M. Romer, 'The Origins of Endogenous Growth', *Journal of Economic Perspectives*, vol. 8, no. 1, (1994) 3-22 and F.R. Lichtenberg, 'R&D Investment and International Productivity Differences', *Working Paper No. 4161*, NBER (Cambridge, 1992).
  20. Minne, 'Onderzoek'.
  21. B. van Ark, 'Sectoral National Accounts and Structural Change in Europe, 1947-1992', *Research Memorandum GD-23*, (Groningen Growth and Development Centre, 1995). To appear under the same title in B. van Ark and N.F.R. Crafts (eds.), *Quantitative Aspects of Postwar European Economic Growth*, CEPR, Cambridge University Press, 1996.
  22. See, for example, B. van Ark, 'Arbeidsproductiviteit, arbeidskosten en internationale concurrentie', *ESB*, 23-11-1994, pp. 1066-1068.
  23. Estimates of unemployment rates are difficult to compare in an international perspective because countries use different methods, and frequently change their procedures. In order to maintain comparability between countries and over time we followed Maddison in using 'the percentage of the labour force which was not in employment', which is also comparable to the estimates in the OECD *Labour Force Statistics* and OECD *Employment Outlook*. However, recent CBS estimates for the period 1929-1938 show higher average unemployment rates for the Netherlands, namely 14.2 per cent (G.P. den Bakker, and W. van Sorge, 'Het onbenut arbeidsvolume in het Interbellum', *Economisch- en Sociaal-Historisch Jaarboek*, vol. 54 (1991) 212-240).
  24. Deflating nominal wages by a producer price index instead of a consumer price index results in an annual decline of real wages by 2.2 per cent in the same period. In 1950 the share of labour costs in manufacturing industries was only 19 per cent of total output value, which was the lowest level of the period under review (calculated from the CBS Production Statistics).
  25. See van Ark, 'Arbeidsproductiviteit', who compares relative levels of unit labour cost in manufacturing, showing that these were even lower than in the United States in 1994.
  26. Maddison, 'Standardised Estimates'.
  27. See H.J. de Jong and R.B.M. Oude Vrielink, 'Productie en productiviteit in de voedingsmiddelenindustrie in Nederland, 1918-1939', *Economisch- en Sociaal-Historisch Jaarboek*, vol. 56 (1993) 288-339.
  28. Van Zanden and Griffiths, *Economische geschiedenis*.
  29. See G. Mason, S.J. Prais and B. van Ark, 'Vocational Education and Productivity in the Netherlands and Britain', *National Institute Economic Review*, May (1992) 45-63, for a study of the relationship between vocational training and productivity on the basis of plant comparisons between the Netherlands and the United Kingdom. See also Prais (S.J. Prais, *Productivity, Education and Training*, National Institute of Economic and Social Research, (Cambridge, 1995)). On the basis of a cross-section comparison, O'Mahony also showed the significant contribution of differences in average skill levels of the work force on the

- comparative productivity levels by industry between Germany and the United Kingdom.
30. E. Schiff, *Industrialization without National Patents* (Princeton, 1971).
  31. For an international comparison, see, for example, Minne (B. Minne, *Technologie en economie*, Research Memorandum No. 94, Central Planning Bureau (The Hague, 1992) and MERIT, *STEMMING 1. Een beoordeling van de Nederlandse technologische positie op basis van kwantitatieve indicatoren* (MERIT, 1994); MERIT, *STEMMING 2. De Nederlandse technologische positie en de invloed van globalisering* (MERIT, 1995).
  32. Minne, 'Onderzoek'.
  33. Van Ark, De Haan and De Jong, 'Characteristics'.

## Appendix A - Population, Employment and Working Hours

### *Estimates of number of persons employed*

Compared to our previous work (B. van Ark, J. de Haan and H.J. de Jong, 'Characteristics of Economic Growth in the Netherlands during the Post-War Period', *CEPR Discussion Paper Series No. 932* (Centre for Economic Policy Research, April 1994) and Van Ark, 'Sectoral National Accounts') we significantly adjusted our pre-1973 estimates of the number of persons employed for the Netherlands. In 1987 the CBS undertook a complete overhaul of its reporting system on employment, which implied in particular a better estimation of persons working less than 20 hours per week. The estimates for the period since 1987 are now reported annually in the *Arbeidsrekeningen*. Recently the CBS has begun to revise its employment estimates backwards to 1950, following the same concepts as those which are used in the *Arbeidsrekeningen*. For this paper we used the recent CBS estimates which gives a consistent series for the period 1950 to 1994 (see Appendix Table A.1).

Given the tentative nature of the recent CBS estimates, we compare those with alternative estimates in Appendix Table A.2. For the period 1973-1987, Van Ark ('Sectoral National Accounts') used a combination of statistics from the Statistiek Werkzame Personen and the Labour Force Survey in order to get as close as possible to the post-1987 concept of employment. Van Ark's estimate took into account persons working less than 15 hours per week, self-employed and the armed forces. The US Bureau of Labor Statistics (BLS) made similar kind of estimates for this period (which were adopted by Maddison, see: Maddison, *Dynamic Forces*; Maddison, *Monitoring the World Economy* and Maddison, 'Macroeconomic Accounts'). As can be seen from Appendix Table A.2 the estimates from BLS and Van Ark differ little from the CBS estimates for the period after 1973.

However, the differences for the various series are much bigger for the period 1950 to 1973. The series which has been used most frequently so far is a series of man-years, for which part-time employment is adjusted to full-time equivalents. This adjustment to obtain a labour volume series seems to be only partial, as no correction is made for changes in working hours, see: CBS, *Arbeidsvolume en geregistreerde arbeidsreserve 1947-1966* (Zeist, 1967); see also A. Maddison, 'The Dutch Employment Problem in Comparative Perspective', in A. Maddison and B.S. Wilpstra, eds., *Unemployment, The European Perspective* (Croom Helm, 1982). The BLS used the man-year series to backdate their employment estimate from 1973 to 1950, and these estimates were adopted by Maddison (Maddison, *Dynamic forces*; Maddison, *Monitoring the World Economy* and Maddison, 'Macroeconomic Accounts') and Van Ark (B. van Ark, 'Sectoral National Accounts'). This explains their comparatively high estimates of employment for 1950 (4,120 to 4,156) and 1960 (4,606 to 4,651).

For 1947 we adopted the census estimate of the working labour force (CBS, *Arbeidsvolume*, p. 27), but this figure is very unreliable. For 1920-1939 we made use of estimates from Den Bakker and De Gijt, *Labour force data*, and for 1913-1921 we linked the estimate by van der Bie, *Een doorlopende groote roes* to that of Den Bakker and De Gijt in 1920.

The result of using the recent CBS employment estimates compared to our earlier studies is that we find a faster growth in employment from 1950 to 1973, and especially from 1960 to 1973 when the share of part-time labour began to rise substantially. As a result the annual growth of value added per hour for the period 1960 to 1973 is adjusted downwards from 5.21 per cent in our earlier work (Van Ark, De Haan and De Jong, 'Characteristics of Economic Growth') to 4.39 per cent in the present study.

Appendix Table A.1. *Population, Employment and Hours Worked, Netherlands, 1913-1994*

	Population (midyear estimate) (1,000)	Population (20-64 years) (1,000)	Number of Persons Employed (1,000)	Hours Worked per Person Employed	Total Hours Worked (mln.)
1913	6,164	3,113	2,381	2,605	6,203.8
1914	6,277	3,176	2,354	2,559	6,023.1
1915	6,395	3,242	2,374	2,514	5,969.6
1916	6,516	3,317	2,460	2,470	6,076.2
1917	6,654	3,400	2,492	2,426	6,046.5
1918	6,752	3,464	2,516	2,384	5,997.7
1919	6,805	3,505	2,540	2,342	5,947.6
1920	6,848	3,540	2,610	2,300	6,004.3
1921	6,921	3,585	2,603	2,260	5,883.9
1922	7,032	3,650	2,598	2,260	5,871.5
1923	7,150	3,725	2,635	2,260	5,955.1
1924	7,264	3,799	2,709	2,260	6,122.3
1925	7,366	3,867	2,761	2,260	6,239.9
1926	7,471	3,945	2,828	2,260	6,391.3
1927	7,576	4,015	2,864	2,260	6,472.6
1928	7,679	4,093	2,929	2,260	6,619.5
1929	7,782	4,163	2,935	2,260	6,633.1
1930	7,884	4,234	2,984	2,258	6,738.5
1931	7,999	4,319	2,893	2,256	6,527.9
1932	8,123	4,411	2,692	2,255	6,069.5
1933	8,237	4,506	2,680	2,253	6,037.7
1934	8,341	4,588	2,762	2,251	6,217.5
1935	8,434	4,656	2,726	2,249	6,131.6
1936	8,516	4,709	2,770	2,248	6,225.7
1937	8,599	4,772	2,897	2,246	6,506.0

