The Dutch growth accounts 2009

Statistics Netherlands

Explanation of symbols

.	= data not available
*	= provisional figure
**	= revised provisional figure
x	= publication prohibited (confidential figure)
–	= nil or less than half of unit concerned
–	= (between two figures) inclusive
0 (0,0)	= less than half of unit concerned
blank	= not applicable
2008–2009	= 2008 to 2009 inclusive
2008/2009	= average of 2008 up to and including 2009
2008/'09	= crop year, financial year, school year etc. beginning in 2008 and ending in 2009
2006/'07–2008/'09	= crop year, financial year, etc. 2006/'07 to 2008/'09 inclusive

Due to rounding, some totals may not correspond with the sum of the separate figures.

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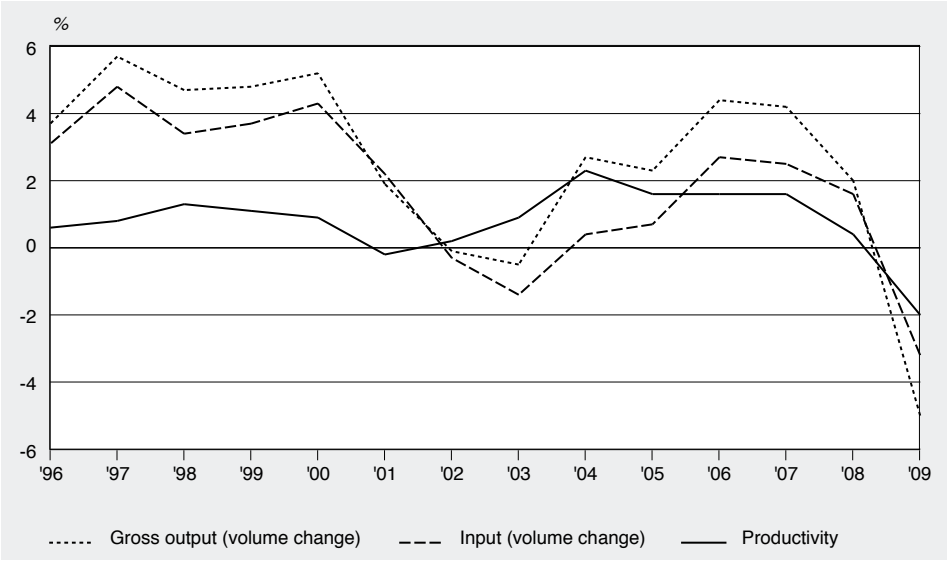
Content

Summary

In 2009 the real (consolidated) output of the Dutch commercial sector fell by 5.0 percent. The total input of capital, labour, energy, materials and services decreased by 3.2 percent. This resulted in a 2.0 percent output reduction per unit production factor. This reduction represents a decrease of multi-factor productivity (*mfp*). An annual *mfp* decrease of 2.0 percent has not been measured before in the entire period 1996–2009 for which Statistics Netherlands has been publishing *mfp* statistics.

The economic downturn largely explains the negative *mfp* growth in 2009. Productivity growth already started to slow-down in 2008 at the beginning of the financial crisis. The major dip in gross output following this turmoil was not accompanied by proportional cutbacks of inputs. When demand dwindled, most companies did not reduce their capital and labour input accordingly and as a result *mfp* decreased. Productivity growth usually declines at the start of a recession. This is called a cyclical productivity downshift.

1. Annual productivity change in the commercial sector



Source: Statistics Netherlands, national accounts.

Despite the strong *mfp* decline in 2009, profitability in the commercial sector developed positively. Profitability refers to the ratio between gross output and the total sum of inputs. It may rise due to productivity improvements or as a result of favourable output price developments relative to input prices. For the entire commercial sector, input prices dropped on average by more than output prices did, contributing to increased profitability.

An economy's international competitiveness is partly influenced by the development of unit labour cost, which reflects the compensation of employees relative to an economy's output. In 2009, Dutch unit labour cost rose considerably, by 4.8 percent. However, this outcome is in line with unit labour cost increases experienced during the 2001 recession. A dip in value added was the main reason of the increased unit labour cost in 2009, whereas rising labour cost accounted foremost for the upswing of unit labour cost in 2001. Although the increase of Dutch unit labour cost in 2009 was substantial, it was in line with developments found in several other EU countries. The international competitive position of the Netherlands may therefore not be directly at stake.

Productivity gains are strongly linked to innovation, which is to a large extent driven by investment in intellectual property. Compared to the rather reserved international national accounts regulations, the economic literature advocates accounting for a much broader range of intellectual property products as capital formation. These additional items such as brand equity, organisational structures and firm-specific human capital bear in many cases

the characteristics of capital goods. Within the knowledge satellite account, experimental estimates have been made for investments in these additional intellectual property products as well as their contribution to economic growth.

The importance of intellectual property products in total capital has increased over the last twenty years. In the Netherlands investment in intellectual property products accounted for more than half of total investment in 2009. Intellectual property products also had a substantial impact on economic growth in the Netherlands. In the period 1996–2001 the average contribution of intellectual property products to economic growth was as large as that of other forms of fixed capital.

In the period following the 2001 downturn, investment in intellectual property products and other fixed assets showed lower growth rates than in the preceding period. In the period 2002–2007 the average annual growth rate of intellectual property products was even lower than that of gross domestic product (GDP) at market prices. In particular, growth in research and development (R&D) expenditure in the Netherlands was limited. As a share of GDP, R&D expenditure went down from 1.3 percent in 1987 to 0.9 percent in 2009. Given this fall back it is quite unlikely that the Netherlands will be able to elevate R&D expenditure to a level of 3 percent of GDP, as formulated by the EU Lisbon target for 2010.

1. Introduction

This is the fourth edition of *The Dutch growth accounts* in which Statistics Netherlands presents statistics on multi-factor productivity *(mfp)* at the macro and meso level. The growth accounts describe the determinants of economic growth, with *mfp* representing a measure of changes in the efficiency of production processes. Statistics on *mfp* are a logical addition to the existing statistics on economic growth and labour productivity. Since multiple factors of production contribute to output growth, measurement of labour productivity provides a partial picture of efficiency change. Efficiency measurement is improved when it is based on *mfp* since this measure takes into account labour and the use of all other inputs such as capital, energy, materials, and services. The residual part of output change, which cannot be explained by changes in the use of these inputs, is called *mfp* change. Multi-factor productivity change can be positive as well as negative.

Growth accounting involves systematically attributing output growth to factors of production. By doing so, growth accounts help to clarify to which extent an increase in labour productivity is explained either by augmented use of capital or by efficiency gains.

Statistics Netherlands publishes *mfp* statistics at the macro, meso, and micro level. Micro level analyses may help to investigate for example the enabling role of ICT investment in corporate innovation strategies. Furthermore, combining findings of micro and macro studies can be valuable in tracking down productivity developments in specific industries, or in analysing the effects of information technology or international competition on productivity. Usually, Statistics Netherlands presents such analyses at the micro and combined micro-macro level in separate publications.

This edition of *The Dutch growth accounts* presents the results of *mfp* measurement at the macro and industry level (Chapter 3). The outcomes presented are fully consistent with the Dutch national accounts. However, the results may occasionally deviate from those released on behalf of EU-KLEMS (the international productivity database) due to requirements of international harmonisation.

The results presented in this publication still have an experimental status. The Dutch growth accounts are subject to ongoing developments. By now the accounts cover the most important types of capital. In previous publications the capital inputs were restricted to those of fixed assets and oil and gas reserves. In this edition of *The Dutch growth accounts*, the capital inputs are extended to other asset types such as other subsoil assets (e.g. sand, gravel and salt), inventories, agricultural land and land underlying dwellings and buildings. Recreational land and construction land are the most important types of capital that are not (yet) covered.

In addition the subdivision of labour based on characteristics such as age (as a proxy of working experience), gender and educational level has not yet been introduced on a regular basis in the Dutch growth accounts. It is expected that these additions will follow in the near future. This implies that the results presented in this publication are likely to be further refined in the coming years.

Chapter 2 provides a short summary of the definition of *mfp* as well as a brief overview of the methodological underpinnings. For a more detailed methodological description we would like to refer to *De Nederlandse groeirekeningen 2006* (in Dutch)[1)] and Van den Bergen et al. (2008, in English).

Chapter 3 presents the main results and discusses the most striking *mfp* developments in the Dutch economy. The chapter also reflects on how the recent economic crisis influenced profitability in the commercial sector. In addition, chapter 3 shows how labour cost developments have affected the international competitiveness of the Dutch economy.

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1) An English translation of a more detailed description of the methods will be available in 2011.

Chapter 4 concentrates on developments in the area of intellectual property. A few years ago Statistics Netherlands developed the knowledge satellite account which pictures the knowledge-based economy in much greater detail than the mainstream Dutch national accounts. In the knowledge satellite account intellectual property is expanded to a comprehensive list of assets including R&D, brand equity, organisational structures, firm-specific human capital and architectural and engineering designs. Chapter 4 presents the effects that capitalising these additional intellectual property products has on macro-economic aggregates such as gross domestic product (GDP) and gross fixed capital formation. These supplementary forms of capital are subsequently introduced in the Dutch growth accounts framework in order to compute also their contributions to economic growth.

This edition of *The Dutch growth accounts* includes four technical annexes. Annex 1 explains the specifications of the Dutch growth accounts, including a discussion on the main assumptions underlying the *mfp* statistics. Annex 2 provides an overview of the effects on the Dutch growth accounts of introducing additional capital categories such as subsoil assets (e.g. sand, gravel and salt), inventories, agricultural land and land underlying dwellings and buildings. Annex 3 presents a sensitivity analysis of the effects of variances in risk premiums on profitability. These risk premiums are included in the cost of capital. Finally, Annex 4 lists the classification of industries as introduced in the Dutch growth accounts.

Literature

Bergen, D. van den, M. van Rooijen-Horsten, M. de Haan and B.M. Balk (2008). Productivity Measurement at Statistics Netherlands, Statistics Netherlands, The Hague/Heerlen.

2. Productivity measurement method

The national accounts describe the production process from two different angles. They determine the output of a production process on the one hand. Depending on how the production process is conceptualised, either gross output or value added is taken as the measure of output. On the other hand, the national accounts systematically determine all inputs in the production process. In case gross output is taken as the output measure, the corresponding inputs are labour, capital and intermediate consumption, with intermediate consumption often subdivided into energy, materials and services inputs. In case value added is chosen as the measure of output, the corresponding inputs are restricted to labour and capital. Productivity is determined by systematically connecting outputs and inputs of a production process. A well-known productivity measure is labour productivity. Labour productivity is usually determined by dividing value added (as a measure of output) by hours worked (the input).

Labour is only one of the inputs in a production process. As such labour productivity only provides a partial view. When a company replaces employees (labour) by machinery (capital) while keeping output constant, labour productivity increases. This replacement leads to increasing capital costs for the company. Therefore, the company's total productivity increase will be smaller than that of its labour productivity. In case the extra costs on machinery exceed the savings on labour (which would be at odds with rational economic behaviour), total productivity will even show a decline.

For a complete description of the productivity change of a company or an industry, all inputs in the production process should be taken into account. Such a productivity measure is called total factor productivity (*tfp*). A productivity measure that takes several, but not all inputs in the production process into account is called multi-factor productivity (*mfp*). In the *mfp* statistics presented, labour and intermediate consumption are taken fully into account. The input of capital is still incomplete, however, although the most important types of capital are now included in the Dutch growth accounts. Fixed assets and inventories are fully covered as well as a range of so-called non-produced assets: the Dutch oil and gas reserves, other subsoil assets (e.g. sand, gravel and salt), agricultural land and land underlying dwellings and buildings. Recreational land and construction land are the most important types of capital that are not (yet) included as capital input. More generally, it is hard to judge whether the production factor capital is fully captured by including all forms of intellectual property. Therefore, we prefer referring to multi-factor productivity instead of total factor productivity.

Multi-factor productivity change is determined by dividing a volume index of the outputs (one industry branch can produce several types of products) by a volume index combining all inputs. In this publication two different models are applied to calculate *mfp* change.[2)] In the first model, capital (K), labour (L), energy (E), materials (M) and services (S) are used as inputs to produce consolidated (gross) output. This model results in so-called *KLEMS mfp*. Consolidation means that all intra-industry deliveries are deducted from both gross output and intermediate consumption. In effect, the industry is described as being one single company. This consolidation assures that productivity change is independently determined from the way an industry is subdivided into industries, and thus only depends on the production process of the industry as a whole and not on the number of intra-industry deliveries.

In the second model, value added is generated by using capital and labour. Value added roughly constitutes the return to labour and capital. In this more restricted model that excludes intermediate consumption, value added is taken as the output measure.

[2)] The results using the first model are the basis for the analyses described in this publication. Results using the second model are shown in tables 3.7 and 3.8 in chapter 3 only.

The total volume index representing all inputs of production is determined by weighing the volume indices of each input with their cost shares in the total (consolidated) production cost.

The volume index of labour is based on hours worked by employees and self-employed persons. The cost of labour consists of the compensation of employees plus the compensation for labour of the self-employed. The labour income of the self-employed cannot be measured directly since the mixed income consists of a compensation of the labour element, a reward for capital input and an entrepreneurial income element. The productivity statistics are based on the assumption that in most industries the self-employed have the same yearly labour income as employees in the same industry. There are a few exceptions to this assumption. In the construction industry it is assumed that people who are self-employed have the same hourly income as employees and in some medical sectors a direct measure of the labour income of the self-employed is used based on a so-called standard income measure of these professions.

The volume index of the capital services of fixed assets is based on the volume change of the productive capital stock. This capital stock measure is corrected for efficiency losses due to aging. Capital cost is determined by multiplying the quantity of assets, broken down by asset type and age, with the user cost per quantity of assets. The user cost represents all (imputed) cost to hold and use an asset in production for the period of one year. It contains the following elements: (imputed) interest (or rate of return) representing the opportunity cost of holding the asset, consumption of fixed capital and holding gains and losses. An exogenous rate of return is used, based on the average interest rate on outstanding bonds. The applied rate of return is represented by the interbank interest rate supplemented by a constant risk premium. Conceptually, the user cost of an asset can best be compared with an asset's rental price.

The user cost of other types of capital inputs are estimated in a similar way. However, a number of different methods are applied for estimating the volume changes of other asset types. The volume changes of the capital services derived from subsoil assets are based on physical extraction levels. For inventories, the quantity levels of inventories by commodity are used. Volume changes of the use of land are derived from data on land surface area by type, corrected for quality (spatial) differences. Land underneath economically favourable locations has a relatively higher economic value. In the growth accounts, this land is therefore treated as land of higher quality than land in less favourable areas.

