

Ministry of Economic  
and Business Affairs  
Division for Economic  
and Business Research

FORA

## Dutch Capacity for Productivity Growth

From Benchmarking  
to Policy Priorities

July  
2005

## About FORA

Founded in 2001, FORA is an independent division for research and analysis under the Danish Ministry for Economic and Business Affairs. FORA currently employs 15 highly qualified analysts, as well as a part-time staff of researchers and students. FORA's employees have previously held positions within key Danish ministries and OECD departments. About half of the analysts are engaged in policy guidance and analyses for the Danish government. The remaining analysts work on advanced and innovative consulting projects.

The work of FORA is constantly inspired by the challenges facing the political decision makers. FORA develops relevant analyses on areas of political importance relating to productivity improvements, so that crucial decisions may be based on the best possible foundation. Thereby, FORA becomes a dynamic link between political challenges and empirical analysis. Through its research and analysis, FORA has become a key player in providing cutting-edge policy guidance.

FORA is well-connected in international networks and has several joint projects with foreign ministries and organisations. For example, FORA is leading an international Consortium on Dynamic Benchmarking in close co-operation with the OECD.

For more information go to [www.foranet.dk](http://www.foranet.dk)

# Foreword

The 1990s witnessed a remarkable change in the growth processes of OECD countries. This policy report shows that beyond established factors such as labour and capital accumulation, investments in *human resources, innovation and use of information and communication techniques (ICT)* as well as a *high entrepreneurial activity* are essential in explaining the diverging patterns of growth. Collectively, these four drivers of growth are key elements in sustaining and building growth throughout the knowledge-based economies.

The main purpose of the report is to analyse factors affecting Dutch productivity performance, and to pinpoint policy areas that need improvement in each of the four drivers of growth mentioned above. The Dutch Ministerie van Economische Zaken commissioned the report from FORA – an independent Division for Research and Analysis in the Danish Ministry of Economic and Business Affairs - in May 2005. Creative Director Anders Hoffmann was the principal author of the report. Comments were received from the rest of the FORA team. Anders Munk Ebbesen was responsible for editing the report. FORA presented the report at an internal meeting at the Dutch ministry July 11, 2005 and submitted the final version on July 25, 2005.

Building on various OECD studies, FORA has conducted extensive research in each of the four drivers of growth. The research efforts have materialised into four in-depth studies:

- “A benchmark study of human resources - What can Denmark learn?”
- ”A benchmark study of innovation - What can Denmark learn?”
- ”A benchmark study of ICT - What can Denmark learn?”
- ”A benchmark study of entrepreneurship - What can Denmark learn?”

Collectively, the four reports introduce a comprehensive framework for carrying out extensive analysis of a country’s capacity for productivity growth. The current report “Dutch Capacity for Productivity Growth - From Benchmarking to Policy Priorities” draws on these four reports and provides a comprehensive picture of the current Dutch ability to foster innovation and entrepreneurship and to use ICT and human resources to their full potential. While the background reports primarily focus on Denmark, they develop a general methodology, which FORA in this report has applied to the Netherlands.

The Danish Government has embraced the overall concept behind FORA’s framework. The 2005 government platform builds on a similar framework and highlights the need for a policy strategy aimed at strengthening human resources, innovation and entrepreneurship. The Government has appointed a Globalisation Council with broad representation from relevant sectors of society. The Council will advise the Government with respect to strategy and contribute to its implementation. The Prime Minister chairs the Council, and the Minister for Economic and Business Affairs acts as deputy chairman.

On a regional level, FORA has applied the framework in analysing the innovation and entrepreneurship capacity of two Danish regions; the County of Northern Jutland and “Trekantområdet”, which cover eight municipalities in mid-Jutland.

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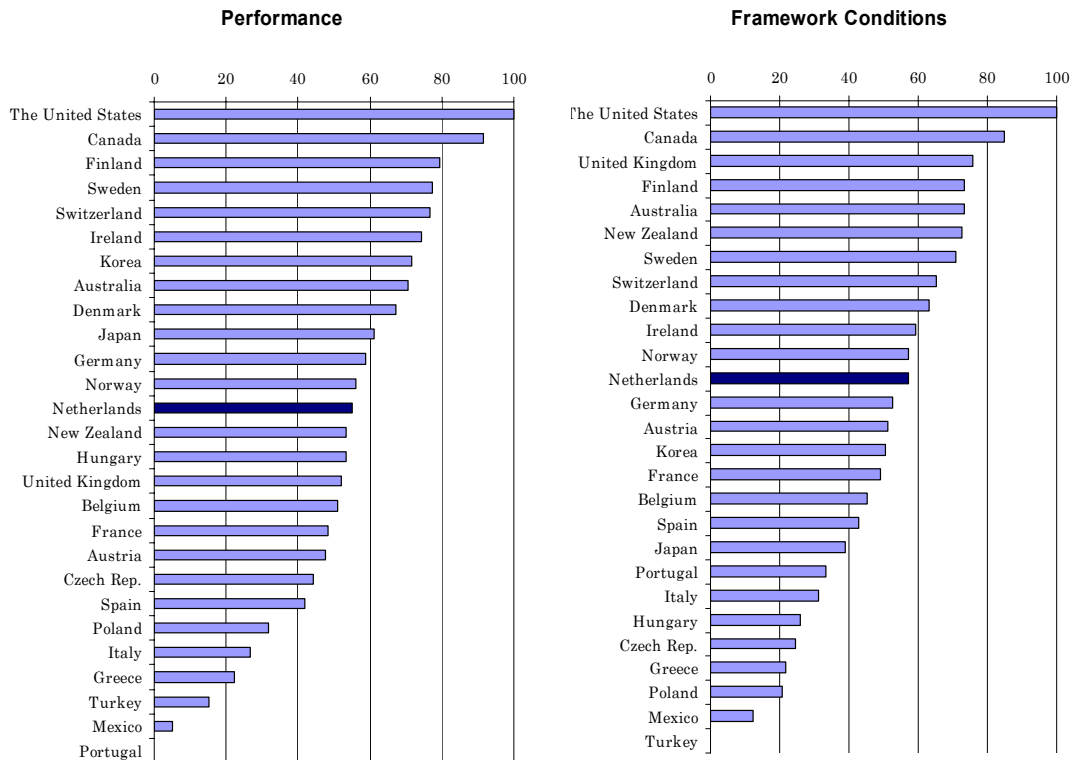
# 1. Highlights

Building on various OECD studies, FORA has identified four drivers of growth, which are key to productivity growth in knowledge-based economies. These drivers are: human resources, innovation, use of ICT, and entrepreneurship. The main purpose of this report is to analyse the underlying factors behind the Dutch productivity performance, and to pinpoint policy areas that need improvement in each of the four drivers.

The report uses a new benchmarking technique that goes beyond traditional benchmarking. The technique measures both performance and framework conditions for each of the drivers of growth and analyses the links between performance and framework conditions. A composite indicator of the four performance indices shows that the Netherlands has an average performance in the four drivers of growth (Figure 1). The United States, Canada and Finland make up the top-3 on the *performance index* followed closely by Sweden.