	Population (midyear estimate) (1,000)	Population (20-64 years) (1,000)	Number of Persons Employed (1,000)	Hours Worked per Person Employed	Total Hours Worked (mln.)
1938	8,685	4,820	2,973	2,244	6,671.4
1939	8,782	4,874	3,135	2,244	7,034.9
1940	8,879	4,946			
1941	8,966	5,021			
1942	9,042	5,082			
1943	9,103	5,116			
1944	9,175	5,156			
1945	9,262	5,205			
1946	9,424	5,277			
1947	9,630	5,345	3,700	2,208	8,169.6
1948	9,800	5,410	3,819	2,208	8,433.1
1949	9,956	5,486	3,833	2,208	8,462.5
1950	10,114	5,563	3,816	2,208	8,425.7
1951	10,264	5,635	3,834	2,192	8,403.3
1952	10,382	5,689	3,821	2,176	8,313.2
1953	10,494	5,730	3,897	2,160	8,416.3
1954	10,616	5,775	4,009	2,144	8,594.5
1955	10,751	5,827	4,089	2,128	8,701.6
1956	10,888	5,880	4,158	2,112	8,783.4
1957	11,026	5,932	4,187	2,097	8,779.7
1958	11,187	5,996	4,157	2,081	8,652.7
1959	11,348	6,048	4,207	2,066	8,692.4
1960	11,486	6,099	4,293	2,051	8,804.9
1961	11,639	6,169	4,390	2,026	8,895.0
1962	11,806	6,222	4,514	2,002	9,035.7
1963	11,966	6,294	4,609	1,978	9,114.3
1964	12,127	6,367	4,724	1,954	9,228.8
1965	12,292	6,466	4,801	1,930	9,265.8
1966	12,455	6,539	4,876	1,907	9,296.7
1967	12,597	6,689	4,901	1,884	9,231.4
1968	12,730	6,811	4,987	1,861	9,279.8
1969	12,878	6,928	5,126	1,838	9,423.2
1970	13,039	7,028	5,218	1,816	9,476.3
1971	13,194	7,138	5,281	1,794	9,474.8
1972	13,329	7,238	5,273	1,772	9,346.0
1973	13,439	7,324	5,315	1,751	9,306.6
1974	13,545	7,423	5,363	1,727	9,261.0
1975	13,666	7,530	5,369	1,703	9,143.4
1976	13,774	7,645	5,409	1,680	9,084.4
1977	13,856	7,746	5,460	1,656	9,043.5
1978	13,942	7,849	5,522	1,633	9,020.0
1979	14,038	7,960	5,616	1,611	9,046.9
1980	14,150	8,080	5,691	1,581	8,997.8
1981	14,247	8,192	5,651	1,552	8,769.0

	Population (midyear estimate) (1,000)	Population (20-64 years) (1,000)	Number of Persons Employed (1,000)	Hours Worked per Person Employed	Total Hours Worked (mln.)
1982	14,313	8,302	5,562	1,523	8,470.9
1983	14,367	8,419	5,499	1,495	8,219.8
1984	14,424	8,539	5,533	1,467	8,117.3
1985	14,491	8,666	5,625	1,440	8,099.3
1986	14,572	8,772	5,754	1,413	8,131.5
1987	14,665	8,872	5,872	1,387	8,144.5
1988	14,760	8,974	6,001	1,377	8,263.7
1989	14,849	9,088	6,140	1,367	8,394.5
1990	14,951	9,195	6,315	1,357	8,571.9
1991	15,070	9,328	6,443	1,348	8,683.0
1992	15,178	9,441	6,542	1,338	8,753.2
1993	15,286	9,538	6,571	1,329	8,735.8
1994	15,389	9,618	6,621	1,321	8,746.0

Source: Population (midyear estimate) from A. Maddison, *Monitoring the World Economy*; Ratio of population 20-64 years to total population from CBS, *Zestig jaren statistiek in tijdreeksen, 1899-1959* (Zeist, 1959); CBS, *Vijfennegentig jaren statistiek in tijdreeksen, 1899-1994* ('s-Gravenhage, 1994); Employment: 1950-94 are employed persons provided by CBS based on concepts and procedures of CBS, *Arbeidsrekeningen 1989-1992* ('s-Gravenhage, 1993). 1947 from CBS, *Arbeidsvolume en geregistreerde arbeidsreserve 1947-1966* (Zeist, 1967) and interpolated for 1947-1950 on the basis of man-year estimates from CBS. 1920-39 from den Bakker and van Sorge (G.P. den Bakker and W. van Sorge, 'Het onbenut arbeidsvolume in het Interbellum', *Economisch- en Sociaal-Historisch Jaarboek*, vol. 54 (1991) pp. 212-240) and Den Bakker and De Gijt, *Labour force data*; 1913-20 from Van der Bie, *Een doorlopende grote roes*.

Annual hours per person employed for 1913, 1929, 1938, 1950, 1960, 1973, 1979, 1987 and 1992 from Maddison, 'Growth and Slowdown in Advanced Capitalist Economies: Techniques of Quantitative Assessment', *Journal of Economic Literature*, vol. XXV, June (1987) pp. 649-698; Maddison, *Dynamic Forces*; Maddison, *Monitoring the World Economy*, with logarithmic interpolations for intermediate years except for the period 1913-1929, where all the decline in hours per person was assumed to have taken place between 1913 and 1920.

Appendix Table A.2. *Alternative Estimates of Persons Employed in the Netherlands, 1913-1992*

	Our Estimate	Van der Bie (1995)	Oomens and Den Bakker (1994)	CBS (1994) jobs	CBS (1993) Labor Accounts	Bureau of Labor Statistics	Maddison (1982, 1987)	Maddison (1991, 1995, 1996)	Van Ark (1995)
1913	2,381	2,372					2,330	2,330	
1920	2,610	2,593	2,618						
1921	2,603								
1929	2,935						3,023	3,023	
1930	2,984		2,998						
1938	2,973						3,169	3,169	
1947	3,700								
1950	3,816			3,962		4,156	3,625	4,120	4,147
1960	4,293		4,202	4,452		4,606	4,101	4,630	4,651
1973	5,315			5,507		5,160	4,731	5,150	5,214
1979	5,616			5,818		5,460	4,915		5,577
1987	5,872			6,082	5,872	5,940		5,864	5,872
1990	6,315		6,233	6,559	6,315	6,350		6,356	6,315
1992	6,542			6,777	6,542	6,550		6,655	6,528

**Appendix B - Human and Physical Capital Stock**Appendix Table B.1 *Stock of Non-residential Capital, Human Capital and Research and Development, Netherlands, 1913-1994*

	Non-residential capital stock			Years of Education			Stock of Research and Development (mln. 1990 DFL)
	Machinery and Equipment (mln. 1990 DFL)	Structures (mln. 1990 DFL)	Total (mln. 1990 DFL)	per Person 15-64 years	for Total Employment not adjusted for trend in hours	for Total Employment adjusted for trend in hours	
1913	28,983	68,857	97,841	6.4	15,280	15,280	
1914	30,153	69,850	100,004	6.5	15,197	14,929	
1915	31,146	70,077	101,224	6.5	15,429	14,891	
1916	32,383	69,703	102,086	6.5	16,088	15,254	
1917	32,183	69,299	101,482	6.6	16,400	15,276	
1918	32,028	68,559	100,587	6.6	16,665	15,249	
1919	32,356	68,214	100,570	6.7	16,929	15,218	
1920	34,685	68,094	102,779	6.7	17,508	15,461	
1921	37,109	71,088	108,197	6.8	17,576	15,248	
1922	38,797	73,471	112,268	6.8	17,651	15,313	
1923	39,997	75,257	115,254	6.8	18,016	15,630	
1924	41,486	77,170	118,655	6.9	18,640	16,172	
1925	43,252	79,192	122,444	6.9	19,119	16,587	
1926	45,008	81,923	126,931	7.0	19,708	17,098	
1927	46,849	85,179	132,029	7.0	20,086	17,426	
1928	49,360	89,349	138,709	7.1	20,673	17,935	
1929	52,457	94,108	146,565	7.1	20,848	18,087	
1930	55,674	99,499	155,173	7.1	21,331	18,491	
1931	59,742	105,198	164,940	7.2	20,813	18,028	
1932	62,787	109,936	172,723	7.2	19,490	16,869	
1933	64,864	114,004	178,868	7.3	19,527	16,887	
1934	65,082	117,941	183,024	7.3	20,253	17,501	
1935	64,881	121,781	186,662	7.4	20,116	17,370	
1936	65,162	125,504	190,667	7.4	20,571	17,749	
1937	66,296	129,334	195,630	7.5	21,652	18,666	
1938	67,958	133,891	201,849	7.5	22,362	19,263	
1939	69,582	138,821	208,403	7.6	23,731	20,442	
1940	70,698	143,700	214,399	7.6			
1941	71,505	148,502	220,007	7.7			
1942	69,645	150,569	220,215	7.7			
1943	66,060	150,998	217,057	7.8			
1944	60,976	150,500	211,476	7.8			
1945	48,064	139,795	187,860	7.9			
1946	47,738	140,791	188,529	7.9			
1947	49,387	143,446	192,833	8.0	29,469	24,978	4,189
1948	53,417	149,248	202,665	8.0	30,614	25,948	4,738
1949	58,054	155,560	213,615	8.1	30,916	26,205	5,332