The Dutch growth accounts systematically quantify, at industry branch level, the contribution of individual inputs to output growth. The contribution of one particular input, say labour, to output growth is determined by examining how much output would have changed in the (hypothetical) situation that only labour input would have changed, keeping all other inputs and *mfp* constant. The contribution of labour is thus determined by multiplying the volume change of labour input with labour's share in the total cost of production. Subsequently, multi-factor productivity growth can be interpreted as that part of output growth that cannot be explained by any growth of inputs. As such, multi-factor productivity change is determined as a residual in the growth accounts and represents a change in the efficiency of existing production processes.

Since multi-factor productivity is determined by dividing the volume index of outputs by the volume index of all inputs, meaningful results can only be obtained when outputs and inputs are independently determined. When volume changes of output are measured on the basis of volume changes of inputs, this independence is lost and productivity measurement becomes impossible. Since the output of several industries, i.e. general government, real estate activities and private households with employed persons, is partly based on volume changes of inputs, productivity change is not, for the time being, calculated for these industries in the Dutch growth accounts. For a more detailed description of the specifications of the Dutch growth accounts we refer to Annex 1.

Productivity change measures are highly sensitive to business cycles. In the short run, companies often have difficulties adjusting their labour and capital inputs to real or

expected volume changes in output. Adjustments of labour and capital inputs to cyclical changes therefore often show a delay. Consequently, in an economic downturn, productivity changes often are below average, whereas in periods of economic recovery they often are above average. For robust analyses of productivity change it is therefore advisable to calculate average productivity change over longer periods of time instead of following year-to-year changes.

For a more detailed description of the theoretical background of productivity measurement we refer to *De Nederlandse groeirekeningen 2006* (in Dutch) and Van den Bergen et al. (2008, in English).

Literature

Bergen, D. van den, M. van Rooijen-Horsten, M. de Haan and B.M. Balk (2008). Productivity Measurement at Statistics Netherlands, Statistics Netherlands, The Hague/Heerlen.

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3. Analysis of productivity growth

This chapter provides an analysis of economic developments based on the Dutch growth accounts. The chapter starts with a general overview of the commercial sector. The commercial sector covers the entire economy except general government, real estate activities, renting of movables, and private households with employed persons.[3)] The main reason for excluding these economic activities is the absence of proper indicators for measuring their output volumes (see Annex 1). These excluded industry branches are thus not represented in the figures of the industries financial and business activities and care and other service activities presented here.

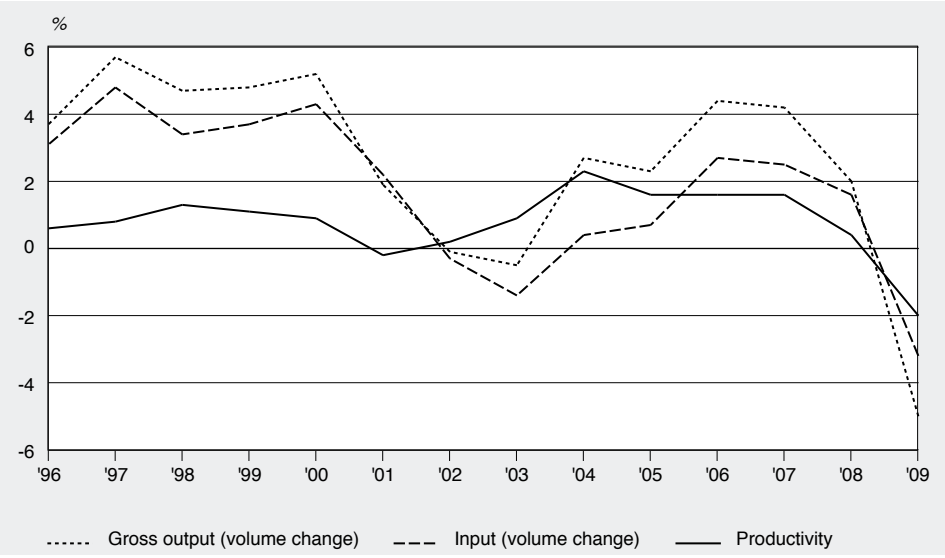
The chapter is structured as follows. Section 3.1 gives an overview of annual productivity change in the commercial sector. Section 3.2 describes some major productivity developments in a selected number of industries. Section 3.3 elaborates on recent developments in profitability. Section 3.4 describes how the development of unit labour cost has affected the competitive position of the Netherlands against other countries.

The growth accounts are based on consolidated gross output. This means that internal deliveries within an industry (or within the commercial sector) have been eliminated from gross output and intermediate use. Unless noted otherwise, in the remainder of this publication productivity change refers to the development of multi-factor productivity (*mfp*) based on consolidated gross output.

3.1 General overview

In 2009 gross output in the commercial sector fell dramatically by 5.0 percent. The volume of all KLEMS inputs went down by 3.2 percent. Productivity therefore decreased by 2.0 percent. In the Netherlands, such a large *mfp* decline has never been measured in the entire period 1996–2009 for which productivity statistics are available.

3.1 Annual productivity change in the commercial sector



Source: Statistics Netherlands, national accounts.

[3)] The expression commercial sector does not fully cover the overtone as commercial activities do take place in the industry branches renting of movables, private households with employed persons and (in parts of) real estate activities. However, no other appropriate name exists for the part of the economy that is described here.

The main explanation for the negative productivity growth in 2009 is the unprecedented economic downturn after the financial turmoil. Productivity growth already started to slow down in 2008 when the economic crisis started. The resulting large drop in gross output was not accompanied by a similar reduction of inputs. When demand dwindled, most companies did not reduce their capital and labour input accordingly and as a result productivity decreased. Productivity growth often declines at the start of a recession. This is also called a cyclical productivity downshift.

Capital retention and labour hoarding

There are several reasons why capital and labour do not follow gross output directly in a period of recession. Capital goods are mostly retained in the production process because discarding them before the end of their service lives brings along substantial extra costs. In addition, the existing capital capacity will be needed again when the economy recovers. With regard to labour, it is not easy to lay off workers immediately after an economic crisis because of employment protection. Companies may also keep workers because they expect an economic recovery in the near future or because skilled workers may be scarce and difficult to attract at a later stage. This labour hoarding was also stimulated by the Dutch government when the Ministry of Social Affairs and Employment introduced a part-time unemployment regulation (in Dutch '*deeltijd WW*') in April 2009. Its objective was to preserve jobs of skilled workers and to help economically healthy companies that ran temporarily out of sales and orders through the economic crisis. Employees who would have been discharged could now continue to work fewer hours while receiving unemployment benefits for the remaining hours. As a consequence, the decline in number of hours worked was probably less dramatic. Due to labour hoarding the unemployment rate in the Netherlands did not rise as fast or as much as expected in 2009 and less than in most other European countries. The average unemployment rate in 2009 was 4.8 percent, which is 1.0 percentage point higher than in 2008, but still 1.7 percentage points lower than in 2005, the year with the highest unemployment rate in the period following the last economic crisis.

In 2009 all inputs had a negative contribution to gross output change. This means that all inputs experienced a negative volume change. Labour input decreased by 1.6 percent, which resulted in a negative labour contribution to output of 0.7 percentage points. Compared to the large decrease of gross output, the reduction of labour input was relatively modest. This was largely caused by labour hoarding.

Interestingly, the share of labour cost in total inputs increased from 47 percent in 2008 to nearly 51 percent in 2009, the largest share of labour cost measured in the period 1996–2009. Although the number of hours worked decreased, the compensation of labour per hour worked increased. This may be because employees worked fewer hours but received the same or higher monthly salaries because of earlier wage agreements. The price increase of total labour input was 1.8 percent in 2009. Combined with the volume decrease of labour input, this resulted in a small increase of 0.2 percent of total labour compensation. In contrast, the cost of capital input and intermediate use in current prices decreased by 14 and 13 percent, respectively. The value decrease of capital input is largely caused by falling prices. As a result of the financial crisis, the interbank interest rate dropped substantially in 2009. This lower interest rate resulted in a price decline of capital input. Some of the conceptual underpinnings of measuring capital services prices is further discussed in section 3.3. The decline in intermediate consumption is caused by both falling prices (–7 percent) and consumption levels (–6 percent). The price decrease is largely due to lower energy prices in 2009. The economic recession led to lower energy demand and subsequently to much lower crude oil prices. Stable labour cost and lower cost of other inputs led to increased labour cost shares.

In 2009 the contribution of capital to gross output change was –0.2 percentage points. This negative contribution of capital is almost entirely determined by a lower extraction of

Table 3.1
Contributions to gross output volume change for the commercial sector

	1996/2001	2002/2008*	2007	2008*	2009*
	percentage point				
Labour	1.1	0.2	1.2	0.6	–0.7
Capital	0.8	0.2	0.3	0.6	–0.2
Intermediate use	1.7	0.5	1.1	0.5	–2.2
energy	0.1	0.1	–0.1	0.2	–0.2
materials	0.6	0.3	0.8	0.1	–1.6
services	1.0	0.2	0.3	0.2	–0.5
Productivity	0.8	1.2	1.7	0.4	–1.9
	% volume change				
Gross output	4.3	2.1	4.2	2.0	–5.0

Source: Statistics Netherlands, national accounts.

natural gas in 2009.[4] The total production of natural gas was almost 8 percent lower than in 2008. The demand for natural gas is closely related to economic growth. When companies lower their output in periods of a recession, they will also use less energy. In addition, the import of natural gas has become more important as it secures gas supply in the context of diminishing domestic gas reserves. In recent years gas import has been stimulated by a larger worldwide availability of liquefied natural gas (LNG) and the concomitant pipeline infrastructure. This has also lowered the domestic extraction of natural gas in the Netherlands. Although most investments in fixed assets decreased considerably in 2009, the user cost of capital still increased. The largest contribution to this increase was caused by software and computers. Since the negative contribution of natural gas was much larger, the contribution of total capital became negative on balance.

The contribution of intermediate consumption to gross output change was –2.2 percentage points. As such, intermediate use made the largest negative contribution to gross output change. In 2009 the volume of intermediate consumption decreased by 6.3 percent. This means that companies reduced intermediate inputs even more than the decline of gross output. Of all intermediate inputs, companies mostly increased the efficiency of using materials. At the same time more than 40 percent of intermediate consumption relates to material use. The volume change of materials was almost –11.0 percent. This reduction was mainly caused by a sharp decrease in the use of metal products and parts of transport equipment. The industries that were predominantly using these materials in their production process were hit hardest by the economic crisis.
Although in 2009 productivity in the commercial sector decreased substantially, this reduction was relatively modest compared to the enormous decline of gross output. A more efficient use of intermediate inputs was mainly responsible for this. The input of capital and labour was also reduced, but to a much smaller extent than intermediate use.

3.2 Performance of individual industries

Agriculture, forestry and fishing was the only industry in 2009 with clear productivity growth. Productivity performance was even above the average productivity growth number of this industry over the last full business cycle. Gross output increased in agriculture, mainly due to more favourable weather conditions and the absence of large livestock diseases. At the same time, the user cost of capital and material inputs decreased in agriculture, offsetting a small increase of labour input and other intermediate inputs.

[4] In the Dutch growth accounts the use of natural oil and gas reserves and other subsoil assets is considered a capital input in the production process.

Table 3.2
Productivity change by industry

	1996/2001	2002/2008*	2007	2008*	2009*
	%				
Agriculture, forestry and fishing	–0.3	1.3	1.2	0.4	1.4
Mining and quarrying	0.1	–1.1	–0.4	–1.3	0.0
Manufacturing	0.7	0.8	1.4	–0.8	–1.5
Electricity, gas and water supply	0.2	1.1	–0.9	0.2	–0.4
Construction	–0.4	0.3	1.7	1.3	–1.5
Trade, hotels, restaurants and repair	1.4	1.5	1.6	0.1	–3.4
Transport, storage and communication	1.8	1.8	1.9	0.4	–2.0
Financial and business activities	–0.3	1.1	1.0	1.6	–1.3
Care and other service activities	–0.3	0.0	0.4	0.9	0.4
Commercial sector	0.7	1.2	1.6	0.4	–2.0

Source: Statistics Netherlands, national accounts.

In 2009, gross output in manufacturing decreased by 8.9 percent, which was the largest output decline across the board. The manufacturing industry was strongly hit by the economic crisis. Surprisingly, due to the efficient use of intermediate inputs and cutbacks in hours worked, productivity losses in the manufacturing industry were rather limited compared to the large decline of gross output.

A decline of gross output is often followed by a reduction of intermediate inputs, since less energy, materials and services are needed to meet lower demand. In 2009, the manufacturing industry realised a 9.0 percent reduction of intermediate consumption, which was almost identical to gross output change. In the manufacturing industry, intermediate consumption has a very high share of over 70 percent in the total production cost. This is higher than in most other industries. In manufacturing, adjustments of intermediate consumption are therefore more prominently reflected in productivity outcomes.

In 2009, manufacturing also realised relatively large reductions in labour input. The number of hours worked decreased by 5.0 percent. Such cutbacks were not found in other industries. Manufacturing companies were granted the highest number of permissions to terminate employment for economic reasons. Besides reducing the number of employees, the manufacturing companies also reduced the number of hours worked per employee, which received government support through the part-time unemployment law.

In manufacturing less temporary staff was hired. In the growth accounts this is reflected by a negative volume change of intermediate services. Almost 40 percent of all temporary staffing services in the Netherlands is consumed by the manufacturing industry. In 2009, temporary staff in the manufacturing industry was reduced by 16 percent. In contrast, in the years between 2005 and 2007 the average annual growth of temporary staff was about the same percentage, but with a reversed sign. Apparently, temporary staff services play an important role in facilitating sufficient labour market flexibility. Employers in manufacturing are thus prepared to face higher labour cost to obtain certain levels of labour input flexibility.

In 2009, the trade, hotels, restaurants and repair industry faced the largest negative productivity change. This is remarkable since this industry previously often was one of the best performing industries with respect to productivity growth. A productivity growth rate of –3.4 percent is clearly below the long-term average (which is 1.1 percent in the period 1996–2009). Evidently, trade, hotels, restaurants and repair suffered greatly from the economic crisis. Businesses and consumers alike reduced their spending on hotels and restaurants. Also car sales dropped considerably and wholesale trade faced substantial losses in trade volumes. Retail trade suffered less, but their trade margins still fell by almost 4 percent. For the industry as a whole gross output decreased by almost 7 percent. Intermediate consumption dropped at a similar rate. The industry in which labour represents more than 40 percent of production cost seemed to suffer from a certain degree of labour inflexibility. The number of hours worked decreased by only 0.8 percent. This limited adjustment of labour input contributed among other things to a very low productivity performance.