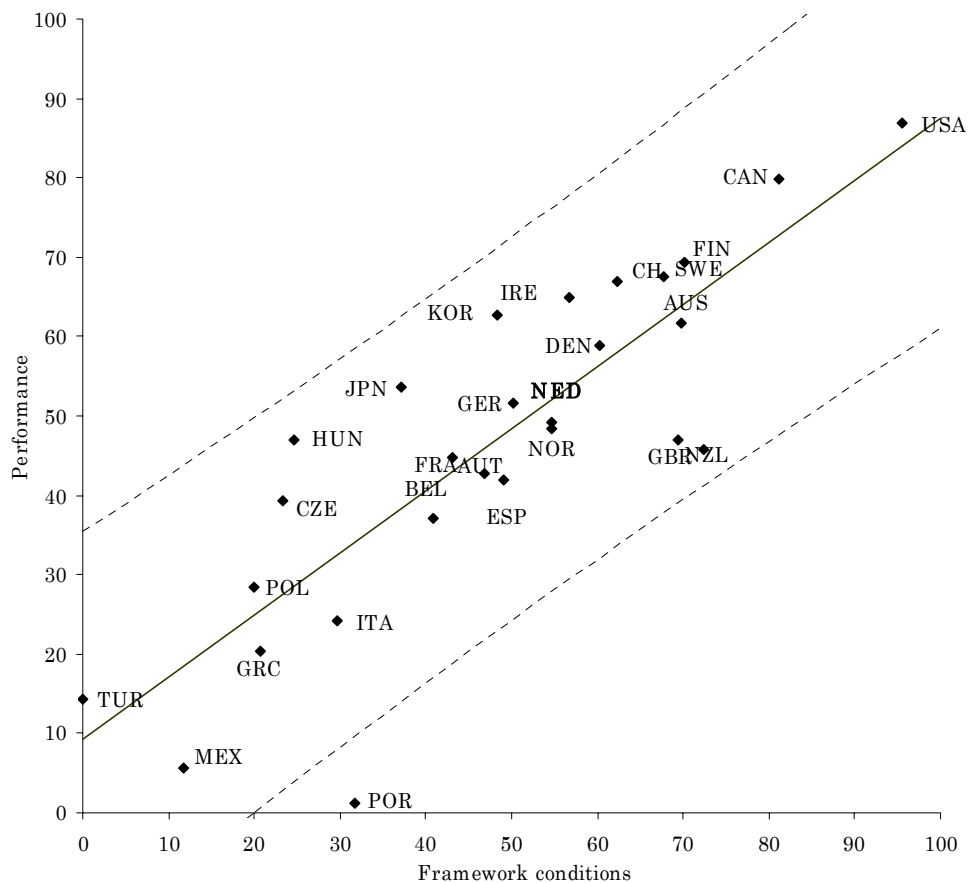
FORA has identified 46 policy areas that constitute the framework conditions driving performance. These policy areas are quantified and weighted into a single index, which shows OECD countries' relative ranking on framework conditions (Figure 1). The United States, Canada and United Kingdom make up the top-3 on the *framework conditions index*. Here, the Netherlands is also ranked around average.

**Figure 1: Composite indices for framework conditions and performance**



A total of 210 indicators have been used in compiling the two indices. A solid correlation exists between countries rankings on the indices for performance and their rank on the indices for framework conditions (Figure 2). The solid correlation shows that the analysis does capture the key elements affecting performance and suggest that improvements in framework conditions do lead to a better performance.

**Figure 2: Correlation between performance and framework conditions**

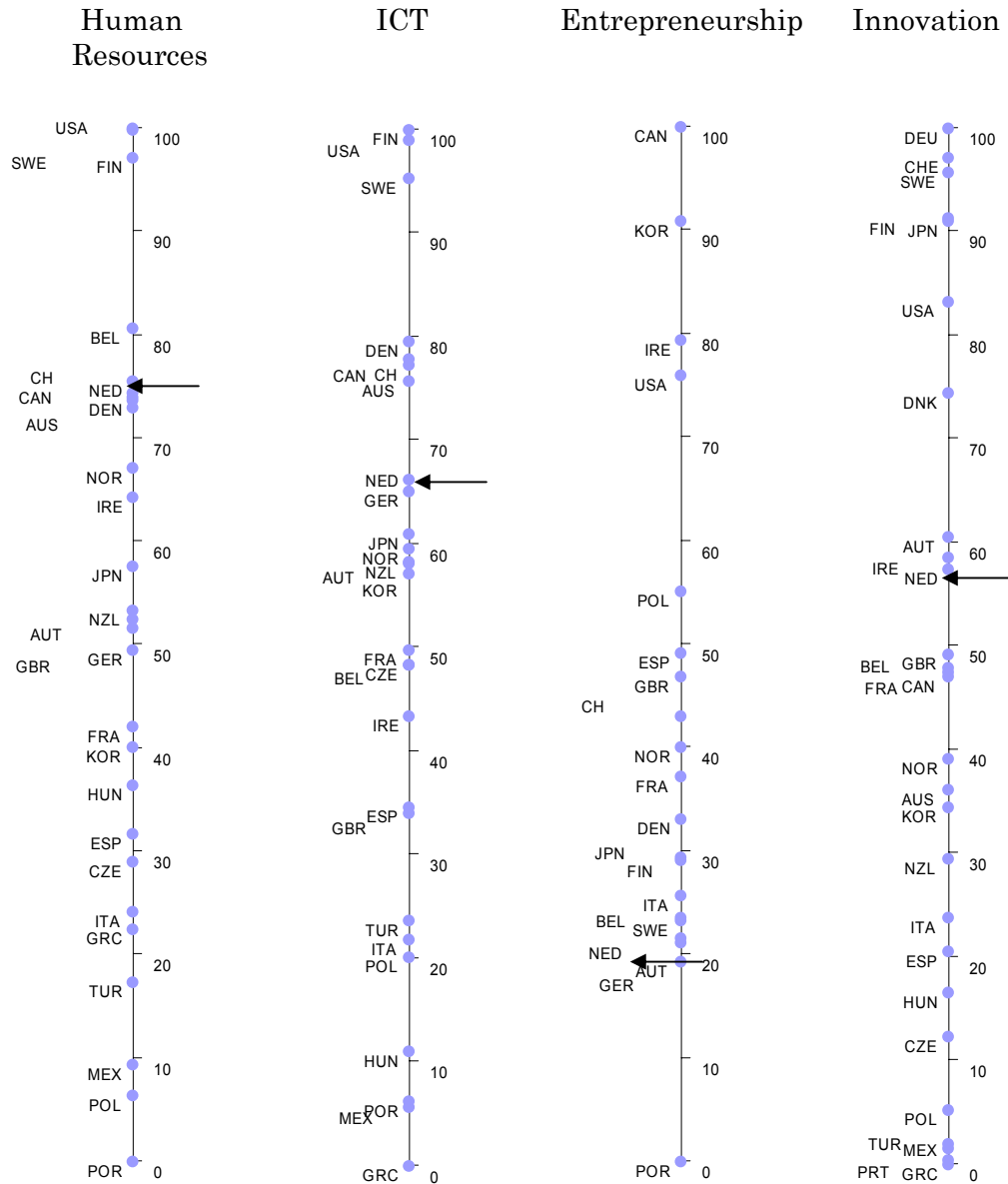


Note: The correlation is 0.85. The dotted lines show the 95% confidence interval. We find that all 27 OECD countries are located within the two error bars except for Portugal, which has a very bad performance.

The chosen indicators for framework conditions explain approximately 70% of the variation in performance among the OECD countries. Analysis also shows that the performance drivers can explain a large part of the differences in multi-factor productivity growth among the OECD countries, which suggest that these four drivers and their related policy areas are crucial in determining future growth.

A disaggregation of the performance indices shows that the Netherlands performs well in the area of human resources (ranked fifth). In the areas of innovation and ICT the Netherlands ranks eight and tenth, respectively, while the Dutch performance in entrepreneurship is well below average (Figure 3).

**Figure 3: Performance rank for each of the four drivers of growth**



The analyses of the framework conditions affecting performance show that a number of policy areas need to be improved if the Netherlands is to claim a position as one of the world’s most innovative countries. The most critical areas are shown in Table 1 below. It is important to stress that the drivers interact and analyses suggest that the contribution to productivity growth from the identified policies are greater when taken together rather than separately. Certain countries may perform worse at the macro-level in terms of overall productivity growth than their performance on some micro-drivers would suggest because of weaknesses in other areas. Therefore, the Netherlands needs to implement an integrated policy approach - where the drivers are promoted together - to enhance overall performance.