	Non-residential capital stock			Years of Education			Stock of Research and Development (mln. 1990 DFL)
	Machinery and Equipment (mln. 1990 DFL)	Structures (mln. 1990 DFL)	Total (mln. 1990 DFL)	per Person 15-64 years	for Total Employment not adjusted for trend in hours	for Total Employment adjusted for trend in hours	
1950	63,199	162,075	225,274	8.1	30,978	26,257	5,984
1951	67,638	168,226	235,864	8.2	31,444	26,456	6,681
1952	70,693	173,538	244,232	8.3	31,659	26,441	7,463
1953	74,990	182,293	257,283	8.4	32,620	27,043	8,408
1954	80,401	191,331	271,732	8.5	33,901	27,899	9,459
1955	87,465	201,639	289,103	8.5	34,933	28,537	10,682
1956	98,046	213,363	311,409	8.6	35,886	29,101	11,978
1957	110,461	226,260	336,721	8.7	36,507	29,387	13,275
1958	121,780	237,516	359,296	8.8	36,618	29,259	14,722
1959	134,933	249,872	384,806	8.9	37,438	29,695	16,623
1960	146,544	260,516	407,059	9.0	38,596	30,387	19,166
1961	157,139	273,006	430,144	9.1	39,872	31,013	22,021
1962	165,899	287,028	452,927	9.2	41,419	31,827	25,224
1963	174,320	301,775	476,095	9.3	42,725	32,433	28,733
1964	185,780	318,928	504,709	9.4	44,240	33,177	32,552
1965	198,671	336,516	535,187	9.5	45,423	33,652	36,639
1966	214,107	354,782	568,889	9.6	46,605	34,111	41,053
1967	229,720	374,596	604,316	9.7	47,325	34,219	45,890
1968	246,714	396,925	643,639	9.8	48,649	34,751	50,906
1969	263,027	421,637	684,664	9.9	50,518	35,650	55,671
1970	281,507	447,454	728,961	10.0	51,953	36,219	60,573
1971	298,057	475,135	773,192	10.1	53,119	36,584	65,781
1972	314,271	500,805	815,076	10.2	53,583	36,458	71,044
1973	332,331	525,153	857,484	10.3	54,564	36,676	75,977
1974	349,109	548,686	897,795	10.4	55,801	36,990	80,735
1975	363,465	572,214	935,679	10.5	56,619	37,015	85,403
1976	374,568	596,106	970,674	10.7	57,813	37,273	89,859
1977	388,991	618,948	1,007,939	10.8	59,147	37,607	93,723
1978	400,474	641,944	1,042,418	11.0	60,628	38,017	97,238
1979	410,946	664,554	1,075,500	11.1	62,494	38,646	100,619
1980	417,226	687,583	1,104,810	11.3	64,185	38,956	103,744
1981	418,930	709,861	1,128,791	11.4	64,596	38,479	106,407
1982	419,111	731,144	1,150,255	11.6	64,439	37,674	108,813
1983	421,355	752,012	1,173,366	11.7	64,571	37,051	111,165
1984	422,815	774,022	1,196,837	11.9	65,849	37,084	113,630
1985	431,335	793,893	1,225,228	12.1	67,849	37,503	116,375
1986	445,661	813,722	1,259,383	12.2	70,344	38,161	119,489
1987	457,591	833,381	1,290,972	12.4	72,757	38,739	123,005
1988	468,468	854,508	1,322,976	12.6	75,361	39,838	126,656
1989	487,616	875,020	1,362,636	12.7	78,150	41,016	129,925
1990	511,918	896,603	1,408,521	12.9	81,645	42,543	132,877
1991	532,517	920,100	1,452,617	13.1	84,615	43,774	135,312

	Non-residential capital stock			Years of Education			Stock of Research and Development (mln. 1990 DFL)
	Machinery and Equipment (mln. 1990 DFL)	Structures (mln. 1990 DFL)	Total (mln. 1990 DFL)	per Person 15-64 years	for Total Employment not adjusted for trend in hours	for Total Employment adjusted for trend in hours	
1992	552,210	940,113	1,492,323	13.3	87,270	44,824	137,763
1993	569,440	959,373	1,528,814	13.6	89,040	45,441	
1994	589,095	977,633	1,566,729	13.8	91,133	46,212	

Notes: The estimates of the non-residential capital stock are based on the perpetual inventory method, using assumptions on asset lives (14 years for machinery and equipment and 39 years for structures) which are standardised across OECD countries and make use of rectangular scrapping (see Maddison, 'Standardised Estimates').

As the first estimates on R&D expenditures were for 1932, and assuming a 'life time' of 15 years for each investment, we have a completely cumulated stock by 1947.

Sources: Non-residential capital stock from Groote, Albers and De Jong (1996), 'A Standardised Time Series'. Years of education per person of the population (15-64) for 1913, 1950, 1960, 1973, 1987 and 1992 from Maddison (Maddison, 'Growth and Slowdown'; Maddison, *Dynamic Forces*; Maddison, 'Macroeconomic Accounts'), with logarithmic interpolations for intermediate years. Total employment and trend in annual hours from appendix table A.1. Stock of R&D: Investment in R&D in current prices by firms, public research institutes and universities from Minne, 'Onderzoek, ontwikkeling', which was converted into 1990 prices with the GDP deflator (see sources appendix table C.1) and cumulated into a stock assuming a service life of 15 years for each investment.

### Appendix C - GDP, Labour and Total Factor Productivity

Appendix Table C.1. *GDP, GDP per Capita, Labour and Total Factor Productivity, Netherlands, 1913-1994*

	Gross Domestic Product (mln. 1990 DFL)	GDP per Capita (1990 DFL)	GDP per Person Employed (1990 DFL)	GDP per Hour Worked (1990 DFL)	Labour compensation as % of GDP at Factor Cost	Total Factor Productivity (1950=100)		
						without human capital and R&D	with human capital	with human capital and R&D
1913	50,744	8,232	21,308	8.18	50.0	64.5	70.6	
1914	49,374	7,866	20,978	8.20	51.2	64.1	70.1	
1915	51,048	7,983	21,499	8.55	52.4	61.9	67.5	
1916	52,419	8,045	21,307	8.63	53.7	61.1	66.6	
1917	49,069	7,374	19,691	8.12	55.0	55.8	60.6	
1918	46,025	6,816	18,292	7.67	56.3	52.9	57.3	
1919	57,036	8,382	22,457	9.59	57.7	59.5	64.3	
1920	58,762	8,581	22,514	9.79	59.1	67.0	72.3	
1921	62,364	9,011	23,954	10.60	60.5	78.4	84.5	
1922	65,764	9,352	25,313	11.20	60.2	81.6	87.7	
1923	67,388	9,425	25,574	11.32	60.0	82.0	88.0	
1924	72,310	9,955	26,693	11.81	59.7	85.7	91.7	
1925	75,355	10,230	27,293	12.08	59.5	87.2	93.1	
1926	81,393	10,895	28,781	12.74	59.2	91.6	97.6	
1927	84,793	11,192	29,607	13.10	59.0	93.3	99.2	
1928	89,309	11,630	30,491	13.49	58.7	95.1	100.8	
1929	90,020	11,568	30,671	13.57	58.5	93.5	98.9	
1930	89,817	11,392	30,099	13.33	59.2	90.1	95.1	
1931	84,337	10,543	29,152	12.92	59.8	84.0	88.5	
1932	83,169	10,239	30,895	13.70	60.5	84.8	89.1	
1933	83,017	10,079	30,977	13.75	61.2	83.7	87.8	
1934	81,495	9,770	29,506	13.11	61.9	79.9	83.6	
1935	84,539	10,024	31,012	13.79	62.6	83.0	86.6	
1936	89,868	10,553	32,443	14.43	63.3	86.8	90.3	
1937	94,993	11,047	32,790	14.60	64.0	88.4	91.8	
1938	92,709	10,675	31,184	13.90	64.7	83.8	86.8	
1939	99,002	11,273	31,579	14.07				
1940	87,229	9,824						
1941	82,611	9,214						
1942	75,507	8,351						
1943	73,680	8,094						
1944	49,425	5,387						
1945	50,592	5,462						
1946	85,402	9,062						
1947	98,849	10,265	26,716	12.10	66.4	86.0	86.6	88.2
1948	109,404	11,164	28,645	12.97	66.1	91.9	92.3	93.4
1949	119,045	11,957	31,061	14.07	65.8	98.0	98.3	98.9