3.3 Profitability

The Dutch growth accounts estimate for each industry a surplus income element that cannot be assigned to any factor input. This income element could be interpreted as a pure profit income component. In other words, profits are the difference between gross output and the sum of all inputs. Profitability refers to the ratio between gross output and total inputs.[5)] Companies may raise their profitability through productivity gains and/or by changing output prices relative to input prices.

Quite surprisingly, in 2009 the commercial sectors' profitability developed positively.[6)] Although productivity decreased by 2.0 percent, input prices fell stronger than output prices, contributing to an increased profitability of 0.6 percentage points. After a long period of annual price increases, input and output prices both declined in 2009. Input prices declined by 3.9 percent, output prices by 1.4 percent. Companies were able to profit from these positive 'terms of trade' developments.

Intermediate consumption and capital each contributed about the same to the strong cost price decrease in 2009. The price decrease of intermediate consumption was mainly caused by lower energy prices. Capital cost fell due to a declining rate of return. However, there are some important measurement issues to take into consideration here. The rate of return contains a risk premium which represents the reward for the likelihood of capital losses (for example due to bankruptcy). Annex 3 shows that profitability rates, as calculated in the Dutch growth accounts, are quite sensitive to the assessment of risk premiums. So far risk premium estimates, based on the difference between the expected gross return on bonds and the interbank interest rate, have been kept constant over time. In the context of the current financial crisis the assumption of constant risk premiums is debatable. As a result, capital cost reductions in 2009 may be somewhat overestimated and the profitability rates may be set too high. The outcomes presented in table 3.3 should therefore be

Table 3.3
Profitability in the commercial sector

	1996/2001	2002/2008*	2007	2008*	2009*
	%				
Profitability	5.8	8.2	8.5	7.2	7.8
	% change				
Productivity	0.7	1.2	1.6	0.4	–2.0
Input volume	3.6	0.9	2.5	1.6	–3.2
Gross output volume	4.3	2.1	4.2	2.0	–5.0
Terms of trade	0.0	–1.2	–2.5	–1.6	2.6
Input price	2.3	3.6	4.1	5.4	–3.9
Gross output price	2.3	2.3	1.5	3.7	–1.4

Source: Statistics Netherlands, national accounts.

5) Profitability in the Dutch growth accounts does not fully correspond with the profitability concept in the national accounts or profitability reported by companies. A major reason for this is that in the Dutch growth accounts capital cost consist of the full user cost of capital, including depreciation, opportunity cost of capital and holding gains/losses. In company bookkeeping only actually paid interest charges are registered. Furthermore, the cost of using several additional asset types such as land, subsoil assets and inventories are included in the Dutch growth accounts. Therefore, profitability according to the Dutch growth accounts is in most instances an underestimation of profitability as reported by companies.

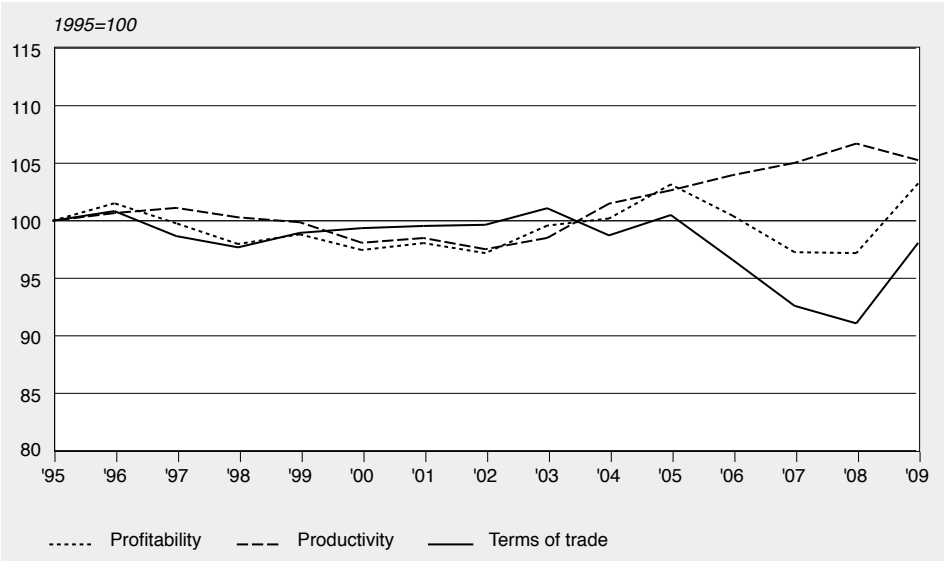
6) Profitability in the mining and quarrying industry is close to zero, because the extraction of subsoil assets has been included as a capital input in the Dutch growth accounts. Excluding subsoil assets from the user cost of capital would have resulted in a higher profitability in the industry mining and quarrying and the commercial sector.

interpreted with some caution. The use of flexible risk premiums in the Dutch growth accounts is subject to future research.

The largest rise in profitability in 2009 was found in the industry financial and business activities. Despite of a declining productivity, profitability almost doubled in a single year. The main reason for this remarkable profitability gain was a substantial increase in the price of banking services. This price increase reflects an increased net interest margin which represents the difference in payable and receivable interest rates of banks vis-à-vis their customers. Although banks are able to attract capital at historically low interest rates, they charged much higher interest rates to their customers representing partly elevated risk premiums on mortgages.

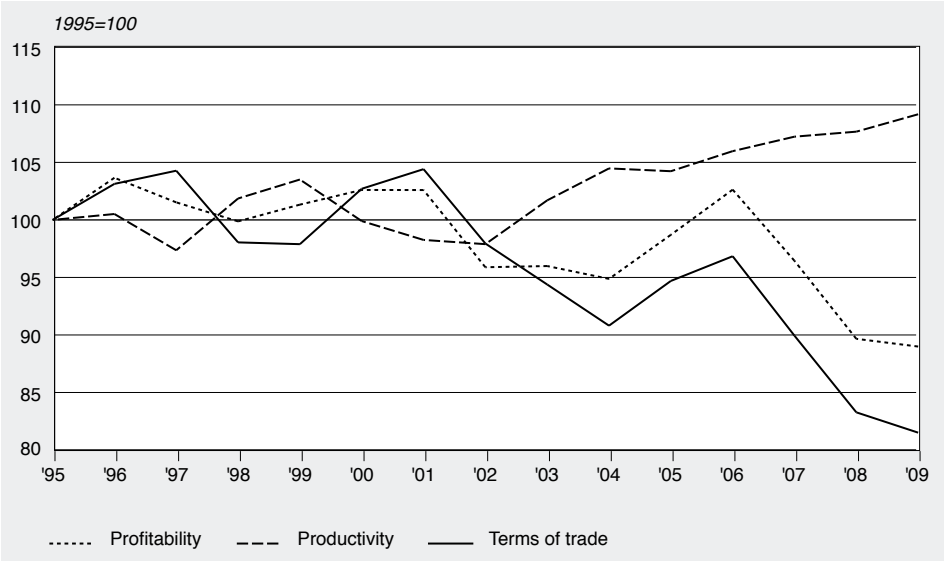
It should be mentioned that in this chapter profitability is discussed in close relationship to production. Generally holding gains and losses are not reflected in the production account and as such not reflected in the profitability figures presented in table 3.3. Information on the capital gains and losses of financial asset positions can be obtained from the national accounts balance sheets for financial assets.

3.2 Profitability in the industry financial and business activities



Source: Statistics Netherlands, national accounts.

3.3 Profitability in the industry agriculture, forestry and fishing



Source: Statistics Netherlands, national accounts.

Despite positive productivity gains in 2009, profitability further decreased in agriculture, forestry and fishing. Output prices decreased more substantially than input prices, resulting in negative profitability developments. The agricultural industry generally shows very low profitability levels, much lower than all other industries. This is partly explained by rather high capital intensities due to the production factor land.[7)] Land accounts for almost 50 percent of the user cost of capital in agriculture, forestry and fishing. However, even when the user cost of land is ignored, profitability of the agricultural industry remains negative. This negative profitability may be explained by the nature of farming businesses. Many companies in the agricultural industry are owned by self-employed persons with unpaid family workers. The main aim of these companies seems to be to earn a reasonable family income. However, when market-based wage rates are imputed for all hours worked by all family members, many farm businesses will end up with negative profit rates.

3.4 Development of unit labour cost

Unit labour cost reflects the compensation of employees relative to an economy's output. Unit labour cost growth represents changes in total labour cost relative to value added volume change. Unit labour cost change can be disentangled in a labour productivity change, and a change of compensation per hour worked component. Unit labour cost change is an important indicator expressing an economy's cost competitiveness. However, labour cost should be complemented with other factor cost components to provide a comprehensive view of an economy's international cost competitiveness. For the sake of international comparison the following analysis is restricted to unit labour cost.

The commercial sector showed a considerable rise in unit labour cost of 4.8 percent in 2009, which was similar to the increase of unit labour cost experienced in the 2001 recession. Both periods show diverging patterns when it comes to compensation of labour per hour worked and labour productivity. In 2001 labour cost per hour worked rose by 5.5 percent, whereas in 2009 labour cost per hour worked increased only by 1.8 percent. On the other hand, value added growth was 1.8 percent in 2001 and –4.4 percent in 2009. Thus, in 2001 increased labour cost accounted foremost for the upswing of unit labour cost while a decrease of value added was the main culprit of increased unit labour cost in 2009.

3.4 Unit labour cost change

Source: Statistics Netherlands, national accounts.

7) See annex 2 for a detailed explanation of the inclusion of land and other non-financial assets in the Dutch growth accounts.

The difference between changes of labour cost per hour worked in 2001 and 2009 can be attributed mainly to different wage developments. Compensation of labour increased by 6.7 percent in 2001 and remained stable in 2009 (0.2 percent). The strong wage increase in 2001 was partly influenced by labour shortage. In 2001 unemployment was lower than in 2009, which may have caused an upward pressure on wage developments. Furthermore, the gravity of the economic recession in 2008 and 2009 must have played a key role in wage developments. The extreme economic situation probably tempered wage claims and as such job security became more prominent than higher wages.

Despite unfavourable unit labour cost developments, the international competitiveness of the Netherlands is expectedly less troublesome. In 2009, the Netherlands labour cost developments were in line with those found in many other countries. Looking at country comparisons of the OECD, only Ireland shows a unit labour cost decline (–6.2 percent). Austria, Norway, Sweden, Italy and the United Kingdom all showed growth rates similar to that in the Netherlands. Some countries, such as Finland, Germany and Luxembourg had higher unit labour cost growth rates. For example, in 2009 unit labour cost in Germany increased by 6.4 percent. In comparison to this latter category of countries the Netherlands' cost competitiveness may even have improved.

Table 3.4
Gross output by industry

	2008*	1996/2001	2002/2008*	2007	2008*	2009*
	mln euro	*% volume change*				
Agriculture, forestry and fishing	23,745	0.7	1.4	2.7	2.3	1.4
Mining and quarrying	27,052	1.1	0.3	–0.3	6.6	–7.3
Manufacturing	242,717	2.8	1.2	4.3	–0.3	–8.9
manufacture of food products, beverages and tobacco	51,971	1.1	1.1	2.5	0.7	.
manufacture of textile and leather products	3,499	–0.6	–2.5	3.7	–5.8	.
manufacture of paper and paper products	5,348	2.4	0.1	0.1	–5.7	.
publishing and printing	11,826	2.5	–0.4	3.5	0.4	.
manufacture of petroleum products	36,586	0.0	1.4	2.1	7.0	.
manufacture of basic chemicals and chemical products	45,973	3.3	2.0	4.4	–3.5	.
manufacture of rubber and plastic products	7,127	3.2	1.5	4.1	–3.6	.
manufacture of basic metals	9,098	1.6	2.0	5.5	–2.6	.
manufacture of fabricated metal products	17,583	3.9	2.1	8.6	2.8	.
manufacture of machinery and equipment n.e.c.	20,528	5.4	3.3	9.8	–5.3	.
manufacture of electrical and optical equipment	18,081	5.3	–1.0	–0.7	–0.3	.
manufacture of transport equipment	16,617	4.5	2.1	12.7	1.2	.
other manufacturing	19,788	3.1	0.6	4.2	0.4	.
Electricity, gas and water supply	29,238	1.8	2.2	–1.8	5.6	–1.9
Construction	65,721	3.6	1.1	6.1	5.5	–5.5
Trade, hotels, restaurants and repair	132,776	5.5	2.3	5.1	1.0	–6.9
trade and repair of motor vehicles/cycles	15,296	6.2	–0.3	2.6	–0.8	.
wholesale trade (excl. motor vehicles/cycles)	72,595	6.8	3.9	6.8	2.1	.
retail trade and repair (excl. motor vehicles/cycles)	29,583	3.2	1.7	4.0	0.8	.
hotels and restaurants	18,363	3.8	–0.9	2.5	–3.1	.
Transport, storage and communication	71,574	7.8	2.1	4.6	0.8	–6.1
land transport	20,762	3.4	1.2	4.0	0.7	.
water transport	5,626	4.9	0.0	11.2	4.7	.
air transport	9,086	4.6	2.3	2.7	–2.7	.
supporting transport activities	17,189	5.5	2.5	5.8	1.8	.
post and telecommunications	22,293	16.5	3.0	3.6	0.6	.
Financial and business activities	142,236	6.6	2.5	5.3	4.3	–3.6
banking	35,893	7.4	5.3	9.2	9.4	.
insurance and pension funding	18,001	2.1	1.2	–1.8	–0.8	.
activities auxiliary to financial intermediation	7,637	7.3	3.0	7.6	10.6	.
real estate activities						
renting of movables						
computer and related activities	17,612	18.5	2.7	7.9	4.8	.
research and development	4,211	2.5	1.3	–0.4	2.5	.
other business activities	77,682	6.4	1.4	5.5	3.2	.
General government						
Care and other service activities	93,798	3.3	2.7	3.2	3.6	2.2
health and social work activities	62,618	2.7	3.5	3.3	4.8	.
sewage and refuse disposal services	6,926	5.6	1.9	2.2	2.5	.
recreational, cultural and sporting activities	14,402	5.1	1.8	2.5	0.9	.
private households with employed persons						
other service activities n.e.c.	10,993	2.4	0.6	4.3	1.1	.
Commercial sector	629,970	4.3	2.1	4.2	2.0	–5.0

Source: Statistics Netherlands, national accounts.