**Table 1: Most critical policy areas for the Netherlands**

<b>Human Resources</b>
Scope and quality of higher education Prerequisite for effective management
<b>ICT</b>
eGovernment Developing people with advanced ICT skills Digitalisation in the education sector
<b>Innovation</b>
Knowledge workers Commercialisation of public research
<b>Entrepreneurship</b>
Entrepreneurship education Labour market regulation Personal income taxes Wealth and bequest taxes Business services for entrepreneurs

Beside these 12 main areas, the report highlights eight other policy areas, where the Netherlands is lacking compared to the best performing countries although these eight areas are considered less important for overall performance than the 12 mentioned above. The report also identifies problems in the structural policies. For example, the product market regulation in the Netherlands could clearly benefit from an improvement as could the labour market regulation.



## 2. Methodology and Overview of the Report

Good macro economic and structural policies have had a great impact on growth, as they create a stable economy where firms seize the opportunities provided in the market. For example, a stable macro economic policy ensured low interest rates and created a good environment for investing in new technologies, while an effective labour market policy ensured that firms could organise their production in a more optimal way. A good competition policy ensured, for example, that ineffective firms were driven out of the market by new or more efficient firms.

However, these policies might not be enough to ensure growth in the knowledge-based economy. OECD notes “*while a stable macroeconomic environment provides the overall basis for growth, investment in factors at the micro-level is crucial for sustained development in knowledge-based economies*” (OECD, 2005d). Innovation and entrepreneurship is becoming more important for growth than factor accumulation, as seen in large contribution to GDP from multifactor productivity (MFP) growth in the 1990s.

The critical barriers to innovation and entrepreneurship are often not in the overall functioning of the economy. Innovation and entrepreneurship depends critically on the functioning at the micro-level. Do the highly educated use their knowledge to organise production more effectively? Does research generated at universities get transferred to productive use in the market place? Do firms use ICT efficiently? Do new firms enter and grow? Consequently, the important policies for innovation and entrepreneurship are policies focusing on the micro-level of the economy – micro-policies.

The main purpose of this report is to analyse the underlying factors behind the Dutch productivity performance and to pinpoint policy areas at the micro-level that need improvement in order to accelerate productivity growth in the Netherlands. The report also examines the macro and structural policies as these are the basis for developing a coherent strategy for improving Dutch wealth. The current wealth level and change is briefly discussed (Chapter 3).

### **Policy framework**

The report builds on the ideas above and divides economic policies into three main categories:

- *Fundamental macroeconomic policies*, which create the foundation for economic prosperity by securing economic stability.
- *Structural policies*, which ensure the presence of effective markets and institutions that ensure an optimal allocation and use of resources within the economy.
- *Micro-policies*, which ensure an effective micro-level of the economy and provides firms with framework conditions conducive to innovation and entrepreneurship.

The report briefly explores the *fundamental macroeconomic policies* by benchmarking inflation levels, government financial balances and level of public debt across OECD countries (Chapter 4).

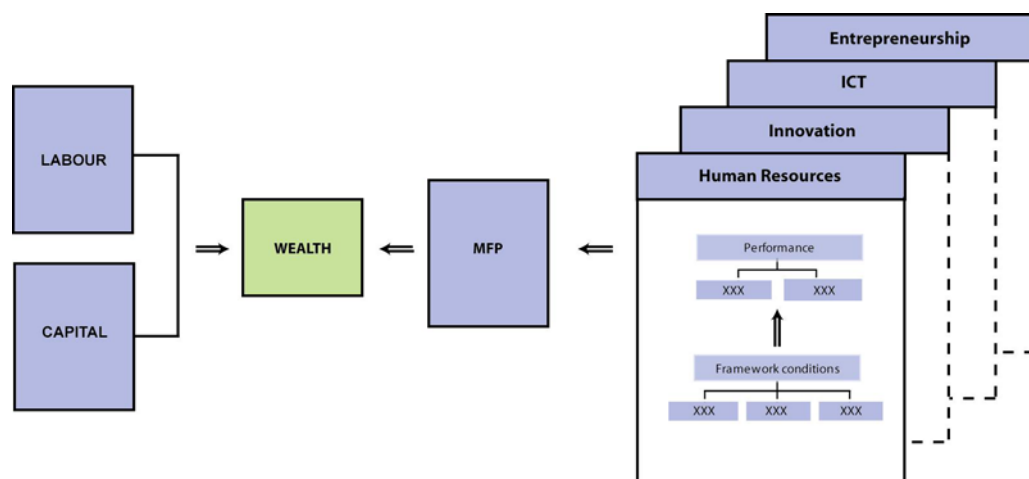
The *structural policies* mainly affect the functioning of the markets. The report focuses on *product* and *labour* markets as well as the *tax structure* and the *infrastructure*. These four areas are measured and benchmarked across the 28 countries included in the report (Chapter 5).

The Dutch framework conditions created by their *micro-policies* are benchmarked using a model developed by FORA drawing on OECD's benchmark project (OECD, 2005b). This benchmarking is the main part of the report (Chapter 6).

### FORA's model for wealth creation

FORA's methodology builds on the classic growth framework, where the accumulation and improvement of factor (capital and labour) and MFP determine wealth creation. Most studies label MFP as the residual but MFP is the focus of this report. It is central to the methodology that the four drivers of growth - human resources, innovation, ICT and entrepreneurship - lead to higher wealth through their contribution to a higher MFP (Figure 4).

**Figure 4: FORA's Framework**



### FORA's benchmarking methodology

Traditional benchmark analyses would rank countries on a number of relevant indicators for each of the four drivers of growth. However, FORA's approach goes a step further in identifying *two separate sets of indicators*:

- *Performance indicators*; a number of complex yet coherent activities that are generally believed to have a positive effect on productivity (MFP).
- *Framework condition indicators*; a quantification of policies and factors related to the four drivers of growth. The framework conditions are believed to have an effect on the performance indicators.

The distinction between performance and framework condition indicators allows for the identification of critical policy areas for building a solid capacity for productivity growth by identifying common features among the top-performing countries. The analysis is based on two important assumptions: i) government initiatives have a significant impact on framework conditions, ii) a positive correlation between performance indicators and framework condition indicators implies that improved framework conditions will lead to an improved performance. The method has five main steps:

1. Performance for each of the drivers of growth is defined, performance indicators related to the definition are collected, and top performing countries are selected for further analysis based on selected indicators.
2. Indicators of the relevant framework conditions for each of the four drivers of growth are collected and analysed.
3. Correlating performance and framework conditions. If the correlation is significant, the critical areas of the framework conditions for growth are identified for each of the four drivers of growth using both benchmarking and regression techniques.
4. The Dutch framework conditions are compared to the top performing countries using spider diagrams, and the areas most in need of policy attention are identified.
5. Identification of effective micro-policies for the areas most in need for policy attention in the Dutch framework conditions. The policies are identified based on a review of micro-policies in the top performing countries.

This report will go through the first four steps whereas the last step is only used for four selected areas.

The composite indices for performance and framework conditions are based on a number of sub-indices. While different weights may be applied in building composite indices, FORA applies a *robustness analysis* for testing country rankings against the use of different weights (Annex 2).

FORA has also carried out research in the area of globalisation. Indicators for globalisation are incorporated into each of the four drivers of growth (Chapter 7).

A snapshot of the current Dutch position for each of the 46 policy areas analysed is also presented (Chapter 8). The snapshot is simply a summary of the analysis presented in Chapter 6.

Finally, four good practice examples from top performing countries in the area of commercialisation of public research, entrepreneurship education, tax treatment of entrepreneurs and business services are presented (Chapter 9). These examples can be used as inspiration for a Dutch reform of the current policy areas.