	Gross Domestic Product (mln. 1990 DFL)	GDP per Capita (1990 DFL)	GDP per Person Employed (1990 DFL)	GDP per Hour Worked (1990 DFL)	Labour compensation as % of GDP at Factor Cost	Total Factor Productivity (1950=100)		
						without human capital and R&D	with human capital	with human capital and R&D
1950	123,308	12,192	32,313	14.63	65.6	100.0	100.0	100.0
1951	125,896	12,266	32,837	14.98	65.3	100.6	100.2	99.7
1952	128,433	12,371	33,612	15.45	65.0	102.1	101.3	100.2
1953	139,597	13,303	35,822	16.59	64.7	108.3	107.0	105.1
1954	149,086	14,044	37,188	17.35	64.4	112.0	110.3	107.7
1955	160,148	14,896	39,166	18.40	64.2	116.9	114.6	111.2
1956	166,034	15,249	39,931	18.90	63.9	117.2	114.5	110.4
1957	170,703	15,482	40,770	19.44	63.6	117.1	113.9	109.3
1958	170,195	15,214	40,942	19.67	63.3	114.9	111.4	106.3
1959	178,517	15,731	42,433	20.54	63.1	117.2	113.2	107.3
1960	193,538	16,850	45,082	21.98	62.8	123.6	118.9	111.9
1961	194,096	16,676	44,213	21.82	63.4	120.6	115.5	107.9
1962	207,391	17,567	45,944	22.95	64.0	125.3	119.6	110.9
1963	214,901	17,959	46,626	23.58	64.6	126.9	120.6	111.0
1964	232,712	19,190	49,262	25.22	65.3	133.7	126.6	115.8
1965	244,890	19,923	51,008	26.43	65.9	137.5	129.7	118.0
1966	251,639	20,204	51,608	27.07	66.5	138.1	129.7	117.3
1967	264,884	21,028	54,047	28.69	67.2	143.2	133.9	120.4
1968	281,883	22,143	56,524	30.38	67.8	148.8	138.7	124.0
1969	300,049	23,299	58,535	31.84	68.5	153.8	142.7	127.0
1970	317,099	24,319	60,770	33.46	69.2	158.9	146.8	130.1
1971	330,496	25,049	62,582	34.88	69.8	162.7	149.7	132.1
1972	341,456	25,618	64,756	36.53	70.5	167.0	153.0	134.5
1973	357,441	26,597	67,251	38.41	71.2	172.8	157.7	138.1
1974	371,649	27,438	69,299	40.13	71.4	177.9	161.4	141.0
1975	371,294	27,169	69,155	40.61	71.6	177.2	159.9	139.2
1976	390,272	28,334	72,152	42.96	71.7	185.2	166.2	144.3
1977	399,355	28,822	73,142	44.16	71.9	188.1	167.8	145.5
1978	409,149	29,346	74,094	45.36	72.1	191.3	169.7	146.8
1979	418,841	29,836	74,580	46.30	72.3	193.7	170.8	147.5
1980	422,444	29,855	74,230	46.95	71.5	194.6	170.7	147.2
1981	419,501	29,445	74,235	47.84	70.7	195.6	170.5	146.9
1982	413,563	28,894	74,355	48.82	69.9	196.4	170.3	146.5
1983	419,399	29,192	76,268	51.02	69.1	202.0	174.2	149.7
1984	432,643	29,995	78,193	53.30	68.4	208.9	179.2	153.8
1985	444,061	30,644	78,944	54.83	67.6	213.1	181.8	155.9
1986	456,239	31,309	79,291	56.11	66.8	216.4	183.7	157.3
1987	461,618	31,478	78,613	56.68	66.1	216.9	183.1	156.6
1988	473,695	32,093	78,936	57.32	66.3	218.7	183.6	156.7
1989	495,870	33,394	80,761	59.07	66.4	224.4	187.4	159.8
1990	516,269	34,531	81,753	60.23	66.6	228.0	189.2	161.1
1991	527,129	34,979	81,814	60.71	66.7	228.4	188.3	160.2

	Gross Domestic Product (mln. 1990 DFL)	GDP per Capita (1990 DFL)	GDP per Person Employed (1990 DFL)	GDP per Hour Worked (1990 DFL)	Labour compensation as % of GDP at Factor Cost	Total Factor Productivity (1950=100)		
						without human capital and R&D	with human capital	with human capital and R&D
1992	534,486	35,215	81,701	61.06	66.9	228.3	187.0	159.0
1993	536,618	35,105	81,665	61.43	66.9	227.6	185.3	157.4
1994	550,065	35,744	83,079	62.89	66.9	231.3	187.1	158.8

Notes: TFP 'without capital and R&D' only takes into account total hours worked and the non-residential capital stock using factor shares as weights. TFP 'with human capital' takes into account total hours worked and 0.6 of the rise in total years of education per person (adjusted for the trend in working hours) which are weighted at the labour share, and the non-residential stock weighted at the capital share. TFP 'with human capital and R&D' is derived as TFP 'with human capital' with taking into account the change in the R&D stock using a weight of 0.07 on top of the average factor share. The latter weight is based on a calculation of the output elasticity to R&D from Minne, 'Onderzoek, ontwikkeling'.

Sources: Real GDP from 1913-1921, kindly provided by J.P. Smits, are provisional estimates from the research project on Historical National Accounts of the Netherlands (N.W. Posthumus Institute). Real GDP from 1921 onwards from Maddison (Maddison, *Monitoring the World Economy*) which is based on C.A. van Bochove, and T.A. Huitker, 'Main National Accounting Series, 1900-1986', *CBS Occasional Paper, No. 17* (CBS, The Hague, 1987) for the period 1921 to 1960, and on OECD *National Accounts, Main Aggregates* for the period 1960-1994. Converted to 1990 guilders on the basis of the EKS purchasing power parity from OECD, *Purchasing Power Parities and Real Expenditures: EKS Results, 1990* (Paris, 1992)). For population, employment and hours worked, see Appendix Table A. For physical and human capital stock and stock of R&D, see Appendix Table B.

The share of labour compensation in total GDP at factor cost is derived for 1913, 1921, 1929, 1938, 1947, 1960, 1973, 1979, 1987 and 1993 on the basis of total compensation of employees plus an imputed compensation for self-employment (excluding unpaid family workers), assuming the same compensation per person for self-employed as for employees (Van Bochove and Huitker, 'Main National Accounting Series'; CBS, *Vijfennegentig jaren*. Intermediate years are derived through logarithmic interpolation.

# XI

## NEW REVISION POLICIES FOR THE DUTCH NATIONAL ACCOUNTS<sup>1</sup>

by

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### *1. Introduction*

In the index of the new System of National Accounts 1993 the word 'revision' does not appear.<sup>2</sup> In the text of the 1993 SNA the word does occur, but only in the sense of the revision of the System of National Accounts itself. Although revisions of SNAs are one of the motives to revise national accounting data, the ins and outs of revisions are not discussed. The fact that a session of the Twenty-third General Conference of the International Association for Research in Income and Wealth was devoted to Policies for Revisions of National Accounts is an indication that the revision of national accounts is a problem with no clear answers.

The fact that the SNA does not discuss revisions of national accounting data is probably one of the reasons that different revision policies occur in different countries. This concerns differences with regard to the frequency, the choice of the benchmark year to be revised and the frequency and the level of detail at which the benchmark year is revised, the length and detail of the time-series and the publication policy (publication of a revised year as soon as the results for that year are available, followed by the revised time-series, or publication of benchmark year results and time-series together).

In the Netherlands, official national accounting data are available from 1900 onwards. In the course of time, national accounts were revised repeatedly. Among the reasons for these revisions were availability of new basic data, improved estimation methods and changes in concepts. Initially, a revision concerned a revision of a 'revision year'. For that year, data were compiled both according to the original methods and according to the revised ones. Usually, a revision is followed by a recomputation for a number of years prior to

the revision year. Thus consistent time-series of a moderate length are obtained.

However, it was not possible to carry out these revisions for the whole period from 1900. Consequently, the data consist of series for a number of separate subperiods, each with their own definitions, methods and level of detail. At present, there are consistent time-series of Dutch national accounting data available for the periods:

- a. 1969-present<sup>3</sup>;
- b. 1969-90 and 1921-39 (1990 and 1989 provisional figures);
- c. 1948-69;
- d. 1938, 1946-49 (1948 and 1949 provisional figures);
- e. 1940-45, only net national income at factor costs, figures consistent with (d);
- f. 1900-1920, only domestic product and national income data.

In order to allow users to make linkages, the data for the borderline years are given twice: both according to the methods and concepts of the period before the revision and according to those of the subsequent period. This is done for current price data. In the case of volume and price data, the problem of intertemporal consistency is sidestepped by providing annual changes instead of constant price values or indices based on a fixed reference year. The latter are affected far more by changes in definitions and concepts than the annual changes are. For instance, in case of annual changes, the choice of the index number formulae has less influence on the outcomes than in case of fixed weighting schemes. Nevertheless, many users of national accounting data are interested in long-period comparisons. To facilitate these, the annual changes of prices and volumes have been chained in order to obtain chain indices for a limited number of years.