Table 3.5
Value added by industry

	2008*	1996/2001	2002/2008*	2007	2008*	2009*
	mln euro	*% volume change*				
Agriculture, forestry and fishing	9,566	0.4	1.7	4.2	0.8	2.7
Mining and quarrying	21,749	–0.3	–1.1	–0.2	7.7	–7.1
Manufacturing	72,605	2.7	1.6	5.7	–1.9	–8.8
manufacture of food products, beverages and tobacco	13,656	0.7	1.5	3.1	–1.5	.
manufacture of textile and leather products	1,120	1.2	–2.3	7.1	–6.5	.
manufacture of paper and paper products	1,506	1.8	1.4	–2.2	–8.0	.
publishing and printing	6,001	1.7	–1.0	3.7	–1.3	.
manufacture of petroleum products	3,797	–5.7	5.8	9.1	8.3	.
manufacture of basic chemicals and chemical products	11,213	4.7	3.5	4.5	–3.7	.
manufacture of rubber and plastic products	2,029	2.7	2.2	8.0	–5.2	.
manufacture of basic metals	2,537	1.7	3.0	7.1	–3.5	.
manufacture of fabricated metal products	6,664	2.1	2.6	8.9	3.1	.
manufacture of machinery and equipment n.e.c.	6,869	4.4	2.4	10.0	–8.4	.
manufacture of electrical and optical equipment	4,011	3.3	–0.2	6.8	–0.4	.
manufacture of transport equipment	4,038	7.4	0.9	10.8	–0.5	.
other manufacturing	9,164	2.8	0.8	4.0	0.0	.
Electricity, gas and water supply	10,373	0.2	3.5	–2.0	5.3	0.3
Construction	30,629	2.5	0.6	5.7	4.8	–4.2
Trade, hotels, restaurants and repair	76,952	5.1	3.1	5.7	0.9	–6.9
trade and repair of motor vehicles/cycles	8,077	6.0	0.3	2.9	–0.9	.
wholesale trade (excl. motor vehicles/cycles)	42,747	6.6	5.2	7.4	2.6	.
retail trade and repair (excl. motor vehicles/cycles)	17,039	2.6	2.3	5.1	0.3	.
hotels and restaurants	9,089	3.7	–1.3	2.3	–4.3	.
Transport, storage and communication	35,136	7.7	3.3	5.2	1.1	–5.6
land transport	11,445	3.1	1.0	4.6	0.4	.
water transport	1,959	8.3	3.5	15.6	3.7	.
air transport	1,370	2.9	3.8	2.1	–5.8	.
supporting transport activities	8,471	5.1	3.2	6.0	3.1	.
post and telecommunications	11,891	15.9	5.2	4.1	0.8	.
Financial and business activities	99,078	5.7	3.0	5.9	4.7	–4.3
banking	16,460	4.9	7.4	10.5	12.9	.
insurance and pension funding	8,192	–1.2	1.2	–5.9	–3.2	.
activities auxiliary to financial intermediation	5,686	6.1	3.5	8.7	12.1	.
real estate activities						
renting of movables						
computer and related activities	11,894	18.6	3.2	8.2	4.7	.
research and development	2,198	1.7	2.0	–0.8	3.2	.
other business activities	54,648	5.6	1.7	6.7	3.4	.
General government						
Care and other service activities	63,967	2.4	2.6	2.7	3.4	2.8
health and social work activities	46,971	2.0	3.2	2.5	4.7	.
sewage and refuse disposal services	3,257	5.6	2.0	2.3	3.2	.
recreational, cultural and sporting activities	6,894	4.7	1.6	2.7	–1.2	.
private households with employed persons						
other service activities n.e.c.	6,845	1.4	0.1	4.2	0.1	.
Commercial sector	420,055	4.0	2.4	4.8	2.3	–4.4

Source: Statistics Netherlands, national accounts.

Table 3.6
Gross output based productivity change by industry

	1996/2001	2002/2008*	2007	2008*	2009*
	% change				
Agriculture, forestry and fishing	–0.3	1.3	1.2	0.4	1.4
Mining and quarrying	0.1	–1.1	–0.4	–1.3	0.0
Manufacturing	0.7	0.8	1.4	–0.8	–1.5
manufacture of food products, beverages and tobacco	0.1	0.7	0.8	–0.3	.
manufacture of textile and leather products	1.4	0.6	2.6	–2.4	.
manufacture of paper and paper products	0.5	1.2	0.2	–1.2	.
publishing and printing	0.5	0.4	1.7	–0.9	.
manufacture of petroleum products	–0.4	0.6	0.7	0.3	.
manufacture of basic chemicals and chemical products	1.3	1.0	1.0	–0.6	.
manufacture of rubber and plastic products	0.2	0.8	1.9	–1.8	.
manufacture of basic metals	0.6	1.3	1.5	–1.1	.
manufacture of fabricated metal products	0.3	1.1	2.0	0.7	.
manufacture of machinery and equipment n.e.c.	0.6	0.5	1.6	–3.8	.
manufacture of electrical and optical equipment	0.7	0.4	1.2	–0.1	.
manufacture of transport equipment	2.0	0.4	1.8	–0.8	.
Other manufacturing	0.7	0.6	1.3	–0.5	.
Electricity, gas and water supply	0.2	1.1	–0.9	0.2	–0.4
Construction	–0.4	0.3	1.7	1.3	–1.5
Trade, hotels, restaurants and repair	1.4	1.5	1.6	0.1	–3.4
trade and repair of motor vehicles/cycles	1.9	0.2	0.8	–0.8	.
wholesale trade (excl. motor vehicles/cycles)	2.1	2.5	2.4	–0.3	.
retail trade and repair (excl. motor vehicles/cycles)	0.1	1.1	1.1	1.5	.
hotels and restaurants	0.8	–0.6	–0.4	–1.0	.
Transport, storage and communication	1.8	1.8	1.9	0.4	–2.0
land transport	0.8	0.7	1.4	0.4	.
water transport	2.3	1.6	4.0	1.0	.
air transport	0.5	1.3	0.5	–1.5	.
supporting transport activities	0.8	0.3	1.3	0.1	.
post and telecommunications	2.9	3.9	2.8	1.4	.
Financial and business activities	–0.3	1.1	1.0	1.6	–1.3
banking	–1.1	3.8	4.4	6.1	.
insurance and pension funding	–1.7	0.9	–3.5	0.5	.
activities auxiliary to financial intermediation	0.5	2.2	6.1	7.5	.
real estate activities					
renting of movables					
computer and related activities	1.3	0.2	0.1	–1.6	.
research and development	0.1	1.3	–2.0	0.3	.
other business activities	0.2	–0.3	0.6	0.0	.
General government					
Care and other service activities	–0.3	0.0	0.4	0.9	0.4
health and social work activities	–0.4	0.0	0.4	2.0	.
sewage and refuse disposal services	1.0	0.5	0.8	1.3	.
recreational, cultural and sporting activities	0.2	0.1	0.2	–1.9	.
private households with employed persons					
other service activities n.e.c.	–0.8	–0.5	0.1	–1.7	.
Commercial sector	0.7	1.2	1.6	0.4	–2.0

Source: Statistics Netherlands, national accounts.

Table 3.7
Value added based productivity change by industry

	1996/2001	2002/2008*	2007	2008*	2009*
	% change				
Agriculture, forestry and fishing	–0.6	2.5	2.5	0.3	3.2
Mining and quarrying	0.1	–1.6	–0.5	–1.7	0.0
Manufacturing	2.1	2.6	5.0	–2.5	–5.7
manufacture of food products, beverages and tobacco	0.6	3.0	3.8	–0.6	.
manufacture of textile and leather products	4.2	1.8	8.2	–7.3	.
manufacture of paper and paper products	1.3	3.6	0.5	–4.1	.
publishing and printing	1.3	1.0	3.6	–1.5	.
manufacture of petroleum products	–5.1	5.4	7.3	3.9	.
manufacture of basic chemicals and chemical products	4.6	3.8	5.3	–3.1	.
manufacture of rubber and plastic products	0.7	2.6	6.4	–5.9	.
manufacture of basic metals	1.8	4.4	6.0	–4.3	.
manufacture of fabricated metal products	1.0	2.9	5.8	2.1	.
manufacture of machinery and equipment n.e.c.	1.8	1.8	5.7	–11.8	.
manufacture of electrical and optical equipment	1.9	1.7	6.3	–0.3	.
manufacture of transport equipment	8.4	1.9	9.4	–3.4	.
other manufacturing	1.6	1.2	3.0	–1.2	.
Electricity, gas and water supply	0.5	3.2	–3.4	0.9	–3.1
Construction	–0.8	0.7	3.9	3.2	–3.4
Trade, hotels, restaurants and repair	2.7	2.6	2.9	0.2	–6.2
trade and repair of motor vehicles/cycles	3.9	0.2	1.6	–1.5	.
wholesale trade (excl. motor vehicles/cycles)	4.0	4.4	4.6	–0.8	.
retail trade and repair (excl. motor vehicles/cycles)	0.3	1.8	1.8	2.4	.
hotels and restaurants	1.8	–1.3	–0.9	–1.9	.
Transport, storage and communication	3.5	3.5	3.9	0.9	–4.2
land transport	1.4	1.3	2.5	0.7	.
water transport	6.9	4.1	10.6	2.7	.
air transport	0.8	3.8	1.4	–6.3	.
supporting transport activities	1.6	0.5	2.9	0.0	.
post and telecommunications	6.1	7.7	5.8	3.0	.
Financial and business activities	–0.3	1.7	1.4	2.3	–1.9
banking	–2.0	7.8	9.4	13.5	.
insurance and pension funding	–3.4	2.6	–5.1	3.2	.
activities auxiliary to financial intermediation	0.8	3.0	8.6	10.4	.
real estate activities					
renting of movables					
computer and related activities	2.1	0.2	0.1	–2.5	.
research and development	0.2	2.4	–3.8	0.7	.
other business activities	0.5	–0.4	0.7	–0.1	.
General government					
Care and other service activities	–0.5	0.1	0.6	1.3	0.6
health and social work activities	–0.6	0.1	0.6	2.7	.
sewage and refuse disposal services	1.9	1.1	1.8	2.8	.
recreational, cultural and sporting activities	0.4	0.3	0.5	–3.8	.
private households with employed persons					
other service activities n.e.c.	–1.3	–0.8	0.2	–2.7	.
Commercial sector	1.1	1.8	2.4	0.6	–3.1

Source: Statistics Netherlands, national accounts.

Table 3.8
Value added based labour productivity by industry

	2008*	1996/2001	2002/2008*	2007	2008*	2009*
	euro	*% volume change*				
Agriculture, forestry and fishing	20	–0.8	3.6	6.2	1.5	1.6
Mining and quarrying	1,792	0.8	2.8	0.9	9.4	–10.0
Manufacturing	50	2.8	3.3	5.1	–2.2	–4.4
manufacture of food products, beverages and tobacco	68	1.5	4.2	4.4	1.2	.
manufacture of textile and leather products	33	5.7	2.4	8.3	–8.9	.
manufacture of paper and paper products	44	2.4	4.9	1.6	–2.3	.
publishing and printing	46	3.1	1.4	3.4	–1.5	.
manufacture of petroleum products	367	–4.5	5.3	7.3	5.3	.
manufacture of basic chemicals and chemical products	108	5.6	5.0	6.0	–2.4	.
manufacture of rubber and plastic products	37	1.5	3.5	6.4	–5.4	.
manufacture of basic metals	74	2.8	4.8	6.0	–4.5	.
manufacture of fabricated metal products	40	1.4	3.5	6.1	2.8	.
manufacture of machinery and equipment n.e.c.	43	2.5	2.5	6.3	–11.3	.
manufacture of electrical and optical equipment	29	3.7	2.3	6.3	–0.3	.
manufacture of transport equipment	49	7.8	2.8	9.3	–3.5	.
other manufacturing	30	1.9	1.5	3.6	–1.3	.
Electricity, gas and water supply	206	3.9	4.1	–3.8	0.9	–5.3
Construction	37	–0.7	0.9	3.9	3.5	–3.2
Trade, hotels, restaurants and repair	33	3.6	3.3	2.6	2.8	–6.1
trade and repair of motor vehicles/cycles	32	5.3	0.5	1.4	–0.5	.
wholesale trade (excl. motor vehicles/cycles)	52	5.2	4.9	4.5	–0.1	.
retail trade and repair (excl. motor vehicles/cycles)	19	1.1	2.6	1.6	5.0	.
hotels and restaurants	24	1.9	–0.4	–1.2	1.9	.
Transport, storage and communication	46	5.0	4.2	3.6	1.5	–2.8
land transport	31	1.7	1.3	1.9	1.3	.
water transport	50	7.7	6.6	10.5	7.3	.
air transport	27	–0.2	3.8	0.0	–6.3	.
supporting transport activities	54	2.7	1.7	3.6	–0.2	.
post and telecommunications	82	9.3	9.7	6.9	3.7	.
Financial and business activities	39	0.7	1.4	0.4	2.2	–0.5
banking	70	1.5	8.4	9.0	13.7	.
insurance and pension funding	90	–3.0	0.8	–6.1	2.4	.
activities auxiliary to financial intermediation	58	3.4	4.1	9.5	12.5	.
real estate activities						
renting of movables						
computer and related activities	43	2.9	0.7	0.5	–2.2	.
research and development	42	–1.7	1.4	–4.5	–0.6	.
other business activities	31	1.0	–0.3	0.2	0.6	.
General government						
Care and other service activities	32	–0.5	–0.4	0.7	1.2	0.7
health and social work activities	33	–0.9	0.4	0.9	2.8	.
sewage and refuse disposal services	66	1.8	0.3	0.8	2.4	.
recreational, cultural and sporting activities	29	1.2	0.8	0.9	–3.7	.
private households with employed persons						
other service activities n.e.c.	22	–0.9	–0.8	0.3	–3.7	.
Commercial sector	40	1.6	2.1	2.2	1.6	–2.9

Source: Statistics Netherlands, national accounts.