The methodology is general in nature and has been applied both to national and regional analyses. FORA is for example involved in measuring the innovation and entrepreneurship capacity in the Danish region “Trekantomraadet”. FORA is tasked with developing a model for benchmarking the capacity to innovate and entrepreneurship of “Trekantomraadet”, a region covering eight Danish municipalities in Western Denmark against other Danish regions. The project, which will be finalized in the summer of 2005, provides a solid strategic platform for all interested stakeholders – the business community, local politicians and knowledge institutions – in formulating and implementing a comprehensive and sustainable long-term strategy for the region. Applying similar analysis in the Dutch regions could provide important insights, which can be used when regional policies are designed. It would allow for developing regional policies more suited for the knowledge-based economy where innovation and entrepreneurship are key drivers of growth.

### 3. Dutch Wealth and Productivity

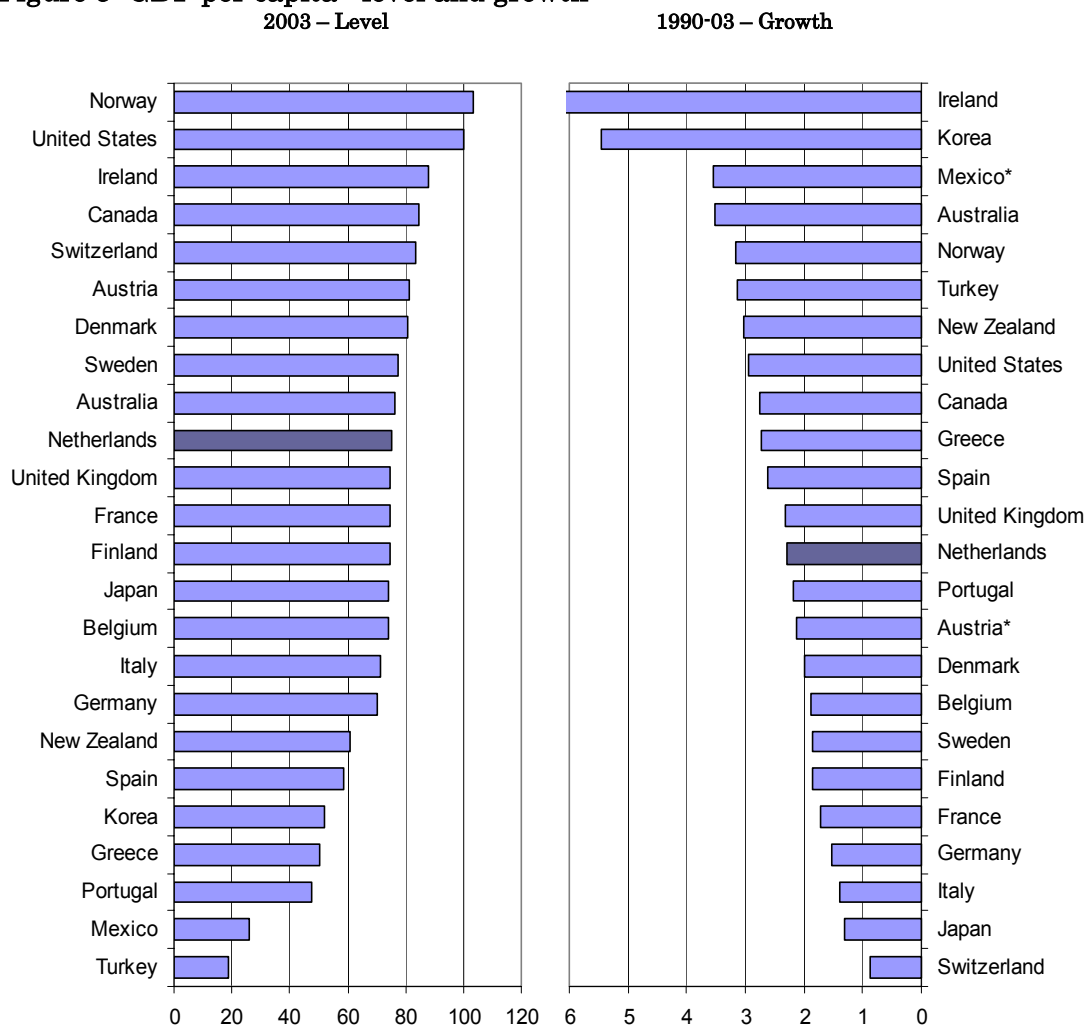
Factor accumulation and increases in productivity create national wealth. Factor accumulation has played a key role in creating wealth in the post World War II period and has been the focus of most policy making in the OECD countries. However, it seems like the traditional sources of wealth are drying out. New patterns in the growth processes of OECD countries have emerged. A country's innovation and entrepreneurship capacity will largely determine future wealth, whereas factor accumulation will play a minor role.

Overall, the Dutch productivity performance has been weak since the beginning of the 1990s. If the Netherlands is to keep its position among the more wealthy nations in OECD, improvements in productivity growth are needed in all sectors of the Dutch economy

#### Current Dutch Wealth

Wealth (expressed as GDP per capita) is above OECD average in the Netherlands but still lacking quite far behind countries like Norway, the United States and Ireland. Growth in GDP per capital since 1990 has been rather low in the Netherlands (Figure 5).

**Figure 5: GDP per capita– level and growth**



Note: USA = 100. \*Data from 1995-2003.  
 Source: OECD Economic outlook 2005

Evidence suggests that growth in the 1990s broke the well-known catching-up patterns of the 1960s and 1970s, where countries lagging in terms of GDP growth engaged in a catch-up process thereby narrowing the gap vis-à-vis the leading countries. After stalling during the 1980s, the convergence process appears to have reversed during the 1990s among the largest OECD economies (OECD, 2001). GDP per capita grew faster in the United States than in Japan and the larger EU member countries. In contrast, a few countries (Ireland, Korea, Australia, Norway, New Zealand and Canada) have witnessed GDP per capita rising faster than in the United States allowing them to narrow the income gap.