Of course, 'short period' revisions with time-series of moderate length are no real solution to the problem of the absence of long consistent time-series. The only way to achieve the latter is to revise the data for historical periods. Some years ago, Statistics Netherlands has begun to do so. These historical revisions cannot be done in such great detail as the 'short-period' revisions, nor as quickly. This would require too many resources. Therefore, only the most important inconsistencies are removed and each period is tackled separately, the results being published whenever they become available. The first period was 1921-39.

Van Bochove describes the revision strategy of Statistics Netherlands as follows:

'The gradual evolution of the national accounts and the integrative nature of the system have significant consequences for the dynamics of the national accounting data. Changes in underlying statistics, changes in classifications,

changes in the definitions, and so on lead to the need to revise methods and concepts; this, in turn, leads to inconsistencies in time-series. Moreover, the fact that the national accounts integrate data from so many individual statistics leads to lags in the availability of the national accounting data. But these are too important to be available with lags of more than two years. Therefore, a system of short-term and provisional data has been designed, as well as a strategy for revising final data.<sup>4</sup>

The most timely national accounting data are monthly data, not integrated but compiled according to national accounting concepts. Next to these come the quarterly accounts and the provisional and revised provisional annual accounts. Afterwards, final national accounting data are available two and a half years after the reference year.

However, nothing is final in national accounting. After the final accounts have been published, gradually a large number of corrections piles up that one would want to make. However, to correct the data for just one year would break the consistency of the time-series, because usually preceding years have to be corrected as well. But it is too expensive to revise the whole time-series annually. Therefore, a revision strategy has been adopted that ensures continuity of time-series, adequate revisions and a manageable workload.<sup>5</sup>

The Dutch revision strategy starts with the basic rule that rates of change are more important than levels. Thus, if for a given year corrections are found to be necessary in the level of a variable, they are not carried out immediately; but the data for the next year are determined in such a way that the rate of change is as correct as possible. This may imply that the levels of the variables for the most recent year are consciously adjusted to be 'wrong'. After a number of years, these errors cumulate and a large scale revision is made (say, once every five to ten years). In these revisions, concepts, classifications and so on are also changed if desirable or necessary. Immediately after such a revision, revised time-series of a limited length are published. Thus the revision, pertaining to 1977, has been calculated backwards to 1969.

After the completion of the revision of the benchmark year 1987 a new revision policy was formulated. A project was set up with the aim to compile relatively long time-series of relatively detailed national accounting data within a relatively short period. This is only possible if the level of detail is less than in the regular national accounts publication. After the completion of the project consistent time-series of national accounting data from 1969 to present are available. The project, will be described in section 3.

The next section presents revisions carried out in the past. In section 4 some time-series results for 1977-87 are presented. Some concluding remarks are given in section 5.

## 2. Revisions in the Past

### 2.1. Introduction

In the course of time, several major revisions of national accounting data (see table 1 for some quantitative results) have been carried out in the Netherlands.

These revisions are, in chronological order of publication:

- Revision 1948-57, comparable data for 1948-57, published in 1958;
- Revision 1968 SNA, comparable data for 1960-72, published in 1973;
- Revision 1977, comparable data for 1977-80, published in 1981;
- Revision 1921-39, comparable data for 1921-39 and 1969-90, published in 1987<sup>6</sup>;
- Revision 1987, comparable data for 1987-91, published in 1992.

Table 1. *The effect of revisions of national accounting figures*

	Gross Domestic Product at market prices			Net National Income at market prices		
	Before revision	After revision		Before revision	After revision	
	mln gld		%	mln gld		%
revision 1948-1957						
1948	15440	15013	-2.8	14240	13535	-5.0
1954	26030	26738	+2.7	24310	24657	+1.4
1968 SNA revision						
1969	103359	101715	-1.6	95289	93797	-1.6
Revision 1977						
1977	261410	274930	+5.2	237760	251100	+5.6
Revision interwar period						
1921	6236	5679	-9.0	5780	5777	-0.1
1938	5624	5446	-3.2	5395	5399	+0.1
Revision 1987						
1987	430170	440580	+2.4	383960	390890	+1.8

In the next section, six revisions of Dutch national accounting data are described. Besides, some minor or 'tacit' revisions are mentioned. The latter concerns 'low profile' revisions. Not discussed are revisions which were carried out without an 'accompanying letter'. Only by comparing the figures in successive publications it was possible to recognize the corrections. However, this 'revision policy' was seldomly used and concerned only very minor corrections.

## *2.2. Policies and Some Results of Earlier Revisions*

In 1948 the first revision of Dutch national accounting data (referring to the years 1921-39) was published.<sup>7</sup> This publication replaced the first official national income estimates.<sup>8</sup> Both the estimates by the income and the production method were corrected. The time-series were published in one run.

In 1954, revised figures for 1938 and 1946-52 were published.<sup>9</sup> This second revision encompassed both new estimates (better basic data had become available) and changes in definitions. In the introduction to the publication it was mentioned that the development of the system of national accounts had reached a phase, both nationally and internationally, in which no great changes were to be expected in the coming years. Explicitly, the CBS revision policy was mentioned: comparability over time had a higher priority than the accuracy of the level estimates.

In 1955, corrections of earlier published figures were carried out.<sup>10</sup> These corrections concerned, amongst others, recalculations of fixed capital formation and the change in stocks. In this publication, the royalties etc. received from the rest of the world were booked as exports of services (so far, they had been booked as income from abroad). The corrections were not announced as a revision but in fact they were a revision. It is remarkable that the corrections were carried out only one year after the publication of the last revision.

In 1958 a complete revision of the national accounts for the years 1948-57 was published.<sup>11</sup> This can be considered as the third revision. The years 1946 and 1947 were left out because they were too much influenced by the war. Therefore it was decided that these years should be deleted from the time-series for use in economic model-building. The explicit purpose of the revision was to obtain time-series which were fully comparable as regards accuracy, definitions and classifications. New basic statistics made it possible to improve upon the estimates. The international definitions as given in the publications of the United Nations and the OEEC were now completely implemented.<sup>12</sup> Finally, new and more detailed classifications were worked out. These were needed for purposes of domestic economic policy and for submission to international agencies. The 1948-57 revision resulted in higher growth rates of national income and final private consumption expenditure.

From the reporting year 1969 onwards the Dutch Standard Classification of all Industrial Activities was used (introduced in the National Accounts 1971, together with time-series as from 1960).<sup>13</sup>

In the National accounts 1972 the definitions of the transactions and the aggregates have been adapted to the 1968 SNA and the 1970 European System of Integrated Economic Accounts.<sup>14</sup> The sectorial breakdown remained unchanged and the industrial breakdown still followed the Dutch Standard Classification. Time-series of detailed data were presented for the years 1960-72. This SNA revision was the fourth revision of national accounting data in the Netherlands.

The 1980 National Accounts contained the 1977 revision.<sup>15</sup> This fifth revision was needed because the years prior to 1977 were ones of major extensions and improvements of the statistics on which the national accounts were based. The extensions primarily involved a number of new statistics in services (e.g. medical services, business services, hotels, cafés and restaurants), while improvements particularly concerned a far better co-ordination of existing statistics (for instance, the general implementation of the Dutch Standard Classification of all Industrial Activities). The 1977 revision resulted in an increase of the gross domestic product at market prices by 13,500 million guilders, or 5.2%. In 1985, four years after the publication of the revised benchmark year 1977, revised time-series for 1969-76 were published, fully comparable with the revised 1977 estimates.<sup>16</sup> The revised input-output tables for these years then also became available on machine-readable tape.

The sixth revision is in a way a special one. It concerns a revision of historical national accounting data. As already mentioned in chapter 1, several years ago, Statistics Netherlands embarked on a project dealing with the compilation of long consistent time-series of national accounting data. In this project, each period is tackled separately, the results being published whenever they become available. The first period to be revised was the interwar period.<sup>17</sup>

In the revision of the 1921-39 data, the concepts and methods that were in use before the 1987 revision have been applied. Moreover, new (detailed) series have been compiled. One example of a change in method is that the national income is fully compiled by means of the net production method. Two examples of conceptual changes are: a recalculation of consumption of fixed capital by means of the perpetual inventory method and a recalculation of yearly price and volume indices by means of a Paasche-Laspeyres pair. Examples of variables for which data have been compiled for the first time are: government investment, government consumption of fixed capital. A system of sector accounts has been made as well.

A major part of the revision of the interwar data concerns an integrated estimate of the working and non-working labour force by industry. This was the first time that labour market figures at a meso-level have been estimated

which are linked to other national accounting figures and are in accordance with the national accounting concepts and methods (before the 1987 revision).