Table 3.9
Capital services per hour worked by industry

	2008*	1996/2001	2002/2008*	2007	2008*	2009*
	euro	*% volume change*				
Agriculture, forestry and fishing	18.9	–0.5	2.0	6.6	2.5	–2.3
Mining and quarrying	1,732.7	0.8	4.7	1.4	11.8	–10.3
Manufacturing	12.3	3.1	2.1	0.4	1.0	5.6
manufacture of food products, beverages and tobacco	17.3	2.8	3.1	1.8	3.6	.
manufacture of textile and leather products	10.4	4.8	2.9	0.5	–2.9	.
manufacture of paper and paper products	18.6	3.3	3.6	3.3	5.0	.
publishing and printing	7.7	7.8	2.1	–0.6	0.1	.
manufacture of petroleum products	95.5	1.5	–0.4	0.0	2.0	.
manufacture of basic chemicals and chemical products	34.8	2.4	2.6	1.7	1.5	.
manufacture of rubber and plastic products	10.1	2.9	3.2	0.0	1.7	.
manufacture of basic metals	22.3	2.8	1.0	0.1	–0.5	.
manufacture of fabricated metal products	6.8	3.6	2.0	1.0	3.1	.
manufacture of machinery and equipment n.e.c.	7.3	5.5	2.9	2.9	2.6	.
manufacture of electrical and optical equipment	13.5	6.9	2.1	–0.3	1.0	.
manufacture of transport equipment	10.5	1.0	1.8	–0.8	–0.5	.
other manufacturing	5.1	2.3	1.0	0.4	–0.6	.
Electricity, gas and water supply	79.1	4.8	1.2	–0.6	–0.1	–3.5
Construction	3.0	4.2	1.9	0.3	3.6	3.5
Trade, hotels, restaurants and repair	5.8	3.9	2.2	–1.0	6.3	1.1
trade and repair of motor vehicles/cycles	7.3	5.3	0.4	–0.9	2.8	.
wholesale trade (excl. motor vehicles/cycles)	7.3	4.4	2.1	–0.4	3.4	.
retail trade and repair (excl. motor vehicles/cycles)	4.8	3.7	2.6	–1.5	7.7	.
hotels and restaurants	3.6	0.8	3.0	–0.9	10.3	.
Transport, storage and communication	15.6	3.6	1.8	–0.7	1.3	3.8
land transport	6.6	1.2	–0.3	–2.8	1.6	.
water transport	30.6	2.1	4.7	–1.0	7.3	.
air transport	19.3	–2.2	–0.1	–3.9	–0.2	.
supporting transport activities	19.2	2.5	2.7	1.6	–0.7	.
post and telecommunications	29.7	6.6	3.9	2.2	1.8	.
Financial and business activities	4.8	6.6	–0.2	–3.4	–1.0	5.0
banking	19.2	11.9	1.8	–1.3	0.7	.
insurance and pension funding	24.8	0.8	–5.0	–3.0	–1.9	.
activities auxiliary to financial intermediation	6.9	14.5	5.1	6.0	6.3	.
real estate activities						
renting of movables						
computer and related activities	3.3	7.3	6.0	4.6	7.6	.
research and development	7.2	–0.6	–1.2	–2.8	–2.8	.
other business activities	1.9	8.8	2.4	–1.9	3.1	.
General government						
Care and other service activities	4.3	1.5	1.1	1.3	0.2	–0.2
health and social work activities	3.4	1.0	1.3	2.6	0.8	.
sewage and refuse disposal services	30.5	–0.3	–1.4	–1.9	–0.9	.
recreational, cultural and sporting activities	5.0	4.1	2.9	1.8	1.2	.
private households with employed persons						
other service activities n.e.c.	3.5	2.7	3.5	0.7	–0.3	.
Commercial sector	9.6	2.0	0.9	–0.9	2.8	0.6

Source: Statistics Netherlands, national accounts.

Table 3.10
Contributions to gross output volume change, average 2002–2008*

	Gross output	Labour	Capital	Intermediate consumption	Productivity
	% volume change	*percentage point*			
Agriculture, forestry and fishing	1.4	–0.4	0.1	0.4	1.3
Mining and quarrying	0.3	–0.2	0.6	0.9	–1.1
Manufacturing	1.2	–0.3	0.0	0.7	0.8
manufacture of food products, beverages and tobacco	1.1	–0.3	0.0	0.8	0.7
manufacture of textile and leather products	–2.5	–1.2	–0.2	–1.7	0.6
manufacture of paper and paper products	0.1	–0.7	0.0	–0.4	1.2
publishing and printing	–0.4	–0.9	0.0	0.2	0.4
manufacture of petroleum products	1.4	0.0	0.0	0.8	0.6
manufacture of basic chemicals and chemical products	2.0	–0.2	0.1	1.0	1.0
manufacture of rubber and plastic products	1.5	–0.3	0.2	0.8	0.8
manufacture of basic metals	2.0	–0.3	–0.1	1.2	1.3
manufacture of fabricated metal products	2.1	–0.2	0.1	1.2	1.1
manufacture of machinery and equipment n.e.c.	3.3	0.0	0.1	2.6	0.6
manufacture of electrical and optical equipment	–1.0	–0.6	0.0	–0.8	0.5
manufacture of transport equipment	2.1	–0.2	0.0	2.0	0.4
other manufacturing	0.6	–0.3	0.0	0.2	0.6
Electricity, gas and water supply	2.2	–0.1	0.2	1.0	1.1
Construction	1.1	–0.1	0.1	0.9	0.3
Trade, hotels, restaurants and repair	2.3	0.0	0.2	0.5	1.5
trade and repair of motor vehicles/cycles	–0.3	0.0	0.0	–0.4	0.2
wholesale trade (excl. motor vehicles/cycles)	3.9	0.1	0.2	1.0	2.5
retail trade and repair (excl. motor vehicles/cycles)	1.7	0.0	0.3	0.4	1.1
hotels and restaurants	–0.9	–0.2	0.2	–0.2	–0.6
Transport, storage and communication	2.1	–0.3	0.2	0.5	1.8
land transport	1.2	–0.1	–0.1	0.6	0.7
water transport	0.0	–0.5	0.3	–1.4	1.6
air transport	2.3	0.0	0.0	1.0	1.3
supporting transport activities	2.5	0.5	0.8	0.9	0.3
post and telecommunications	3.0	–1.0	–0.1	0.3	3.8
Financial and business activities	2.5	0.8	0.1	0.5	1.2
banking	5.3	–0.3	0.1	1.7	3.8
insurance and pension funding	1.2	0.1	–0.7	0.9	0.9
activities auxiliary to financial intermediation	3.0	–0.1	0.5	0.4	2.2
real estate activities					
renting of movables					
computer and related activities	2.7	1.5	0.5	0.6	0.2
research and development	1.3	–0.1	–0.1	0.2	1.3
other business activities	1.4	1.3	0.2	0.2	–0.2
General government					
Care and other service activities	2.7	1.4	0.3	1.0	0.0
health and social work activities	3.5	2.0	0.4	1.1	0.0
sewage and refuse disposal services	1.9	0.4	0.0	1.0	0.5
recreational, cultural and sporting activities	1.8	0.4	0.3	1.0	0.1
private households with employed persons					
other service activities n.e.c.	0.6	0.2	0.4	0.6	–0.6
Commercial sector	2.1	0.2	0.2	0.5	1.2

Source: Statistics Netherlands, national accounts.

4. Intellectual property in the Netherlands

A few years ago Statistics Netherlands developed the knowledge satellite account[8)] which presents statistical information on the knowledge-related economy in greater detail than the core national accounts of the Netherlands. The satellite account expands the analytical capacity of the national accounts without losing connection with the national accounts framework and its coherent set of macro-economic indicators.

One of the main issues in measuring the knowledge-based economy is determining its knowledge capital base. At the moment intellectual property in the Dutch national accounts is confined to computer software, mineral exploration and evaluation, and entertainment, literary or artistic originals. In addition, the new, yet to be implemented SNA (2008) guidelines, recommend capitalising expenditure on R&D.[9)]

Including R&D in the existing SNA coverage of intellectual property is an important step forward but still is insufficient in capturing all forms of knowledge capital. This would require the inclusion of a much broader range of intellectual property spending. In the knowledge satellite account intellectual property is expanded to a more comprehensive list of assets as identified by Corrado, Hulten and Sichel (CHS) (2004, 2005 and 2006). This list includes spending on R&D, brand equity, organisational structures, firm-specific human capital and architectural and engineering designs[10)]. In the remainder of this chapter these supplementary asset categories that remain uncovered in the SNA are called *the additional intellectual property products*.

As in the study of CHS (2004, 2005 and 2006) both the SNA covered and the additional intellectual property products are divided into three asset categories in the Dutch knowledge satellite account. The category c*omputerised information* includes spending on software and databases. *Innovative property* includes spending on R&D, mineral exploration and other innovative property, such as architectural and engineering designs, and entertainment, literary and artistic originals. The final category *economic competencies* comprises spending on brand equity, organisational structures and firm-specific human capital. When mentioning *intellectual property products* we thus refer to a broader range of assets than those covered in the Dutch national accounts (following the international SNA accounting guidelines).

Besides conceptual differences (i.e. the demarcation of intellectual property assets) the knowledge satellite account is partly based on different sources and estimates compared to the Dutch national accounts. This concerns in particular estimates for the market output of R&D and firm-specific human capital. The different outcomes for firm-specific human capital are explained in Annex 2 of *De Nederlandse groeirekeningen 2008* (in Dutch)*, w*hereas the different outcomes for R&D are explained in Annex 4 of *De Nederlandse groeirekeningen 2007* (also in Dutch).

This chapter provides the outcomes of the Dutch knowledge satellite account by, first of all, measuring the investments in intellectual property products in both absolute figures and as a share of GDP and total investment (section 4.1). In section 4.2, attention is paid to investment in intellectual property per industry as well as per type of intellectual property product. Subsequently, in section 4.3, the effects of the capitalisation of expenditure on intellectual property are shown on a range of macro-economic variables such as total

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8) In earlier publications the knowledge satellite account was referred to as the knowledge module.

9) R&D will not be capitalised in the core national accounts. The Eurostat Taskforce on the capitalisation of R&D finds it recommendable to achieve a high level of reliability and comparability first. Therefore, R&D is presently only capitalised in the knowledge satellite account.

10) In the knowledge satellite account we have only estimated purchases of architectural and engineering designs. Due to the absence of reliable data sources we made no estimates for architectural and engineering designs on own-account for the time being.

Measuring intellectual property investment

The knowledge satellite account provides tentative estimates of a range of additional intellectual property products. As a general principle, it uses existing national accounts data series as much as possible. One important conceptual change made in the satellite account is that expenditure on the additional property products is reclassified from current to capital expenditure. This extension of capital expenditure leads to a different registration of output, intermediate use, investment and capital cost. The exact changes in the growth accounting framework depend on whether the intellectual property products are purchased or produced on a firm's own account. An extensive description of changes that will occur when intellectual property is recognised as capital is given in van Rooijen-Horsten et al. (2008). A detailed description of other conceptual and data considerations can be found in van Rooijen-Horsten et al. (2007 and 2008). As a result of ongoing international discussions on the underlying concepts and methods, the outcomes may be revised in future publications.

Intellectual property is accounted for as any other fixed asset recorded in the Dutch national accounts and growth accounts. The Perpetual Inventory Model (PIM) is used to convert investment time series into capital stocks. Besides investment time series and prices of the different forms of intellectual property, this model also requires information about the distribution of service lives (i.e. amortisation patterns) and the decay in efficiency. Asset values decline over time because their contribution to company profits will inevitably fall. R&D will ultimately be shared by others or may simply become obsolete due to new knowledge creation. Similarly, brand equity will lose its value without new investments, and organisational structures become inefficient if not renewed once every couple of years.

investment, value added, net capital stock, economic growth and multi-factor productivity (*mfp*). Section 4.4 winds up with conclusions.[11)]

4.1 Investment in intellectual property

Table 4.1 shows for the total Dutch economy estimates of investment in intellectual property by asset type for a range of years. In 2009 investment in intellectual property totalled 50.9 billion euro, amounting to 8.9 percent of GDP at market prices. Although this share was 8.1 percent in 1987, intellectual property spending relative to GDP was higher in the late nineties, with a peak of 10.2 percent in 1999. Since 1999 investment in intellectual property measured as a share of GDP has declined. In 2009 there was a substantial decrease in investment in intellectual property caused by the worldwide economic crisis that started in 2008. This decline was not only restricted to investment in intellectual property, investment in other assets also slowed down substantially. It seems that the Netherlands is back to square one. In 1996, intellectual property investment was also around 9 percent of GDP at market prices.

In 2010 a mixture of public organisations and industry, including VNO-NCW (the Confederation of Netherlands Industry and Employers), the FNV and CNV (both trade union federations) launched a new Knowledge Investment Agenda. This so-called KIA coalition continues the work carried out previously by the National Innovation Platform set up by the Dutch government in 2003 with the goal of elevating the Netherlands to a leading knowledge economy. In a recent report (KIA, 2010) the KIA coalition formulated its vision to transform the Netherlands into a "nation of talent" within the time period of ten years.

11) The results in the tables 4.6 and 4.7 are slightly different from the results as published in *De Nederlandse groeirekeningen 2008* (in Dutch). This is due to small inaccuracy in the calculation of production and intermediate use after capitalising intellectual property products.

Table 4.1
Investment in intellectual property products

	1990	1995	1999	2005	2007	2008*	2009*
	bln euro						
1. Computerised information	2.1	2.3	5.5	7.0	8.3	9.4	8.5
2. Innovative property	5.6	6.0	9.1	9.2	9.7	9.8	9.5
a. R&D	2.8	3.3	4.1	5.1	5.5	5.2	5.1
b. Mineral exploration	0.5	0.2	0.3	0.1	0.2	0.2	0.2
c. Other innovative property	2.3	2.5	4.8	4.0	4.0	4.4	4.2
3. Economic competencies	13.3	18.0	24.9	30.0	32.8	34.0	32.9
a. Brand equity	5.5	7.2	9.8	11.9	12.5	12.7	12.0
b. Firm-specific human capital	2.6	4.2	5.4	5.9	6.5	6.8	6.7
c. Organisational structure	5.2	6.7	9.8	12.2	13.8	14.4	14.2
Total investment in intellectual property	21.0	26.3	39.6	46.2	50.8	53.3	50.9
	percent of GDP						
1. Computerised information	0.8	0.7	1.4	1.4	1.5	1.6	1.5
2. Innovative property	2.3	2.0	2.4	1.8	1.7	1.7	1.7
a. R&D	1.2	1.1	1.1	1.0	1.0	0.9	0.9
b. Mineral exploration	0.2	0.1	0.1	0.0	0.0	0.0	0.0
c. Other innovative property	0.9	0.8	1.2	0.8	0.7	0.7	0.7
3. Economic competencies	5.5	5.9	6.4	5.8	5.7	5.7	5.8
a. Brand equity	2.3	2.4	2.5	2.3	2.2	2.1	2.1
b. Firm-specific human capital	1.0	1.4	1.4	1.1	1.1	1.1	1.2
c. Organisational structure	2.1	2.2	2.5	2.4	2.4	2.4	2.5
Total investment in intellectual property	8.6	8.6	10.2	9.0	8.9	8.9	8.9

Source: van Rooijen-Horsten et al. (2008).

Categories 1, 2b and a part of 2c are already considered as intellectual property in the Dutch national accounts.
The new, yet to be implemented, SNA (2008) guidelines, recommend capitalising Category 2a (R&D).