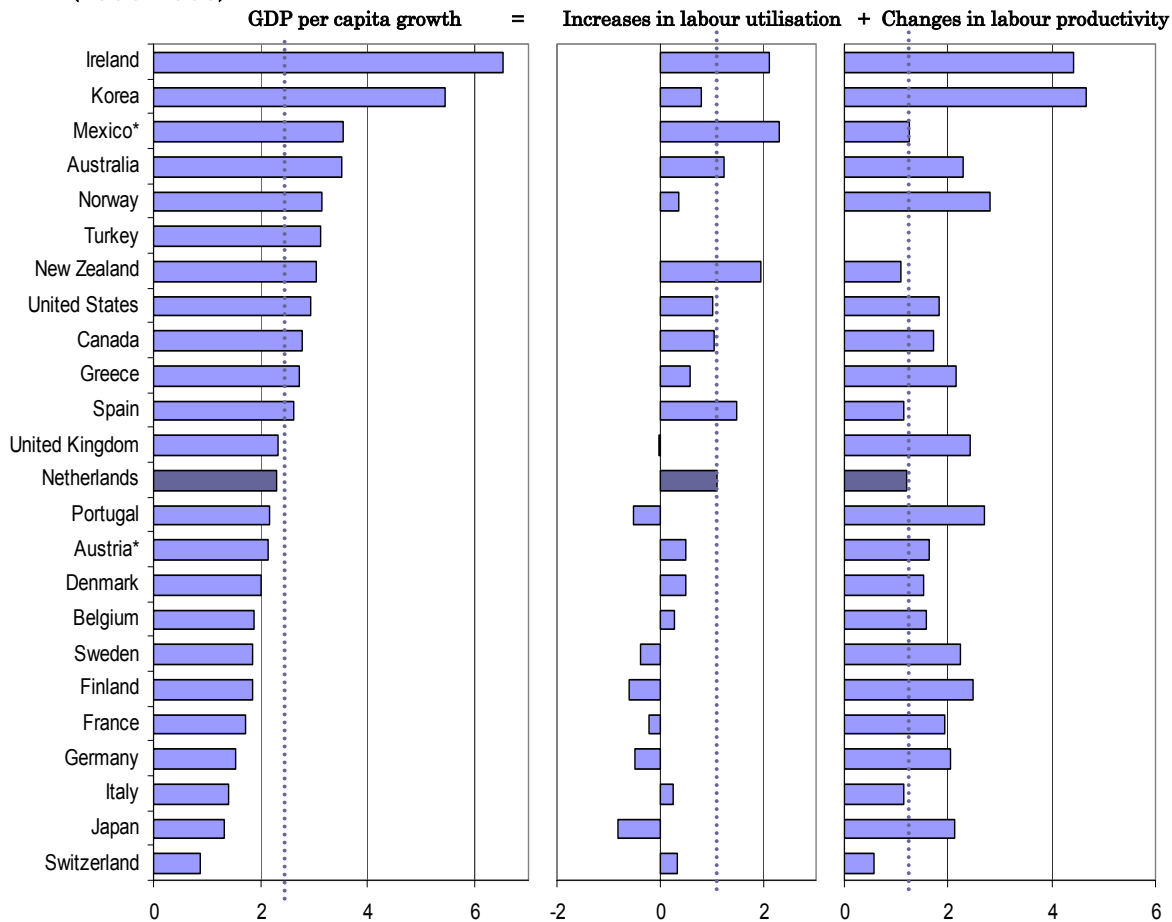
The mediocre Dutch growth may be the cause of some concern in the light of these new growth patterns, as catching up is no longer guaranteed. A further breakdown of the factors determining GDP growth will shed light on this.

## GDP growth, Labour utilisation and Labour productivity

Diverging growth patterns in *labour productivity* and *labour utilisation* generates diverging GDP growth patterns. As mentioned above, Dutch GDP per capita growth over the past decade has been mediocre. A combination of increased labour productivity and higher labour utilisation created the Dutch GDP growth (Figure 7).

The increase in labour utilisation remains relatively high compared to other OECD countries, whereas labour productivity growth is among the lowest in the OECD. Dutch labour market policy does therefore seem relatively successful in increasing the labour supply, whereas policy attempts to increase productivity have been less successful.

**Figure 7: GDP per capita growth, labour utilisation and labour productivity (1990-2003)**



Note: \* Data from 1995-2003.

Source: OECD Online Productivity Database at <http://www.oecd.org/topicstatsportal>

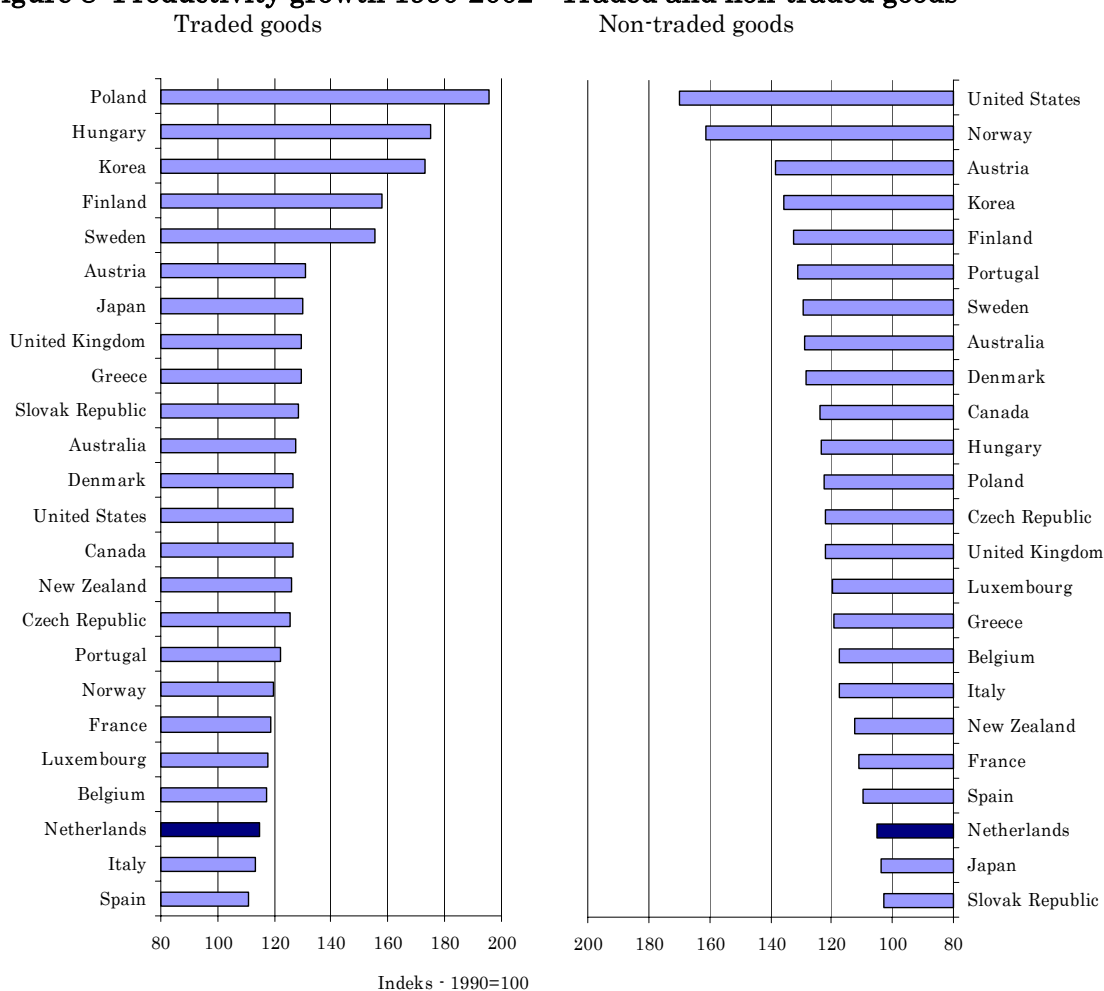
## Labour productivity across sectors

The low Dutch labour productivity growth is due low productivity growth in both *traded* and *non-traded* sectors. Several countries have experienced diverging labour productivity rates in *traded* and *non-traded* goods. For example, Finland

has recorded the highest labour productivity growth in *traded goods* since the 1990s, while productivity in the non-trade sectors has been slightly below the OECD average. Norway's performance is the other way around. Norway recorded very high productivity increases in the non-trade sectors, whereas their performance in the trade sectors was below the OECD average (Figure 8).

The structures of the *traded* and *non-traded* goods sectors are very different and different policy frameworks affect the two sectors. Companies in *traded goods* (manufacturing-, business- and knowledge-intensive companies) often compete in the global markets, where competition is a part of everyday life. Companies in *non-traded goods* primarily trade and compete with companies in domestic service industries. This makes national competition regulation crucial in the non-traded goods sector, whereas other policy areas might play a more important role in generating growth in the trade sectors (Lewis, W.W., 2004).