In the revision, the year 1938 plays an important role. For that year relatively much statistical information is available, which made it possible to compile a Social Accounting Matrix (SAM).<sup>18</sup> A SAM is a quite suitable data framework when a comprehensive description of an economy must be presented on the basis of scarce and sometimes contradictory statistical information, as in compiling historical national accounting figures. In the SAM framework detailed confrontations of income and labour market figures can be carried out. This approach draws its strength from the fact that all figures are mutually consistent. In this way, there is a greater opportunity to test the plausibility of the estimates. Ratios from 1938 have been used in estimating figures for the years 1921-37 and 1939.

### *3. The 1969-85 Revision*

#### *3.1. Methodology of the 1969-85 Revision*

The methodology of the present revision can be summarized as follows:

- Detailed revision of the 1987 benchmark year, reconciliation of data within a framework of supply and use matrices;
- Compilation of time-series backwards to 1969, reconciliation of data on the basis of input-output tables.

The compilation of the time-series concerns:

- Integration of current price data within an input-output table (59 economic activities, domestic production plus imports);
- Input-output tables are compiled for all years, starting with 1985 and backwards to 1969;
- Analysis of the resulting time-series and if necessary corrections of the series;
- Simultaneous compilation of figures in current and in constant prices;
- Integration of constant price data within an input-output table for the years 1978-86 (22 economic activities, domestic production plus imports).

The revision started with a detailed revision of the benchmark year 1987. The results were published in 1992.<sup>19</sup> This revision is characterized by a greater emphasis on the institutional aspects of the system, particularly when recording goods and service transactions and the generation of income. From this revision onwards, aggregation and integration of the basic data is based on the supply and use matrices (instead of the input-output tables), estimated both in current and in constant prices. This allows for a better link to basic statistics

and for a more sophisticated comparison and mutual balancing of data from different sources. Over the period 1978-1987 a number of new sources have become available and some existing sources have become more complete. For instance, in this revision a better use is made of data from CBS surveys on household consumption expenditure and on gross fixed capital formation. It is also the first occasion in which the production statistics for trade have been utilized.

With respect to income transactions, considerably more information has become available since the 1977 revision. This particularly concerns the Business Finance Statistics compiled over the years 1977-1985. This statistic provides detailed data on the profit and loss accounts and the balance sheets of non-financial enterprises. Independent income estimates were arrived at by combining these data with information on sole proprietorships and partnerships obtained from production statistics. In fact, this meant a partial rehabilitation of the income method in compiling the Dutch national accounts.

Besides, various changes in definitions and concepts were carried through. Examples are changes from net to gross and from gross to net registration. Registration of indirect taxes changed from cash basis to accrual basis. Another example of a specific change concerns an improved estimation of imports and exports of services. For a description of the 1987 revision see, for instance, the study by Van den Bos and Al.<sup>20</sup> For a detailed description of the compilation of the final estimate of Dutch GNP after the 1987 revision.<sup>21</sup>

After the detailed revision of the 1987 benchmark year, time-series backwards to 1969 were compiled. The data for the year 1986 were estimated in the same way as the data for 1987, thus, for instance, with supply and use matrices as an integration framework. The compilation of the time-series started with an analysis of the 1987 and 1986 data before and after revision on an industry level. On the basis of this analysis, it was decided that, as much as possible, branch specialists had to be involved in compiling the time-series backwards to 1977. A plain extrapolation of the 1987 revision corrections backwards to 1977 is to be avoided, unless detailed information is not available.

With regard to the time-series 1969-76, extrapolation methods have been used more frequently for several reasons. Firstly, there are not enough resources for a continued, detailed year-by-year revision available. Secondly, the revision corrections become smaller back in time, see chapter 4. The relatively small revision corrections don't justify a great effort of the national accounts staff. Thirdly, the extrapolation method leads to results relatively quickly.

In the compilation of the time-series 1969-85, computerization plays an indispensable role. For the storage, processing, integration and analysis of data completely new software has been built by the project group. Without this

software it is not possible to make the detailed long time-series within a short period.

An important difference between the revision 1969-85 and the revision 1969-77 is that in the earlier revision, all corrections were made on the figures available in the input-output tables before revision. In the present revision, all new data are re-integrated, starting from scratch. Only, a separation of the origin of transactions into domestic and foreign is done more or less mechanically.

Since the 1987 revision, a new method is used to estimate the volume growth of government value added. This method takes into account changes in the labour productivity of government employees. Changes in wages and salaries can be split up into a compensation for inflation and a compensation for productivity changes. A proxy for the first component is the index of basic wage rates according to collective agreements. The latter is used to deflate value added of the government. The introduction of the new method had a substantial impact on the growth rates of government value added. For example, for the years 1988-91 this growth rate is, on average, about 1.5 percentage point higher than on the basis of the old method and GDP growth is about 0.1 percentage point higher.<sup>22</sup>

### *3.2. Estimation Method of the Data in Current Prices*

In this section, the estimation method of the current price data is described. However, these figures were estimated in relation with the estimates of the growth rates and the deflators. The estimation of the growth rates and the deflators is described in section 3.3

The estimation method can be split up into two stages. Firstly, after revision estimates have been made by the specialists of the National accounts department. Secondly, these estimates have been integrated, in consultation with these specialists.

All corrections estimated for the 1987 benchmark year have also been estimated for the years 1985-77. The cornerstones of the estimation process are the estimates by industry, made by the branch specialists. For each of the 59 industries, the specialists provided the following revised data:

- Total output;
- Total intermediate inputs (in some cases specific input items were provided);
- Gross value added at market prices;
- Wages and salaries;
- Operating surplus/mixed income.

This means that the knowledge of the specialists about the particular nature of industries is very important. This procedure is preferable to a method which

heavily relies on extrapolation of the revision corrections of the benchmark year. Of course, the latter method is less labour intensive.

Specialists on final expenditure provided data per product group for:

- Household final consumption;
- Government final consumption;
- Fixed capital formation;
- Exports of goods and services;
- Imports of goods and services.

Besides, data on indirect taxes (value-added tax, excises etc.) and subsidies have been provided by the specialists.

The compilation of the input-output tables is done in several stages. In the first stage the data provided by the specialists are put in the columns of the table. Data on final expenditure by origin are considered to be relatively hard information. This means that the domestic production and imports being 'known', for every row of the table a preliminary estimate of the supply of intermediate inputs can be compiled.

In the next stage, the integration of the figures provided by the branch specialists took place. The integration process started by checking the data supplied by the specialists. Firstly, the completeness (e.g. coverage of all industries) and the correctness (e.g. valuation) of the data was checked. Secondly, the plausibility of the data: total output, intermediate inputs, value added and its components. An important check is a comparison of yearly rates of changes before and after the revision.

Afterwards, given total intermediate inputs by industry, intermediate inputs are specified by industry of origin. This is done column by column. For every input item, an estimation method has been determined. There are three possibilities:

- The annual change of the input item equals the change before revision;
- The annual change equals the change in total intermediate inputs of the column involved, after revision;
- The annual change equals the change in total supply of intermediate inputs, after revision.

The next step is to balance every column. This is done by the integration experts. In some cases, specific intermediate inputs were provided by the specialists. If necessary, the calculation method for the inputs can be changed. In fact, this means that the input structure was adjusted.

Finally, the balanced columns are put together into the input-output framework. Of course, supply and use is then still not balanced. Next, all data are integrated.

In the integration process the major statistical decisions are taken by experts on the basis of their knowledge of the statistical system and the Dutch economy. Remaining, small differences between supply and use are eliminated with a RAS-method.

The input-output tables are submitted for approval to the specialists. They compare the final estimates after integration with the data they provided. They judge the levels, the annual changes and the whole time series. This can lead to a final round of corrections.

In compiling the time series 1977-1985 both the production and the income method were used. The first estimates from both methods showed considerable differences. This led to detailed analyses and changes of the estimates of both the income and the production method. As stated before, in this revision project the income method has been rehabilitated, more or less.

### *3.3. Estimation of Growth Rates and Deflators*

In the revision, growth rates and deflators have been estimated in relation with the estimates in current prices. There was a feed-back between the estimates of the growth rates and the estimates in current prices. In some cases, analysis of the growth rates and the deflators led to the conclusion that the estimates in current prices had to be corrected.

Immediately after the provisional input-output tables in current prices were finished, input-output tables in prices of the previous year were compiled. However, the aggregation level was higher: 22 industries.

To begin with, matrices of deflators were calculated from the input-output tables in current and in previous-year prices before revision. With the help of these matrices the revised input-output tables in current prices (aggregated to 22 industries) were deflated. Afterwards, the resulting matrices of data in prices of the previous year were integrated to give input-output tables in prices of the previous year.

In the integration, an important role was played by the matrices of revised volume mutations, which were calculated from the deflated input-output tables and the current price input-output tables. The plausibility of these volume mutations was checked and compared with the figures before the revision. The plausibility of the input-output ratios in constant prices was also important in the integration process. In a few cases (for example agriculture, imports and exports), volume mutations have been estimated by specialists.