The main goal is to bring the Netherlands back to the world's top 5 of most knowledge-intensive economies. To achieve this goal the KIA advice is to focus on investing in intellectual property. Current moderate spending levels are not in line with these recommendations. And despite the economic recession, other countries such as the US, France, Germany and Finland were able to substantially increase their government budgets for investing in knowledge (KIA, 2010).

Table 4.1 indicates that in the Netherlands growth in R&D expenditure was not very promising. R&D expenditure as share of GDP fell from 1.2% in 1990 to 0.9% in 2009. The 2000 EU Lisbon Agenda target set for 2010 for all EU member states was 3% of GDP. The Netherlands will quite likely not achieve this goal. Also the Dutch R&D business investment shares in GDP are below that of many other countries. At the same time business R&D is highly concentrated in a restricted number of companies. This makes R&D in the Netherlands rather vulnerable for mergers and outplacement.
A country comparison shows that the Netherlands has a modest position when it comes to investment in intellectual property. Table 4.2[12)] shows that in the commercial sector the US, UK and France had higher intellectual property investment-to-GDP ratios. Intellectual property investment in Spain and also in Italy was lower than in the Netherlands. Both countries invested around 5 percent of GDP in intellectual property in 2006.[13)] Countries may invest less in intellectual property if technology transfers from other countries are less costly than domestic knowledge development programmes. In addition, a country's industrial structure may equally determine the height of intellectual property investment. For example, the financial and business activities industry which invests a lot in intellectual property is relatively small in Spain.

Overlooking two complete business cycles (1992–2001 and 2002–2008) it can be observed that (table 4.3) in the period 1992–2001 intellectual property investment in the commercial sector increased by an average of 4.6 percent a year and surpassed the GDP growth (3.1 percent). The growth in intellectual property was dominated by investment in computer software. After the internet hype in 2001, investment in intellectual property started to decrease. Intellectual property investment growth became positive again after 2005. This volatile growth path resulted in an average volume growth

of 0.3 percent in the period 2002–2008. In this period the growth was smaller than that of GDP (2.0 percent).

Table 4.2
Investment in intellectual property products in the commercial sector as a percentage of GDP, 2006

	Nether-lands	Ger-many	France	Italy	Spain	UK	US
	percent of GDP						
1. Computerised information	1.2	0.7	1.4	0.6	0.8	1.6	1.6
2. Innovative property	1.4	3.6	3.2	2.2	2.8	3.2	4.4
a. R&D	1.0	2.5	1.9	1.2	1.2	1.1	
b. Mineral exploration	-	-	-	0.1	-	-	
c. Other innovative property	0.4	1.1	1.2	1.0	1.6	2.0	
3. Economic competencies	4.8	2.8	3.3	2.2	1.9	5.8	5.5
a. Brand equity	2.2	0.6	1.0	0.7	0.4	1.2	
b. Firm-specific human capital	0.6	1.3	1.5	1.0	0.8	2.5	
c. Organisational structure	2.1	1.0	0.8	0.5	0.7	2.1	
Total investment in intellectual property	7.4	7.2	7.9	5.0	5.5	10.5	11.5

Sources: van Ark, Bart, Janet X. Hao, Carol Corrado and Charles Hulten (2009), van Rooijen-Horsten et al. (2008).

Looking at more recent years the worldwide crisis contributed to a serious decline in intellectual property investment. Preliminary results for the year 2009 and the first two quarters of 2010 indicate that intellectual property investment fell sharply.

Table 4.3
Investment and GDP, average changes per business cycle

	1992/2001	2002/2008*
	% volume changes	
Investment in intellectual property	4.6	0.3
Software	12.3	2.9
R&D, including social sciences and humanities	1.9	0.3
Mineral exploration and evaluation	–8.6	–4.6
Other innovative property	–1.7	0.5
Brand equity	4.3	–0.6
Firm-specific human capital	4.5	–0.3
Organisational structure	5.1	–1.3
Investment in other fixed assets	3.5	1.3
Gross domestic product (market prices)	3.1	2.0

Source: Statistics Netherlands, national accounts.

Figure 4.1 shows that in the commercial sector the decline of the investment in intellectual property in 2009 was less dramatic than that of other fixed assets. As a result, investment in intellectual property as a percentage of investment in other fixed capital increased to 108 percent in 2009.[14] In 1987 this was not even 60 percent. This clearly indicates that the

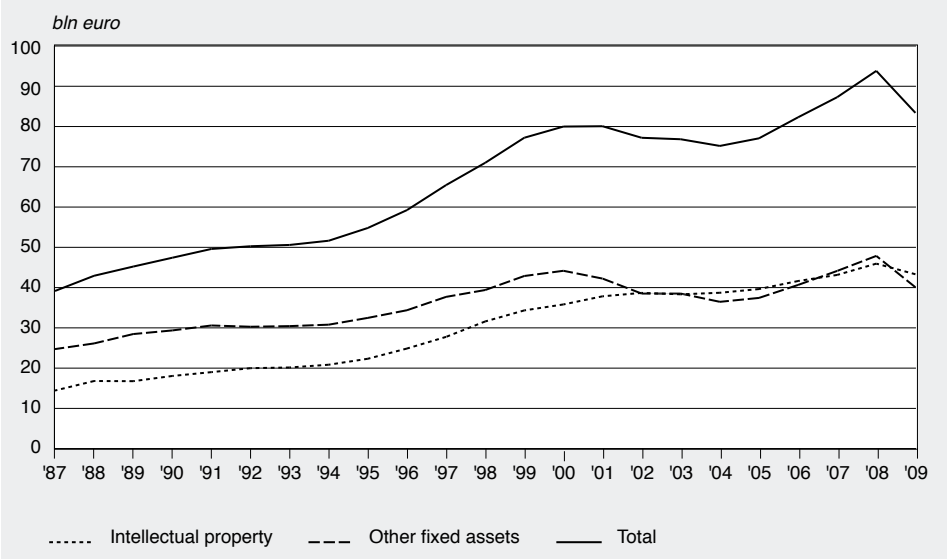
[12] For international comparability we looked at the results for the commercial sector by excluding government and the health sector.

[13] Since at this stage the measurement of intellectual property is still a rather new area of national accounting, it is unavoidable that some of the differences in outcomes between countries reflect divergences in applied methods and sources. It is clear however that all studies so far indicate that intellectual property investment is a highly important production factor in post industrialised economies.

[14] When considering the total economy this share is much lower. In the total economy the industry general government and the industry real estate activities are included. Other fixed assets in these two industries are approximately 40 percent of total other fixed assets of the total Dutch economy. In these industries a lot is invested in civil engineering works and dwellings.

importance of intellectual property in overall business investment has increased substantially over the last 20 years.

4.1 Investment in intellectual property and other fixed assets in current prices

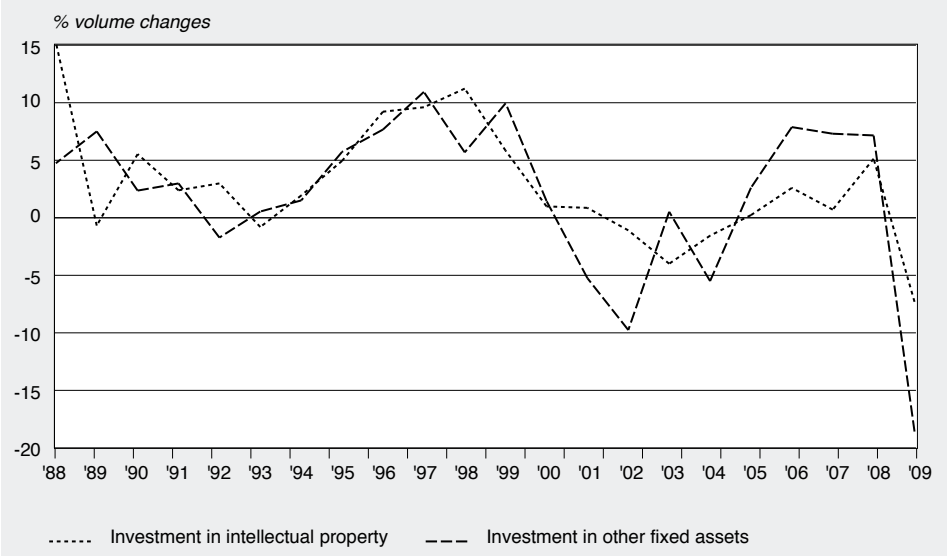


Source: Statistics Netherlands, national accounts.

Figure 4.2 shows that since the year 2000 the annual volume growth of investment in intellectual property products fluctuated less on average than the volume growth of investment in other fixed assets. By including the additional intellectual property products the overall volume growth of total investment follows a smoother growth path. Investment in intellectual property is often carried out on a firm's own account with in-house personnel. Adjusting the working staff to fluctuations in the business cycle is only possible at very high cost. Therefore the investment in intellectual property is generally less sensitive to cyclical changes.

The preliminary results of the first two quarters of 2010 confirm the relative insensitivity of intellectual property products to business cycles. For the first two quarters of 2010 the core Dutch national accounts (total economy) showed an average year to year overall investment volume growth of respectively –11.2 and –3.8 percent. In comparison, the volume growth of investment in intellectual property products in the same two quarters, as recorded in the knowledge satellite account was only –2.8 and –3.2 percent.

4.2 Investment in intellectual property and other fixed assets, commercial sector



Source: Statistics Netherlands, national accounts.

4.2 Intellectual property by industry

Intellectual property investment levels differ considerably per industry (table 4.4). Especially the financial and business activities industry invests substantially in intellectual property: almost 72 percent of this industry's total investment in 2007. Other industries with relatively high intellectual property investment shares are the manufacturing industry (58 percent) and the trade, hotels, restaurants and repairs industry (53 percent). Investment in intellectual property in those industries was very high in absolute terms as well as in relation to other investment. Almost 80 percent of all investment in intellectual property takes place in these three industries.

Investment in economic competencies was larger than investment in the other two categories of intellectual property, computerised information and innovative property. In 2007 67 percent of total investment in intellectual property consisted of economic competencies. For computerised information and innovative property these shares were 17 and 16 percent respectively. Within the category of economic competencies investment in organisational structures and brand equity are dominant.

In the manufacturing industry the share of intellectual property in total investment was 58 percent. In this industry intellectual property investment is dominated by R&D and brand equity. Within the manufacturing industry the electro-technical industry and the chemical industry are relatively high R&D investors. Investment in brand equity is leading in the industries publishing and printing, and manufacturing of food products, beverages and tobacco.

Table 4.4
Investment in intellectual property by industry, 2007

	Total	Software	Innovative property	Economic competencies	Total
	bln euro	*as a percentage of the total investment*			
Commercial sector	43.1	8.3	8.0	33.1	49.4
Agriculture, forestry and fishing	0.4	0.9	3.9	3.2	8.0
Mining and quarrying	0.6	5.3	22.7	4.7	32.7
Manufacturing	10.6	8.3	25.1	24.9	58.4
Electricity, gas and water supply	0.4	4.2	1.8	7.8	13.8
Construction	1.4	4.3	3.1	36.9	44.3
Trade, hotels, restaurants and repair	7.7	5.0	1.7	46.6	53.2
Transport, storage and communication	3.6	9.6	2.4	21.0	33.0
Financial and business activities	15.4	15.0	3.1	53.9	71.9
Care and other service activities	3.2	3.7	5.0	22.9	31.5

Source: Statistics Netherlands, national accounts.

4.3 Effects of capitalising intellectual property

Capitalisation of a broader range of intellectual property products leads to a higher level of total investment (see table 4.5). In 2007 adding these new intellectual property products

Table 4.5
Effects of the capitalisation of the additional intellectual property products, commercial sector

	2007	1996/2001	2002/2007	2006	2007
	bln euro	*% volume changes*			
Excluding additional intellectual property products					
Total investment	52	5.7	0.5	8.8	4.4
Net capital stock	562	2.4	–0.1	0.4	0.4
Value added	404	4.0	2.4	4.2	4.7
Including additional intellectual property products					
Total investment	87	5.5	–0.1	5.2	4.0
Net capital stock	655	2.6	–0.1	0.2	0.4
Value added	439	4.1	2.1	3.9	4.6

Source: Statistics Netherlands, national accounts.

(35.4 billion euro) led to a 68 percent adjustment of total investment in the commercial sector. Net capital stock for the commercial sector was adjusted upwards by 17 percent and value added by 9 percent. For the period 1996–2001 the effect on the average annual volume growth of value added was negligible (0.1 percentage points). In the period 2002–2007 the effect of capitalisation on the average volume growth of value added was –0.3 percentage points.

Contribution of intellectual property to output growth
In the Netherlands intellectual property investment has a substantial impact on economic growth. In the period 1996–2001 the average contribution of intellectual property to economic growth was 0.5 percentage points. This contribution was as large as that of other forms of fixed capital. The largest contributions come from computerised information, brand equity and organisational structures. Fixed capital contributed in total as much as labour to economic growth. The end of the internet hype in 2001 and the recession in the following years led to a sharp decline of investment growth in computer hardware and software. As a consequence the general contribution of capital to economic growth fell dramatically compared to the period 1996–2001. The contribution of economic competencies fell sharply as did the contributions of other forms of intellectual property. The dip of investment in brand equity and organisational structures was quite remarkable compared to the previous 1996–2001 period. Apparently, businesses lowered their budgets for advertising and consultancy during the recession.

Generally, the extended notion of capital leads to downward adjustments of *mfp*. However, a counterintuitive upward adjustment of *mfp* was found in 2007 (table 4.6). Before 2000 intellectual property was dominating investment growth. In these years intellectual property investment appeared, like investment in other fixed assets, very sensitive to business cycle movements. After the internet bubble burst intellectual property investment dropped substantially but became less sensitive to business cycle movements. In 2007 the contribution to output growth of intellectual property was less than that of other inputs. Capitalisation of the additional intellectual property products therefore led to an upward *mfp* adjustment in 2007.

The manufacturing industry is generally an important R&D investor. However, this does not necessarily lead to higher profit margins. Profitability is relatively low in manufacturing compared to the other industries. Strong international competition in this industry seems to limit the monopoly rents that can be obtained from intellectual property and the innovations they bring forward. However, measurement issues may also play a role here. R&D surveys seem to indicate that a substantial share of R&D carried out in the Netherlands may feed innovations conducted by foreign affiliates. Because of difficulties in measuring intra-company R&D transfers, it is not easy to assign R&D to the companies that truly benefit in terms of innovation, growth and productivity. Statistics Netherlands is currently carrying out a supplementary survey to investigate how to improve the measurement of cross-border intra-company flows of R&D.