**Figure 8: Productivity growth 1990-2002 - Traded and non-traded goods**



Note: Productivity *level* data is not currently available.  
 Source: OECD STAN database and own calculations

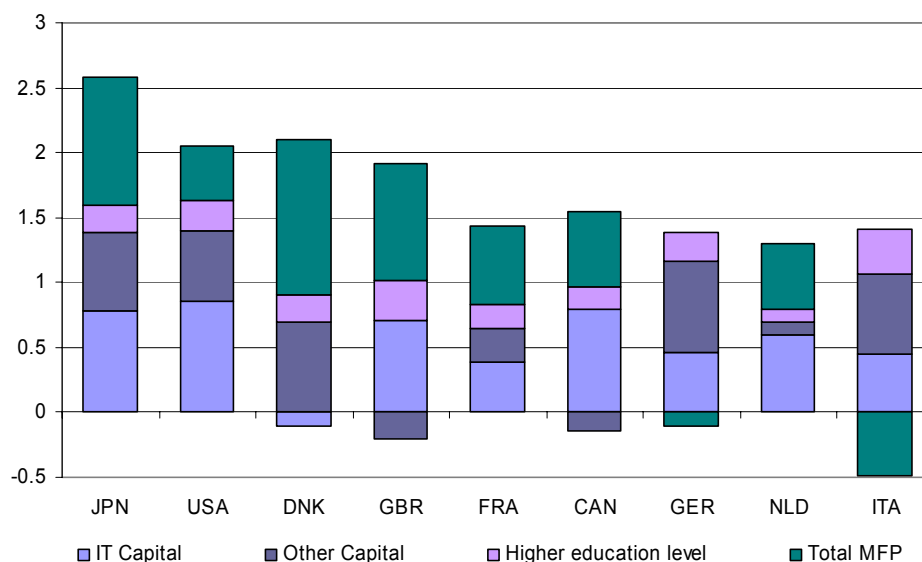


## Multi-factor productivity (MFP), higher education level, capital deepening and labour productivity

Labour productivity growth can be increased by several factors: raising the level of educational attainment among workers, increasing the use of capital, improving the quality of capital, and increasing MFP. Growth accounting techniques can determine the contribution to changes in labour productivity for each of these factors.

Since 1995 the Netherlands has witnessed low contributions from *other capital* and *higher education*, while the contributions from *IT capital* and *MFP* play a relative large role (Figure 9). The absolute contribution from MFP to labour productivity is still quite low in the Netherlands compared to, for example, Denmark and the UK.

**Figure 9: Percentage point contribution to labour productivity 1995-2001**



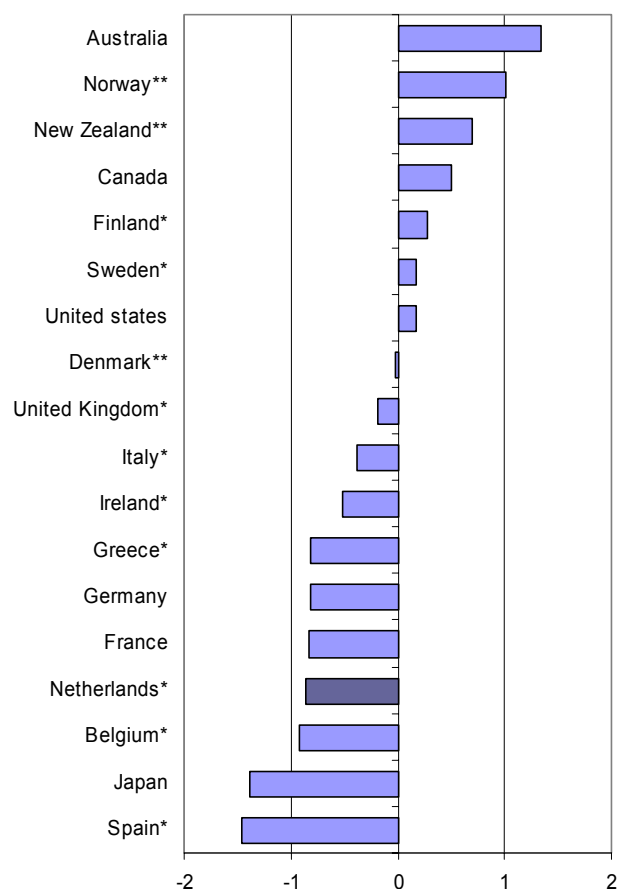
Note: The period is different from the previous figures and the data is therefore not directly comparable.

Sources: Statistics Denmark (2004), van Ark (2003) and Jorgensen, D.W. (2003)

Many ways of measuring MFP growth exist, but most studies focus on changes in MFP growth from one period to another. This is due to the methodological problems relating to measuring of capital goods and prices especially relating to ICT. These problems are minimised if cross-country comparisons are based on the change in MFP growth from one period to the next within a country (OECD, 2001). The majority of the English-speaking- and Nordic countries (Figure 10) dominate the top ranking-countries.

The Dutch performance is below average. From 1980 to 1990, Dutch MFP-growth was among the highest in the OECD trailing only Ireland and Finland. From 1990 to 2002, Dutch MFP-growth remained below average. The significant growth gap between the two periods explains the low Dutch MFP-acceleration.

**Figure 10: MFP growth, 1980-90 and 1990-2002**



Note: \*1980-1990 and 1990-2001, \*\*1980-1990 and 1990-2000  
Source: OECD Economic Outlook 2004 and OECD's Productivity Database

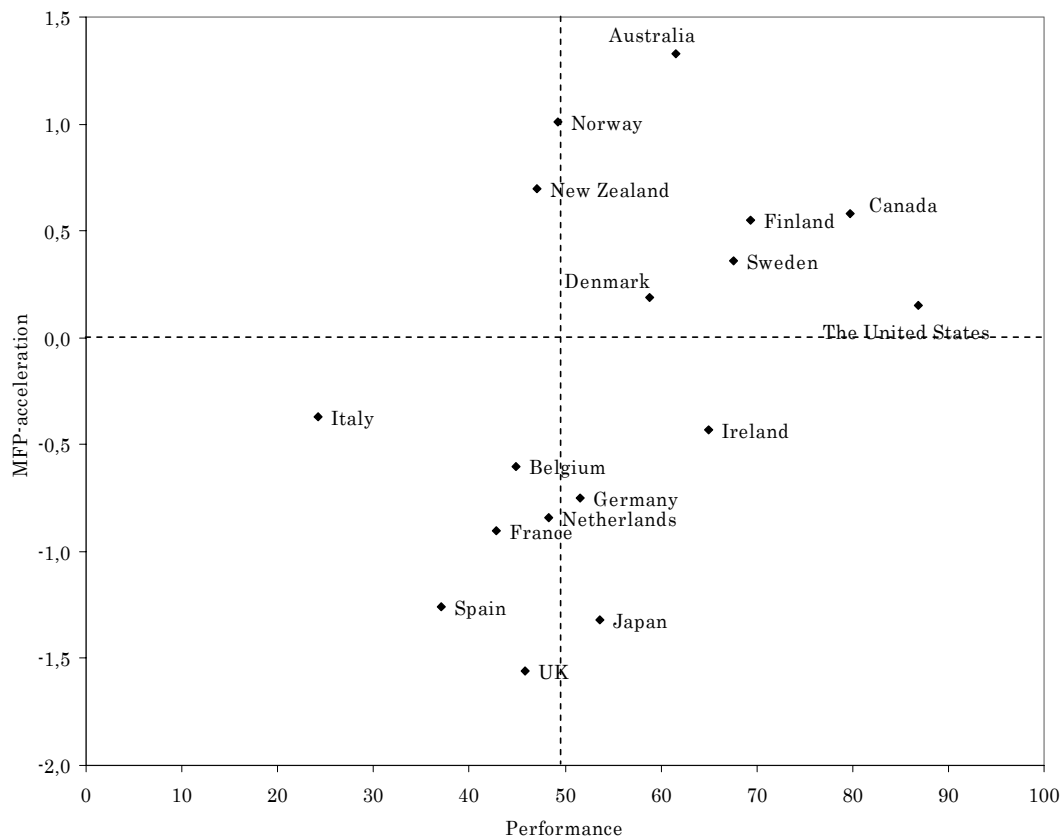
It is striking that no Central European countries are among the top-performers in terms of MFP acceleration. The absence of major structural reforms and a reluctance to allocate resources to areas conducive to innovation may explain this.