### *3.4. Organization and Time-table*

For the revision of the national accounting data 1969-85 a project group was set up at the end of 1992. This group is responsible for the coordination, the integration process, the time-series results and the publication of the results. This group consists of, on average, five persons. The group started in January

1993 and was set up for two years. Besides, many staff members (about 50 persons) of the National Accounts Department are involved: branch specialists and specialists of final expenditure categories, value added components and employment.

A steering committee was set up, consisting of chiefs of the National accounts divisions involved in the project and the project manager. The steering committee is responsible for the realization of the aims of the project and the time-series results.

As mentioned before, the aim of the project was to compile long time-series of national accounting data in a relatively short period. The time-table of the revision project is as follows:

- Publication of the 1985 figures in the publication National Accounts 1992 (September 1993);
- Publication of time-series 1977-85 medio 1994;
- Publication of time-series 1969-84 ultimo 1994, including an explanation of the methods and an analysis of the results.

The aim of publication of the 1985 data in September 1993 was reached. The publication of the time-series has delayed.

#### *4. Time-series Results*

To give an impression of the quantitative results of the revision provisional macro-economic aggregates for 1977-87 are presented in the tables of the appendix.

In general, the revision corrections of the macro-economic aggregates are getting smaller backwards in time, with the smallest corrections in the early 1980s. For instance, in the benchmark year 1987 the correction of the gross domestic product at market prices (GDP) was 10410 mln gld, that is 2.4%. In 1982, the GDP correction was 4058 mln gld (1.1%) and in 1977 the correction was 3880 mln gld (1.4%).

The final consumption expenditures of households were raised by 1.5% in 1987, 0.6% in 1981 and 1.7% in 1977. The corrections of fixed capital formation range from 5.0% in 1987 to 3.7% in 1977.

The corrections of imports and exports are negative. These corrections are also getting smaller backwards to 1977.

In the Netherlands, the national accounting data are estimated in such a way that the rate of (annual) change is as correct as possible (see chapter 1). This is reflected in table A2 of the appendix which shows the annual mutations of the macro-economic aggregates before and after revision. In general, the GDP annual mutation after revision is higher than before revision. This is partly a

consequence of the new estimation method of productivity in general government, see section 3.1.

### 5. *Conclusions*

In this article the successive revision policies of Statistics Netherlands were described. The changing Dutch revision policy reflects in a way the fact that there are two archetypes of revision policies:

- ‘Short period’ revisions: a revision of a benchmark year, followed by time-series of moderate length;
- ‘Long period’ revisions: a revision of a benchmark year followed by time-series backwards to the very first year with national accounting data.

In the Netherlands, the first revisions were of the ‘long period’ type. Of course, the choice of such a policy was relatively easy because the time-series of national accounting data were not that long in the early days of national accounts and the system of national accounts was relatively simple. But still, the first revision concerned the years 1921-39: time-series of nineteen years.

In the course of time, the revisions became more and more ‘short period’ revisions. For instance, the revision with 1977 as a benchmark year was followed by time-series backwards to 1969: time-series of nine years.

The last revision with 1987 as a benchmark year, was followed by time-series back to 1969: time-series of nineteen years. This is again more of the ‘long period’ type. Besides, recently, Statistics Netherlands has revised the national accounting data for the interwar period which makes the time-series longer. However, there is still a gap between 1939 and 1969.

After the 1987 revision, the Dutch estimate of GNP at market prices complies with the concepts in the European System of Integrated Economic Accounts (ESA). An exception is the calculation of value added of some types of non-market production.<sup>23</sup>

In due time, the statistical description of the economy improved considerably. This is an explanation for the fact that, in general, the quantitative corrections of the macro-economic aggregates, because of revisions, became smaller. For instance, the revision of the benchmark year 1977 resulted in a GDP correction of 5%. The revision of the benchmark year 1987 gave a GDP correction of 2.4%. However, at a meso-level the revision corrections are sometimes substantially greater.

The revision of the years 1977-87 led to a rise of most of the macro-economic aggregates. Imports and exports are lower after the revision. This is mainly caused by the net registration of many processing transactions. Final

consumption expenditure of general government is lower after revision. This is the net result of a great number of corrections.

This article started with the observation that different revision policies are used in different countries. This obscured comparisons of national accounting data across countries. For the European countries there is a special need to harmonize revision policies.

Since 1988, the member states of the European Community have to compile GNP data in accordance with the ESA definitions. These GNP estimates (fiscal GNP) are the basis for the calculation of the countries' contributions to the Community. For this purpose, mainly *levels* of GNP are of interest. This implies that in between two revisions, statistical GNP may not be equal to fiscal GNP, strictly speaking. These differences between the statistical and the fiscal GNP will disappear when a revision of the national accounts is carried out in such a way that the revised GNP for fiscal purposes is the same as the revised GNP for statistical purposes. For the Netherlands, such a revision is scheduled for the reference year 1995. Until the reference year 1995, the data to estimate the fiscal GNP will be sent to the European Community, but - because of the Dutch revision strategy - they can not immediately result in new estimates of the statistical GNP.

Probably, from the reference year 1996 onwards, fiscal GNP will deviate from the statistical GNP again, because new fiscal GNP requirements will not be incorporated into the statistical GNP estimates before a next revision. The Dutch point of view is that no continual revisions can be carried out for fiscal purposes.

In the future, all countries of the European Community should follow the same revision policies to achieve that changes will be introduced at the same time into all databases and publications. Only in that case, fiscal GNP and statistical GNP can be completely harmonized.

## Appendices

Table A1. *Macro-economic aggregates, revision corrections as a percentage of the average before and after revision levels*

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Gross domestic product, market prices	1,4	1,2	1,2	1,4	1,5	1,1	1,6	1,3	1,7	2,1	2,4
- wages and salaries	1,8	1,6	1,4	1,3	1,4	1,5	1,5	1,9	2,3	2,7	3,3
- employers' social contributions	2,0	2,5	2,8	2,6	2,8	2,6	2,5	2,5	2,2	2,9	2,4
- indirect taxes	7,7	4,6	5,9	2,2	1,5	4,3	3,2	4,3	3,6	4,5	3,6
- subsidies (-)	34,9	32,6	24,2	22,3	22,6	21,4	20,8	18,6	18,5	19,0	18,4
- operating surplus/ mixed income	0,7	1,3	0,5	2,6	2,6	0,6	2,5	0,9	1,8	1,8	2,7
Imports (cif)	-1,4	-1,1	-1,2	-1,4	-1,2	-2,5	-2,8	-2,8	-3,0	-3,6	-2,7
Disposable for final expenditure	0,5	0,5	0,4	0,5	0,5	-0,1	0,1	-0,2	-0,0	0,2	0,7
Final consumption expenditure	0,9	0,8	0,8	0,4	0,1	0,7	0,9	0,9	1,4	1,0	1,0
- households	1,7	1,6	1,5	1,0	0,6	1,1	1,4	1,5	2,1	1,6	1,5
- general government	-2,1	-2,1	-1,7	-1,7	-1,6	-1,0	-0,7	-1,1	-1,2	-1,2	-1,2
Fixed capital formation (gross)	3,7	3,5	3,1	3,1	3,6	3,4	3,9	3,9	4,2	3,6	5,0
- enterprises	3,6	2,6	1,8	2,0	2,5	2,1	3,1	2,9	3,2	3,3	4,1
- general government	4,4	8,2	10,2	9,1	9,0	10,0	8,3	9,6	10,1	5,7	11,4
Increase in stock											
Exports (fob)	-1,6	-1,1	-1,2	-1,3	-0,9	-2,0	-2,3	-2,4	-2,6	-4,7	-3,3
Total final expenditure	0,5	0,5	0,4	0,5	0,5	-0,1	0,1	-0,2	-0,0	0,2	0,7