Table 4.6
Contributions to consolidated output growth, commercial sector

	Excluding additional intellectual property products			Including additional intellectual property products		
	1996/2001	2002/2007	2007	1996/2001	2002/2007	2007
	percent					
Consolidated output	4.3	2.1	4.3	4.3	2.0	4.2
	percentage point					
Labour	1.1	0.1	1.2	1.0	0.1	1.1
Capital	0.8	0.1	0.3	1.1	0.1	0.2
other fixed assets	0.6	0.1	0.2	0.6	0.1	0.2
intellectual property products	0.2	0.0	0.0	0.5	0.0	0.0
computerised information	0.2	0.0	0.1	0.1	0.0	0.1
innovative property	0.0	0.0	0.0	0.1	0.0	0.0
economic competencies	–	–	–	0.3	0.0	0.0
Intermediate consumption	1.6	0.6	1.3	1.5	0.5	1.0
Multi-factor productivity	0.8	1.3	1.6	0.7	1.2	1.8

Source: Statistics Netherlands, national accounts.

In the period 1996–2001 the contribution of intellectual property to output growth was most significant in the industry financial and business activities, namely 1.2 percentage points per year on average (table 4.7). Economic competencies gained importance in this industry, especially in banking and legal and economic activities. The restructuring of the financial market in the Netherlands that followed the unification of the European market led to mergers and takeovers in banking. In the second half of the nineties organisational and strategic renewals and related investments were therefore put in place. This industry invested also a lot in more efficient and automated systems during the internet hype period. After the internet bubble burst in 2001 the incentive to further invest in intellectual property products was rather low. Output growth could be sustained with a minimal growth of inputs. Intellectual property investment growth was on average even negative in this period. As a consequence in the period 2002–2007 *mfp* growth increased in this industry. Similar kinds of effects in other industries may partly explain the relatively high *mfp* rates in the period 2002–2007 in the commercial sector.

Table 4.7
Average contributions to consolidated output growth 1996–2001

	Consolidated output	Labour	Capital	of which		Intermediate consumption	Multifactor productivity
				other fixed assets	intellectual property		
	percent	*percentage point*					
Agriculture, forestry and fishing	0.8	0.4	0.2	0.1	0.1	0.4	–0.3
Mining and quarrying	1.1	–0.1	–0.2	–0.4	0.2	1.3	0.1
Manufacturing	2.8	–0.1	0.4	0.2	0.1	1.8	0.7
Electricity, gas and water supply	1.7	–0.4	0.3	0.3	0.1	1.6	0.2
Construction	3.7	1.1	0.4	0.3	0.1	2.5	–0.3
Trade, hotels, restaurants and repair	5.5	0.7	0.9	0.5	0.4	2.4	1.5
Transport, storage and communication	7.8	0.8	1.5	1.0	0.5	3.6	1.9
Financial and business activities	6.7	2.5	1.9	0.8	1.2	2.5	–0.3
Care and other service activities	3.1	1.4	0.6	0.5	0.2	1.6	–0.5
Commercial sector	4.3	1.0	1.1	0.6	0.5	1.5	0.7

Average contributions to consolidated output growth 2002–2007

	Consolidated output	Labour	Capital	of which		Intermediate consumption	Multifactor productivity
				other fixed assets	intellectual property		
	percent	*percentage point*					
Agriculture, forestry and fishing	1.2	–0.5	0.0	0.0	0.1	0.2	1.4
Mining and quarrying	–0.7	–0.2	–0.5	–0.5	0.0	0.9	–1.0
Manufacturing	1.3	–0.4	0.0	0.0	0.0	0.8	0.9
Electricity, gas and water supply	1.6	–0.1	0.0	0.0	–0.1	0.5	1.3
Construction	0.3	–0.2	0.0	0.0	0.0	0.4	0.1
Trade, hotels, restaurants and repair	2.5	0.1	0.2	0.1	0.1	0.5	1.7
Transport, storage and communication	2.2	–0.3	0.2	0.1	0.1	0.5	1.9
Financial and business activities	2.0	0.6	0.1	0.1	0.0	0.3	0.9
Care and other service activities	2.5	1.4	0.4	0.3	0.1	0.9	–0.2
Commercial sector	2.0	0.1	0.1	0.1	0.0	0.5	1.2

Source: Statistics Netherlands, national accounts.

4.4 Conclusion

Accounting for a wider range of intellectual property products in terms of capital formation helps to better understand how the knowledge-based economy develops. For this purpose we have, based on their capital characteristics, reclassified spending on R&D, brand equity, organisational structures, firm-specific human capital and architectural and engineering designs as investment rather than as intermediate use. In this chapter these supplementary asset types are addressed as *the additional intellectual property products*. Intellectual property products already covered in the official national accounts are computer software, mineral exploration and evaluation, and entertainment, literary or artistic originals. Based on information from the Dutch knowledge satellite account this chapter showed the effects of intellectual property investment on several macro-economic variables as well as its contribution to economic growth.

Capitalisation of the additional intellectual property products led in 2007 to an upward adjustment of the net capital stock and of value added of almost 17 and 9 percent respectively. The average yearly volume growth of total investment is downward adjusted by the capitalisation of the additional intellectual property products. Generally intellectual property is less sensitive to cyclical changes than the other classic forms of capital investment.

The importance of intellectual property in total capital expenditure is increasing. In 2007 investment in intellectual property products was roughly 10 percent higher than investment in other fixed assets. However, this outcome was especially due to the modest increase of other fixed capital. Intellectual property investment as a percentage of GDP declined substantially in the recent period. Also growth of intellectual property lagged behind that of GDP. The contribution of intellectual property to economic growth in the period 2002–2007 was therefore very small.

During the internet hype in the period 1992–2001 the high growth rates of investment in software led to a very large contribution of intellectual property to economic growth. In 2001 the internet bubble burst and software investment dipped. This is in line with more modest capital formation growth rates generally observed after 2001. While shares of intellectual property in total capital formation are increasing, as a part of GDP intellectual property investment is falling behind. In the period 2005–2007 intellectual property investment growth rates became positive again.

Spending levels on intellectual property were less promising in recent years. If this moderate path will be followed in the common future, it will be less easy for the Netherlands to reach the goal of becoming a leading knowledge economy. This conclusion is also reflected in a recent study of the conference board (Ark, B. van, and Kirsten Jäger, 2010) in which, based on data from the knowledge satellite account of the Netherlands, various future projections of the Dutch knowledge economy are explored.

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Annex 1. Specifications of the growth accounts

This annex provides a more detailed specification of the official growth accounts produced by Statistics Netherlands. Section 1.1 describes the data sources used as well as the level of detail of the data involved. Section 1.2 discusses the most important assumptions underlying the official growth accounts of Statistics Netherlands. Finally, section 1.3 describes the definition of the commercial sector.

1.1 Level of detail of the data involved

Goods and services
In the growth accounts, the production and intermediate consumption of goods and services are classified into 219 different types of goods and services. These comprise 132 types of material goods, 16 types of energy sources and 71 types of services. Beside the products of water and electricity companies, the 16 types of energy sources further comprise energy sources such as coal, oil and gas. The fact that all sources of energy are included under the heading 'energy' has consequences for the interpretation of the data. One example is the processing of crude oil into plastic products in the manufacturing industry. The use of crude oil for this purpose is registered as intermediate consumption of energy, even though the crude oil is not used to generate energy.

In the growth accounts, the deployment of temporary workers is registered as intermediate consumption of a service (produced by employment agencies). It may be preferable to register the deployment of temporary workers as labour input. In that case only the trade-margins earned by employment agencies would be registered as intermediate consumption of a service in the growth accounts. However, this way of registering is currently not feasible because of a lack of data.

Labour
In the growth accounts, the hours worked and labour cost are subdivided into two categories: labour by employees and labour by self-employed (including unpaid family workers). Hours worked and labour cost are also classified by industry. Per industry, the total volume change of labour is determined by weighting the hours worked for each type of labour (employees or self-employed) with the corresponding labour cost per hour worked. Since labour cost of employees and the self-employed may differ (see also section 1.2 of this annex), the volume change of total labour input can deviate from the change in total hours worked. A subdivision of labour by other characteristics such as educational level, sex or age is not available at this time. Changes in such characteristics will therefore manifest themselves in *mfp* change.

Capital
In the growth accounts, the non-financial assets make up the capital input. The non-financial assets include the capital stock, the Dutch oil and gas reserves and livestock raised for slaughter[15)] The capital stock comprises 20 asset types and long series of vintage years. A vintage year is the year in which a capital asset is produced. In addition, in this publication, capital input is expanded with the asset types other subsoil assets (e.g. sand, gravel and salt), inventories, agricultural land and land underlying dwellings and buildings. Recreational land and construction land are the most important types of capital that are not yet included in the capital input.
The volume changes of the capital stock are based on the productive capital stock per asset type and vintage year. The volume changes of the input of subsoil assets are based on physical extraction levels. For inventories, the quantity levels of inventories by commodity are used. Volume changes of the input of land are based on land surface area

[15)] Other types of livestock such as livestock for breeding, dairy, draught, etc. (AN.11141) are already included as a fixed asset in the non-financial balance sheet. Livestock raised for slaughter is not a fixed asset and is therefore added separately.

by type, corrected for quality differences due to differences in location. Land in more popular locations has a higher economic value. In the growth accounts, this land is therefore treated as land of higher quality than land in less popular locations.

1.2 Model assumptions

Introduction
Two types of inputs cannot be measured directly: the user cost of capital and the labour income of the self-employed. The indirect measurement of the cost of these inputs is based on a number of assumptions. A detailed description of these assumptions can be found in "Productivity measurement at Statistics Netherlands" (Van den Bergen et al., 2008). A short summary is presented below.

User cost of capital
Capital assets are usually purchased with the aim to use them for more than a year. Variables related to the use of non-financial assets that can be observed directly are the acquisition cost, if applicable the interest payments to finance the acquisition, and the sales of non-financial assets. The actual user cost of capital per year cannot be observed directly. They are therefore determined with the help of a mathematical model.

Conceptually, user cost of capital can be compared with rental prices of non-financial assets. Generally user cost of capital consists of three different cost components: consumption of fixed capital (applicable only to fixed assets), the imputed (opportunity) cost of the money that is tied up in the assets and holding gains and losses.[16)] When prices of non-financial assets rise, holding gains arise that must be deducted from the user cost of capital. Reversely, when prices fall, the user cost increases.

In the system of national accounts, the consumption of fixed capital is calculated mathematically by using long time-series of capital formation and information about the economic lives of different types of fixed assets. The cost of the money that is tied up in the assets is calculated by multiplying the market value of the assets with a rate of return. The rate of return can be interpreted as the interest rate that would have been paid if the acquisition of the asset had been financed with a loan. Holding gains and losses are determined based on price changes of new capital assets since information on price changes of second-hand assets is not readily available. Holding gains and losses are not included in the user cost of inventories and land since large variations in the price of these assets may lead to negative user cost.

With regard to the interest rate, which is also called rate of return, the first choice is between an exogenous and an endogenous rate. An endogenous rate is in accordance with the standard neoclassical model. This model is based on the twin assumptions of constant returns to scale and perfect competition. These assumptions imply that profit equals zero. All gross output revenue of an enterprise is used to reward the inputs in the production process. The whole operating surplus / mixed income must therefore be allocated to user cost of capital and labour income of the self-employed. When the labour income of the self-employed is estimated exogenously, which is common practice, an endogenous interest rate is required to make the equation fit.

An exogenous rate of return is chosen independently of the operating surplus. For example, the average interest rate on the capital market could be used. Almost certainly an exogenous rate will lead to a difference between the user cost of capital and the operating surplus. Profit will therefore be non-zero. Although the usefulness of the neoclassical model is generally recognised, its assumptions seem incompatible with economic reality, especially when there is rapid technological progress and unbiased

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16) An exception is made for subsoil assets. For subsoil assets, the user cost is estimated endogenously as the difference between the gross operating surplus and the user cost of capital on the other non-financial assets.

measurement of productivity change is more important than ever. To avoid making these assumptions, an exogenous interest rate is employed in the official growth accounts of Statistics Netherlands.

The exogenous interest rate consists of two parts. Lenders must be compensated for providing capital and for the risk that the capital will not be returned (for example due to the bankruptcy of the borrower). In the growth accounts the first part of the interest rate is set equal to the internal reference rate (IRR) between banks. The risk premium is determined as the difference between the expected gross return on bonds (before subtracting management fees) and the IRR. This leads to a risk premium of 1.5 percent. The total interest rate therefore equals the yearly IRR plus 1.5 percent. For more details with regard to the calculation of the exogenous rate of return we refer to Van den Bergen et al. (2008).

Labour income of the self-employed
Unlike compensation of employees, labour income of the self-employed cannot be observed directly and no explicit estimate of it is provided in the national accounts. Labour income of the self-employed, together with the user cost of capital and the profit of the sector households (S.14), is part of mixed income. In order to break down mixed income, some assumption with regard to profit of S.14 or labour income of the self-employed must be made.

A logical choice would be to assume that the self-employed have the same income per hour as employees. However, although firm evidence is lacking, most data suggest that self-employed people work more hours than employees without earning substantially more money. It is therefore assumed that the self-employed have the same labour income per year as employees. There are a few exceptions to this assumption. In the industry construction it is assumed that the self-employed have the same income per hour as employees because some (anecdotal) evidence exists to support this assumption. In some medical sectors, for instance in the case of dentists and general practitioners, the self-employed are generally university graduates while the employees usually have lower educational levels. Since educational level is generally positively correlated with earnings, the self-employed in these sectors usually have a higher income than employees. Therefore, the labour income of the self-employed in these sectors for the year 2003 is set at a so-called standard income of these professions. It is further assumed that the development of labour income of the self-employed equals the development of wages of employees in these sectors, both forwards and backwards in time.

Net profit or loss
Since by using an exogenous interest rate the values of the input components are calculated independently from the value of output, revenue does not need to be equal to total cost. A new balancing item is created, called net profit (NP).

$$NP = Y - K - L - E - M - S \qquad \text{(A1.1)}$$

The balancing item net profit is not part of the system of national accounts. However, it can easily be deduced by deducting the calculated user cost of capital from the gross operating surplus. It should be noticed that the net profit determined this way can differ from profits as reported by companies. The main reason for this is that only actually paid interest charges are registered in company bookkeeping, while in the growth accounts imputed interest charges (opportunity cost of the money that is tied up in the assets) of all assets are part of the user cost of capital. Since companies usually partially finance their assets with loans, the imputed interest charges in the growth accounts will generally exceed the interest charges actually paid. The resulting net profit calculated in the growth accounts will therefore generally be lower than profits reported by companies. Differences in the method used to determine consumption of fixed capital may also explain part of the differences found between net profit as determined by equation A1.1 and profits as reported by companies.