The ability to create wealth in the global knowledge-intensive economy will depend on the ability to increase MFP. The need for a better understanding of the conditions necessary to accelerate MFP growth has never been greater.

### From MFP to Policy

As shown in Chapter 2, FORA's approach is based on the four drivers of growth, which lead to higher wealth through an increased MFP-contribution. The overall performance index is simply a weighted average of the individual indices for the four drivers of growth. With a few exceptions, a good performance has materialized into growing contributions from MFP. This suggests that the performance measured in this report does play an important role in explaining differences in growth among OECD countries during the 1990s (Figure 11).

**Figure 11: Correlation between changes in MFP-growth (1980-90 and 1990-2002) and the overall performance index**



Note: Correlation 0.46; t-value equals 2.1; see chapter 6 for further details about the performance index. For more on weighting procedures, robustness analysis and the link between the drivers of growth and MFP see: "Correlation between drivers of growth and changes in MFP-growth" at [www.foranet.dk](http://www.foranet.dk).

Source: OECD's Productivity database and own calculations

## 4. Stable Macroeconomic Environment – Getting the Fundamentals Right

Macroeconomic stability is the fundament for any attempt to boost productivity through policies aimed at human resources, innovation, ICT and entrepreneurship. Fiscal and monetary policies can stabilise and destabilise the macroeconomic environment, making firms ability to operate and plan more or less difficult. This report measures macroeconomic stability by *inflation levels*, *government financial balances* and *level of public debt*.

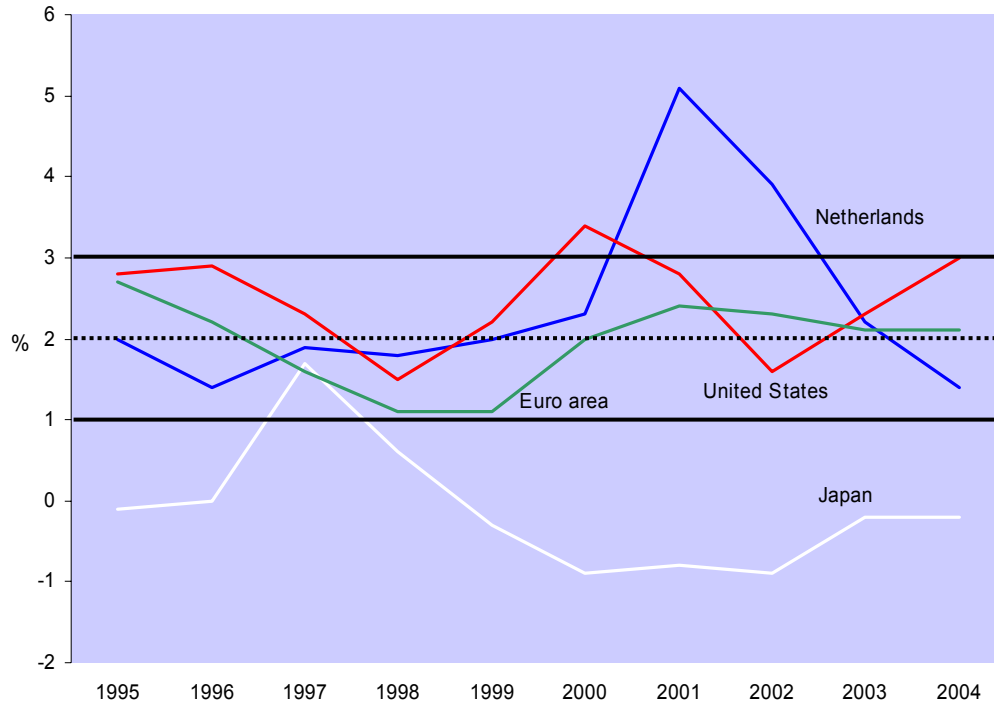
The chapter rates the Netherlands against the United States, the euro-area and Japan. The convergence criteria stipulated in the EU Stability and Growth Pact are used as benchmarks (European Commission, 1999).

Overall, the macroeconomic environment looks relative stable in the Netherlands even though attention should be given to the *government financial balances*. Compared to the United States, the euro-area and Japan, Dutch economic fundamentals are solid. The relatively stable macroeconomic environment (low inflation rates, fiscal discipline and continued improvement of government debt) provides a solid foundation for future economic growth.

## Inflation

Inflation levels in the United States, Japan and the EU have been moderate and stable from the mid 1990s through 2004. Despite the Dutch inflation peak in 2001-2002, inflation has also been quite stable in the Netherlands (Figure 12). For most of the period, inflation levels in the Netherlands and the United States have been slightly above those of the EU.

**Figure 12: Inflation, percentage change from previous year, 1995-2004**



Note: According to the EU Stability and Growth Pact the inflation rate must not exceed the inflation rate of the three top-performing Member States by more than 1.5%. The European Central Bank has established that the annual inflation in all EU Member States must be less than 2%. Since the convergence criterion is variable, the ECB target rate has been chosen as a point of reference in Figure 12

Source: IMF, World Economic Outlook Database

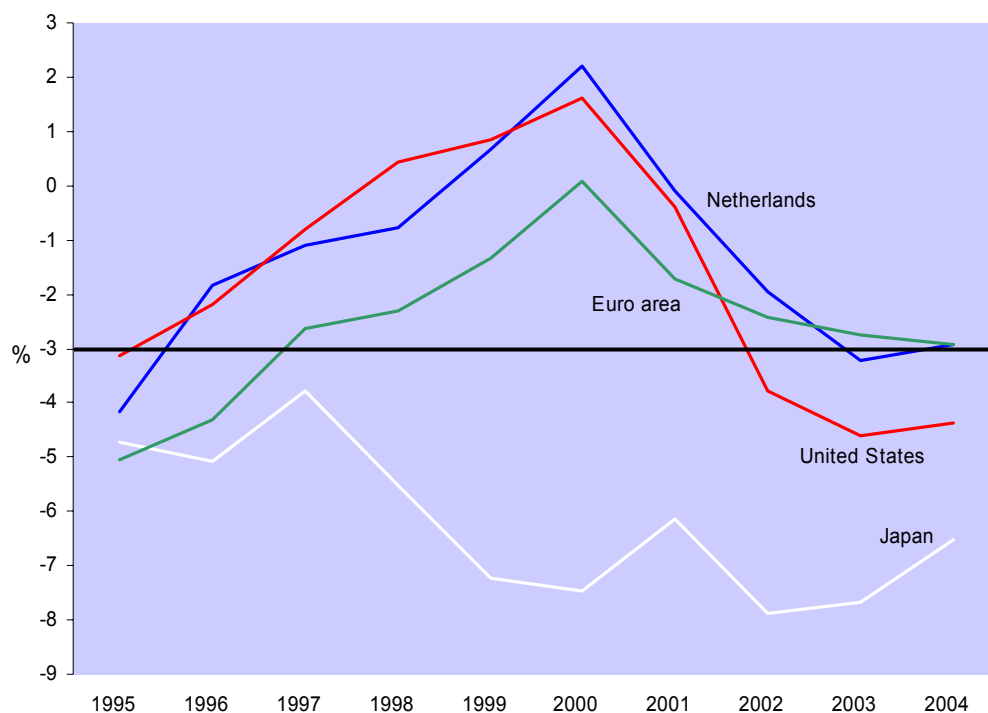
## Government Financial Balances

In general, the countries of the euro-area have kept annual deficits below 3% of GDP as stipulated in the EU Stability and Growth Pact. Since 2002, the United States has been running deficits of between 3 and 5% of GDP, while the economic downturn in Japan has led to a massive deterioration in the budget deficit since the mid 1990s.