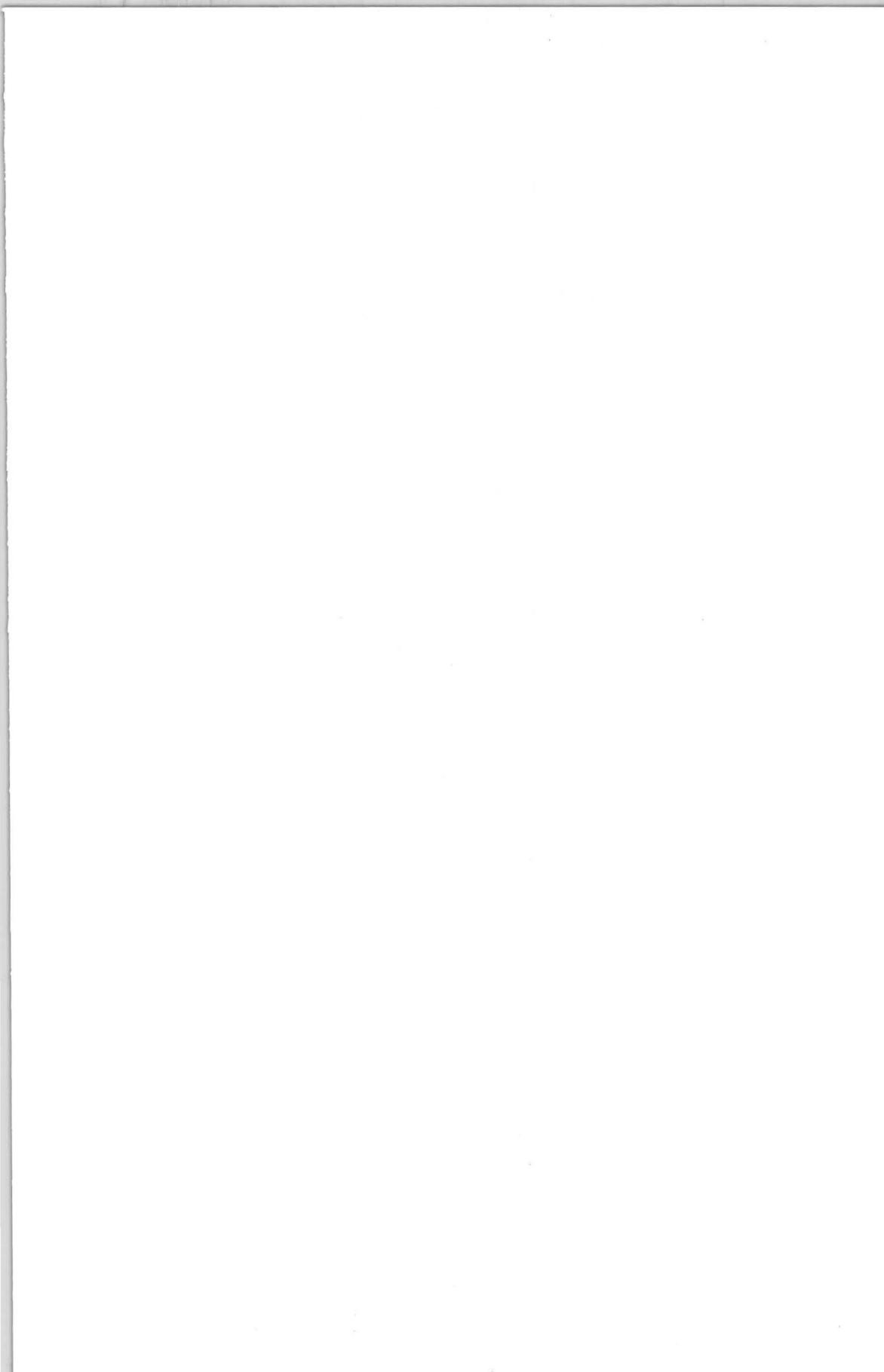
Table A2. *Macro-economic aggregates before and after revision, annual mutations / (%)*

	1978		1979		1980		1981		1982		1983		1984		1985		1986		1987	
	before	after																		
Gross domestic product, market prices	8.0	7.8	6.4	6.4	6.6	6.8	4.8	4.8	4.5	4.1	3.3	3.8	5.0	4.7	4.5	4.9	2.5	2.9	0.4	0.7
- wages and salaries	8.5	8.2	7.1	6.9	6.1	6.0	2.0	2.1	3.3	3.4	-0.3	-0.3	0.5	0.8	3.5	3.9	4.1	4.6	3.4	4.0
- employers' social contributions	7.7	8.3	9.4	9.6	7.5	7.3	1.5	1.7	1.7	1.5	5.5	5.4	-0.7	-0.7	2.3	2.0	3.2	3.9	1.9	1.4
- indirect taxes	10.8	7.3	5.1	6.6	7.1	3.2	1.6	0.9	2.4	5.3	5.7	4.6	6.5	7.7	5.4	4.7	6.2	7.2	6.9	5.9
- subsidies (-)	16.3	13.5	20.6	10.7	5.7	3.7	-2.9	-2.5	14.9	13.5	12.9	12.1	13.5	11.1	6.4	6.3	3.6	4.2	21.9	21.2
- operating surplus/ mixed income	7.1	7.6	5.6	4.8	6.6	8.8	10.8	10.8	8.7	6.5	6.8	8.9	12.7	10.9	6.0	7.0	-0.4	-0.4	-3.7	-2.9
Imports (cif)	4.6	4.9	17.6	17.5	14.0	13.8	7.6	7.8	2.4	1.1	4.3	3.9	11.0	10.9	7.8	7.6	-13.2	-13.8	0.1	1.0
Disposable for final expenditure	6.9	6.9	9.9	9.8	9.0	9.1	5.8	5.8	3.8	3.1	3.6	3.9	7.1	6.8	5.7	5.8	-3.3	-3.1	0.3	0.8
Final consumption expenditure	9.2	9.2	7.7	7.7	6.6	6.2	3.7	3.4	4.0	4.5	3.3	3.5	2.3	2.3	4.0	4.5	3.0	2.6	3.0	3.0
- households	9.0	9.0	7.4	7.3	6.9	6.4	3.6	3.2	4.0	4.6	3.6	3.8	3.0	3.1	4.6	5.2	3.4	2.9	3.0	3.0
- general government	9.9	9.9	8.7	9.1	5.4	5.5	4.1	4.2	3.8	4.5	2.2	2.5	-0.3	-0.6	1.9	1.8	1.3	1.3	3.0	3.0
Fixed capital formation (gross)	9.3	9.0	5.0	4.7	6.5	6.5	-4.5	-4.1	-0.6	-0.8	3.4	3.9	7.0	7.0	8.0	8.3	7.4	6.8	1.1	2.5
- enterprises	10.4	9.3	5.6	4.8	5.5	5.7	-5.6	-5.1	0.1	-0.2	4.8	5.8	6.5	6.3	9.8	10.2	9.1	9.2	1.7	2.5
- general government	3.9	7.9	1.7	3.7	11.9	10.7	1.2	1.1	-4.3	-3.4	-4.0	-5.7	9.8	11.2	-2.2	-1.7	-3.4	-7.6	-3.1	2.6
Increase in stocks																				
Exports (fob)	2.0	2.4	16.3	16.2	14.0	13.9	15.7	16.1	3.9	2.8	3.4	3.0	13.1	13.0	6.8	6.6	-12.4	-14.2	-2.5	-1.2
Total final expenditure	6.9	6.9	9.9	9.8	9.0	9.1	5.8	5.8	3.8	3.1	3.6	3.9	7.1	6.8	5.7	5.8	-3.4	-3.1	0.3	0.8

## NOTES

1. Statistics Netherlands, Department of National Accounts. The views expressed in this article are those of the authors and do not necessarily reflect the view of Statistics Netherlands. This article was presented at the Twenty-third General Conference of the International Association for Research in Income and Wealth, St. Andrew's, New Brunswick, Canada, August 21-27, 1994.
2. United Nations, *System of National Accounts 1993*. Document symbol ST/ESA/STAT/SER.F/2/ Rev. 4 (New York, 1993).
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5. For more details on the revision strategy of the CBS, see for instance: S.B. Algera, P.A.H.M. Mantelaers and H.K. van Tuinen, 'Problems in the Compilation of Input-Output Tables in the Netherlands', in: J. Skolka (ed.), *Compilation of Input-Output Tables. Lecture Notes in Economics and Mathematical Systems*, vol. 203 (Berlin/ Heidelberg/ New York) 37-103; Van Bochove, 'The micro-meso-macro linkage'.
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15. CBS, *Nationale rekeningen*, 1981.
16. CBS, *Nationale rekeningen*, 1985.
17. Cf. G.P. den Bakker, Th.A. Huitker and C.A. van Bochove, 'The Dutch Economy 1921-1939: Revised Macro-Economic Data for the Interwar Period', *Review of Income and Wealth* series 36, no. 2, 187-206.
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19. CBS, *Nationale Rekeningen*, 1992
20. C. van den Bos and P.G. Al, 'The 1987 Revision of the Netherlands' National Accounts'. National Accounts Occasional Paper Nr. NA-058 (Voorburg, 1994).

21. F. Bos and C. Gorter, 'Compiling Dutch Gross National Product (GNP); Full Report on the Final Estimates after the Revision in 1992'. National Accounts Occasional Paper Nr. NA-057 Extended (Voorburg, 1993).
22. For a description of the method, see: B. Kazemier, 'Volume Measurement of Government Output -The Dutch practice since Revision 1987'. BPA no. 10797-92-HE8 (Voorburg, 1992).
23. Besides, on specific practical issues, there are some small imperfections, see: Bos and Gorter, 'Compiling Dutch gross National Product'.
24. In this article relative corrections are expressed as a percentage of the average of the before and after revision levels.



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