Conclusion
In contrast with the standard neoclassical model, the official growth accounts of Statistics Netherlands employ an exogenous interest rate to determine capital services. This implies

that revenues in a certain industry need not be equal to total cost. This inequality also holds for any aggregate of industries. For the calculation of aggregate figures, volume changes of inputs per industry are not weighted by revenues per industry, which would imply a return to the neoclassical model, but by cost-shares. In conclusion, on the industry level as well as any aggregate of the industry level revenues need not be equal to total cost.

1.3 Demarcation of the growth accounts

Calculations have been performed at three different levels of aggregation: 36 industries, 9 industries and the commercial sector. The commercial sector is defined as the set of all industries for which consistent and independent measures of input and output exist. In practice, this means that the commercial sector contains the whole economy except public administration and social security, defence activities, subsidized education, real estate activities, renting of movables, and private households with employed persons.

The name 'commercial sector' must not be taken too literal. Real estate activities, renting of movables, and private households with employed persons contain activities which are at least partially commercial. On the other hand, industries like research and development, and sewage and refuse disposal services contain non-market (and thus non-commercial) activities. However, the greater part of the commercial sector concerns commercial activities, whereas the majority of the excluded industries deals with non-commercial activities. Therefore, the label 'commercial sector' seems acceptable.[17)]

Figure A1.1 summarises the industries excluded from productivity measurement.

A1.1 Industries excluded from productivity measurement

	Excluded from productivity measurement
Financial and business activities	Real estate activities Renting of movables
Care and other service activities	Private households with employed persons
Commercial sector	Real estate activities Renting of movables Public administration and social security Defence activities Subsidized education Private households with employed persons

Literature

Bergen, D. van den, M. van Rooijen-Horsten, M. de Haan and B.M. Balk (2008). Productivity Measurement at Statistics Netherlands, Statistics Netherlands, The Hague/Heerlen.

[17)] Labels that have been utilised in other countries include 'the measured sector' (Statistics New Zealand) and 'the market sector' (Australian Bureau of Statistics). The label 'market sector' is not used for the present publication because it is already defined within the Dutch national accounts as 'all industries except general government, health and social work activities, real estate activities and mining and quarrying'.

Annex 2. Differences with the previous edition

The Dutch growth accounts presented in this year's publication are improved in comparison to last year. In the previous edition, the capital inputs represented in the growth accounts were restricted to those of fixed assets and oil and gas reserves. In this edition, the capital input is expanded with the asset types other subsoil assets (e.g. sand, gravel and salt), inventories, agricultural land, and land underlying dwellings and buildings. By adding the input of these additional non-financial assets, the estimates of productivity change have been refined. As a result, the growth accounts time-series have slightly changed.

2.1 Other subsoil assets

In the Netherlands the asset type other subsoil assets comprises sand, salt, gravel, clay, peat and limestone. Mining the coal reserves in the Netherlands is not economically feasible and all coal mines were closed in the seventies. The introduction of the asset type other subsoil assets in the growth accounts completes the coverage of capital inputs of subsoil assets.

The user cost of the other subsoil assets are determined in about the same way as the user cost of oil and gas reserves. The volume changes of the user cost are based on the changes in physical extraction from one year to another. The user cost of capital corresponds to the resource rent of the reserves. The resource rent is calculated endogenously by subtracting the exogenously estimated user cost of capital of the fixed assets and the pure profits for secondary activities from the gross operating surplus in the mining industry.

In the Netherlands the extraction of salt takes place in two different industries: the industry 'extraction of other subsoil assets' and in the 'chemical industry' as secondary production. It is not possible to estimate the resource rent endogenously in an industry where the extraction of subsoil assets is not the primary activity. In the chemical industry, the pure profits of the main activities are many times larger than the (expected) resource rent of the other subsoil assets, making it impossible to arrive at a plausible endogenous estimate of this resource rent. The unit resource rent is therefore first estimated for the mining industry. For the extraction of salt in the chemical industry, it is assumed that the unit resource rent equals the unit resource rent of salt in the extraction of other subsoil assets industry.

2.2 Inventories

The Dutch balance sheet distinguishes four different types of inventories: work-in-progress, materials and supplies, final products and goods for resale. Work-in-progress consists of output produced that is not yet finished, such as maturing livestock and uncompleted structures. Companies keep inventories of materials and supplies to secure the continuity of their production process. The service provided by these inventories is the certainty of delivery of raw materials. Inventories of final products provide a company with the certainty of customer delivery which enables a company to cope with changing demand over time. Inventories of goods for resale in the hands of a trader provide more or less a similar service as the inventories of final products in the hands of the manufacturer. The volume change of capital services of all types of inventories are based on the changes in quantities of inventories by commodity type.

2.3 Land

The balance sheet for land represents three different types of land: agricultural land, land underlying dwellings and land underlying non-residential buildings. The use of balance

sheets for land to determine the capital input in the growth accounts requires a breakdown by industry. The industry breakdown is based on the use of land in production which is not necessarily equal to a breakdown based on land ownership.

Agricultural land is subdivided into two separate groups: open farmland and land underlying greenhouses. All open farmland is assigned to the industry agriculture, forestry and fishing. This equally applies to all land underlying greenhouses used in agricultural production. For other uses of greenhouses, an estimate is made of the area (and value) of land that is occupied by garden centres. This estimate is based on the number of garden centres and their average size. This land is assigned to the industry retail trade and repair. It is assumed that all other land underlying greenhouses (not in use for agricultural purposes) are used for secondary activities of agricultural businesses and is therefore assigned to agriculture, forestry and fishing.

In the Netherlands, land underlying dwellings is assigned to the real estate industry (including owner-occupied housing), insurance and pension funds and to the industry government. The division of land underlying dwellings by industry is based on the value distribution of dwellings.

For the industry breakdown of land underlying non-residential buildings, all industries are divided into two groups: (1) industries with a relatively high ratio between land values underlying non-residential buildings and the values of the buildings and (2) industries with relatively low ratios. The first group consists of industries occupying buildings with a restricted number of floors that are primarily located in town centres and cities (for example retail trade and restaurants). For the time being and due to data constraints, it is assumed that the ratio between the values of land and buildings in the first group is two times the ratio in the second group.

The volume changes of land-related capital service inputs are based on changes in occupied land areas, corrected for quality differences due to location. Land values in more economically active locations are higher than land values in areas with fewer activities. In the growth accounts, the former is treated as land of a higher quality than the latter.

Although the most important types of land are now included, the estimates of land are still incomplete. Construction land and privately owned recreational land are not yet included in the figures. Furthermore, land underlying tax-exempted buildings, like churches, is also excluded because no data on the value of these real estate objects is currently available. These estimates are subject to future research.

2.4 Effects on growth accounts

Table A2.1 shows the effects of including the asset types other subsoil assets, land and inventories on capital services per hour worked. Land has the largest contribution to the value of capital services per hour worked in agriculture, forestry and fishing. In this industry, the user cost of land are about the same as the user cost of fixed assets. Including all additional asset types resulted in an increase of more than 100 percent of capital services per hour worked in agriculture, forestry and fishing. In the commercial sector, including the asset type other subsoil assets has a very small effect (<1 percent) on capital services per hour worked. The extraction of other subsoil assets is mostly restricted to mining and quarrying, although some extraction takes place as secondary production in manufacturing. The extraction of oil and gas represents the largest part of the user cost of capital in mining and quarrying and these asset types have already been included in the growth accounts for some years. Inventory stocks are mostly present in manufacturing and trade. In manufacturing, the inventories mostly consist of materials and supplies and finished goods, whereas the inventories in trade represent mostly goods for resale. Including inventories raises capital services per hour worked in manufacturing by 12 percent and in trade by 24 percent. In the other industries, the importance of inventories is less significant.

Table A2.1
Capital services by industry

	Capital services per hour worked 2009*		Capital services 1996/2009*	
	Excluding land, inventories and subsoil assets	Including land, inventories and subsoil assets	Excluding land, inventories and subsoil assets	Including land, inventories and subsoil assets
	euro		*% volume change*	
Commercial sector	7.2	8.4	2.5	2.4
Agriculture, forestry and fishing	7.8	16.6	0.3	0.3
Mining and quarrying	1,146.1	1,155.4	–0.3	–0.3
Manufacturing	9.5	11.1	1.6	1.6
Electricity, gas and water supply	79.0	81.0	0.9	0.9
Construction	2.5	2.7	4.3	4.1
Trade, hotels, restaurants and repair	3.8	5.1	3.3	3.3
Transport, storage and communication	15.8	16.2	3.2	3.1
Financial and business activities	4.0	4.4	6.3	5.8
Care and other service activities	3.2	3.6	3.8	3.7

Source: Statistics Netherlands, national accounts.

The effects of the extended coverage of capital on the Dutch growth accounts are apparently small. In most industries, the average increase of capital services becomes slightly smaller after including the asset types other subsoil assets, land and inventories. The most important reason for this is that volume changes of land are typically lower than those of other capital inputs. In most industries land has higher cost shares than the other two extra capital inputs combined. Therefore, as a result of including land, the volume change of all capital inputs will be adjusted downwards.

Since the expansion of capital coverage has only a very small effect on the total volume change of capital services, the effects on productivity growth are also small (see Table A2.2). The largest difference in productivity growth is found in agriculture, forestry and fishing were the average annual productivity growth between 1995 en 2009 increased by 0.05 percentage points after including the extra capital inputs. Manufacturing and trade, hotels, restaurants and repair are the only two industries were the average annual productivity growth decelerated after including the additional capital input items. The inventories are responsible for this growth deceleration, as the volume change of the user cost of capital increased slightly in these industries after their introduction. As productivity change for the commercial sector is hardly effected, including the extra capital inputs in the growth accounts does not change much of the overall picture of the Dutch economy.

Table A2.2
Effects of capital extensions on productivity, average 1996–2009*

	Excluding land, inventories and subsoil assets	Including land, inventories and subsoil assets
	% change	
Commercial sector	0.78	0.79
Agriculture, forestry and fishing	0.58	0.63
Mining and quarrying	–0.53	–0.52
Manufacturing	0.58	0.57
Electricity, gas and water supply	0.59	0.59
Construction	–0.11	–0.10
Trade, hotels, restaurants and repair	1.17	1.13
Transport, storage and communication	1.51	1.52
Financial and business activities	0.33	0.37
Care and other service activities	–0.09	–0.08

Source: Statistics Netherlands, national accounts.

Annex 3. Sensitivity of profitability to different risk premiums

Capital services as recorded in the growth accounts of the Netherlands are valued on the basis of exogenous rates of return (see also chapter 2 and annex 1). The applied rate of return is represented by the interbank interest rate supplemented by a risk premium of 1.5 percent. This risk premium is kept constant over time. As a result of the financial crisis, the interbank interest rate dropped substantially in 2009. This lower interest rate resulted in a price decline of capital services and contributed positively to profitability at the industry branch level.

The rate of return represents the interest rate of loans to finance the acquisition of capital goods. Especially in times of financial crises one may question the sense of assuming constant risk premiums over time. In times of recession, investments bare greater risks than in times when economic growth expectations are more promising. For example, in 2009 banks were able to attract capital at historically low interest rates while, at the same time, banks charged much higher interest rates to their customers, representing at least partly elevated risk premiums.

Table A3.1 shows the sensitivity of profitability to variances in risk premiums. Profitability is calculated under different scenarios and corresponding risk premiums. The baseline scenario represents the 1.5 percent risk premium applied in the official growth accounts. Logically, profitability drops when the risk premium is set higher. Higher risk premiums lead to rising capital cost and subsequently to lower profits. In other words, there are one to one relationships between capital returns, capital cost and profit levels. A risk premium increase of 0.5 percentage points would lower profitability by 0.9 percentage points.

Table A3.1
Profitability in the commercial sector for different risk premiums in 2009*

	Baseline			
	1.5%	2.0%	2.5%	3.0%
	%			
Profitability	7.8	6.9	6.1	5.2
	% change			
Terms of trade	2.6	1.8	1.0	0.2
Input price	–3.9	–3.1	–2.3	–1.5
Gross output price	–1.4	–1.4	–1.4	–1.4

Source: Statistics Netherlands, national accounts.

In the Dutch growth accounts changes in risk premiums have an effect on price levels but not on the volume levels of capital services. Also output prices and output volume changes remain unaffected. However, as input prices have an effect on input cost shares, productivity growth and factor contributions will also be affected by risk premium changes. Contributions to output growth are calculated based on cost shares in current prices of the previous year. The cost share of capital input may be underestimated in 2009 as the risk premium for 2009 is probably set too low. Increasing the risk premium in 2009 will have an effect on growth contributions and productivity in 2010.

This sensitivity analysis shows the importance of choosing economically sound risk premiums for the calculation of capital rates of return as well as industry branch related profit rates. A current research project at Statistics Netherlands investigates to what extent the estimation of the exogenous rate of return can be improved. The outcomes of this research will be incorporated in upcoming editions of the Dutch growth accounts.

Annex 4. Classification of industries in the growth accounts

SBI 1993	Description
01–05	Agriculture, forestry and fishing
10–14	Mining and quarrying
15–37	Manufacturing
15–16	manufacture of food products, beverages and tobacco
17–19	manufacture of textile and leather products
21	manufacture of paper and paper products
22	publishing and printing
23	manufacture of petroleum products
24	manufacture of basic chemicals and chemical products
25	manufacture of rubber and plastic products
27	manufacture of basic metals
28	manufacture of fabricated metal products
29	manufacture of machinery and equipment n.e.c.
30–33	manufacture of electrical and optical equipment
34–35	manufacture of transport equipment
20; 26; 36; 37	other manufacturing
40–41	Electricity, gas and water supply
45	Construction
50–55	Trade, hotels, restaurants and repair
50	trade and repair of motor vehicles/cycles
51	wholesale trade (excl. motor vehicles/cycles)
52	retail trade and repair (excl. motor vehicles/cycles)
55	hotels and restaurants
60–64	Transport, storage and communication
60	land transport
61	water transport
62	air transport
63	supporting transport activities
64	post and telecommunications
65–67; 72–74	Financial and business activities
65	banking
66	insurance and pension funding
67	activities auxiliary to financial intermediation
70	real estate activities
71	renting of movables
72	computer and related activities
73	research and development
74	other business activities n.e.c.
75; 801–803	General government
85–93; 804	Care and other service activities
85	health and social work activities
90	sewage and refuse disposal services
92	recreational, cultural and sporting activities
95	private households with employed persons
804; 91; 93	other service activities n.e.c.
01–67; 72–74; 804; 85–93	Commercial sector