The average budget deficit for the euro-area is now approximately 3% of GDP. However, due to a slowdown in economic growth, Germany, the UK, France and Italy have been running large deficits, thereby undermining the criteria laid out in the EU Stability and Growth Pact.

The Netherlands, on the other hand, has witnessed temporary improvements in government finances and recorded a surplus in 1999 and 2000. Since 2001 Netherlands has been running deficits, and in 2003 the Netherlands passed the 3 % criteria. 2004 saw an improvement in the Dutch budget deficit, and today the Netherlands meets the requirements of the EU Stability and Growth Pact (Figure 13). The financial balances still have to be followed closely, which was also highlighted in the latest OECD country survey of the Dutch Economy (OECD, 2004).

**Figure 13: General government financial balances as percentage of GDP, 1995-2004**



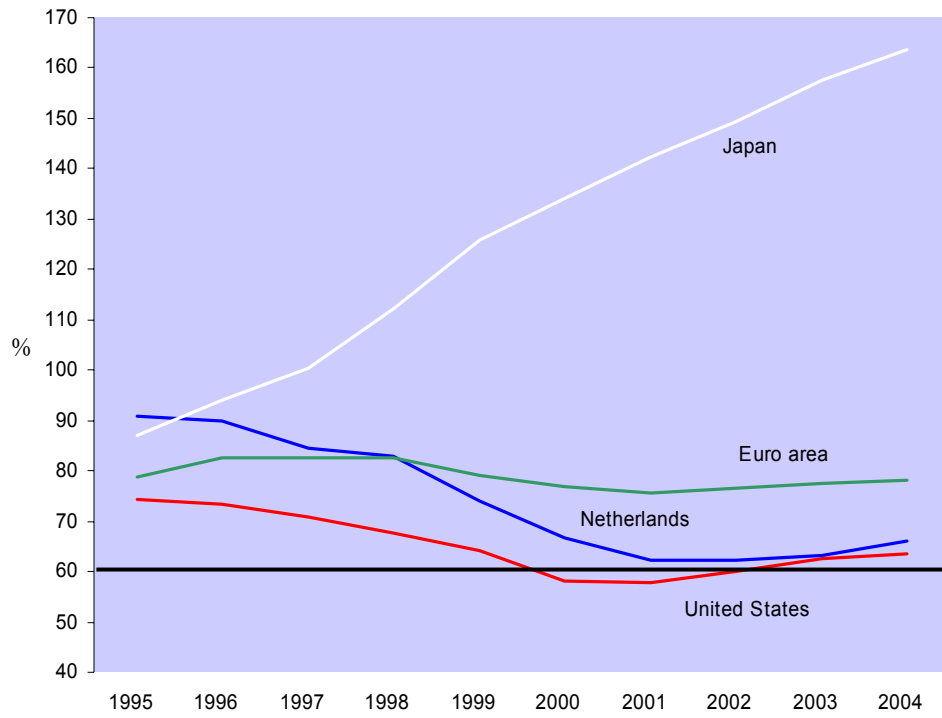
Source: OECD Economic Outlook 2004

## Public debt

The EU Stability and Growth Pact stipulates that overall public debt must be below 60% of GDP. Since 1995 public debt has been between 60% to 80% in the United States and the euro-area, while the economic downturn in Japan has led to a sharp increase in government debt, which is currently running at about 150% of GDP.

The Netherlands has been able to reduce the level of public debt from around 90% of GDP in 1995 to around 60% in 2004, well below the average of the euro-area (Figure 14).

**Figure 14: General government gross financial liabilities as percentage of GDP, 1995-2004**



Source: OECD Economic Outlook 2004

## 5. Competitive Market Structures – Ensuring Efficient Allocation of Resources

Competitive markets are the basis of an efficient utilisation of the existing resources, as they ensure an optimal allocation of resources among various alternative uses. This chapter focuses on *product* and *labour* markets as well as the *tax structure* and the *infrastructure* as key elements for ensuring an optimal allocation of resources within the economy. The right mix of structural policies ensures that product markets are competitive, that the labour market is flexible and that the tax system offers the proper incentives for work.

Overall, the Netherlands could benefit from improvements in almost all areas measured in this chapter. The regulation of product markets is the area most in need of improvements. This is also the area, where the benefits are most obvious. Productivity in the non-trade sectors in the Dutch economy was among the lowest in the OECD in the 1990s. A clear link between competition and productivity improvements in these sectors is often shown in OECD work. Labour market regulation could also be improved mainly in the areas of rules relating to individual workers dismissal. Lower tax rates may also create a better platform for innovation and productivity growth. However, the structure of the welfare system in the Netherlands may set a limit to the extent of tax reforms. Finally, the Dutch infrastructure is well developed and further developments are not strongly required.

### Competition in Product Markets

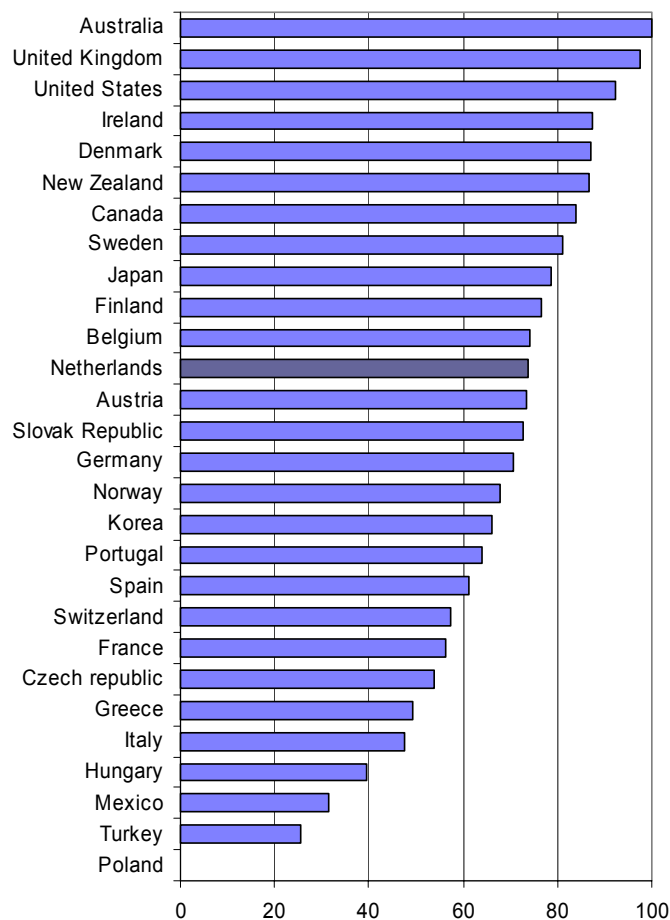
The OECD has collected country data on product market regulation to measure the effects of government regulation on the competitive environment (OECD, 2005e). The OECD index is based on three dimensions; *state control* (public ownership and price controls), *administrative barriers* (licenses and permits, administrative burdens and legal barriers) and *barriers to trade and investment* (ownership barriers, tariffs, and regulatory barriers).

A high score indicates that country regulations are designed to improve competition in the product markets.

The majority of the English-speaking countries have a strict competitive environment, while legislation in Continental European countries is less supportive of a competitive environment. Over the past decade, the Netherlands has undertaken a number of structural reforms in the product markets, primarily aimed at increasing its productivity growth (OECD 2004a). The index shows that the Netherlands has an intermediate competitive environment (Figure 15). This causes some concern. The Netherlands recorded some of the lowest productivity growth rates in the non-traded sectors during the 1990s. Further improvements in the competition regulation would be highly beneficial to productivity growth in these sectors.



**Figure 15: Level of regulation in the product markets, 2003 (100=least regulated)**



Source: OECD and own calculations

### Flexibility in the labour markets

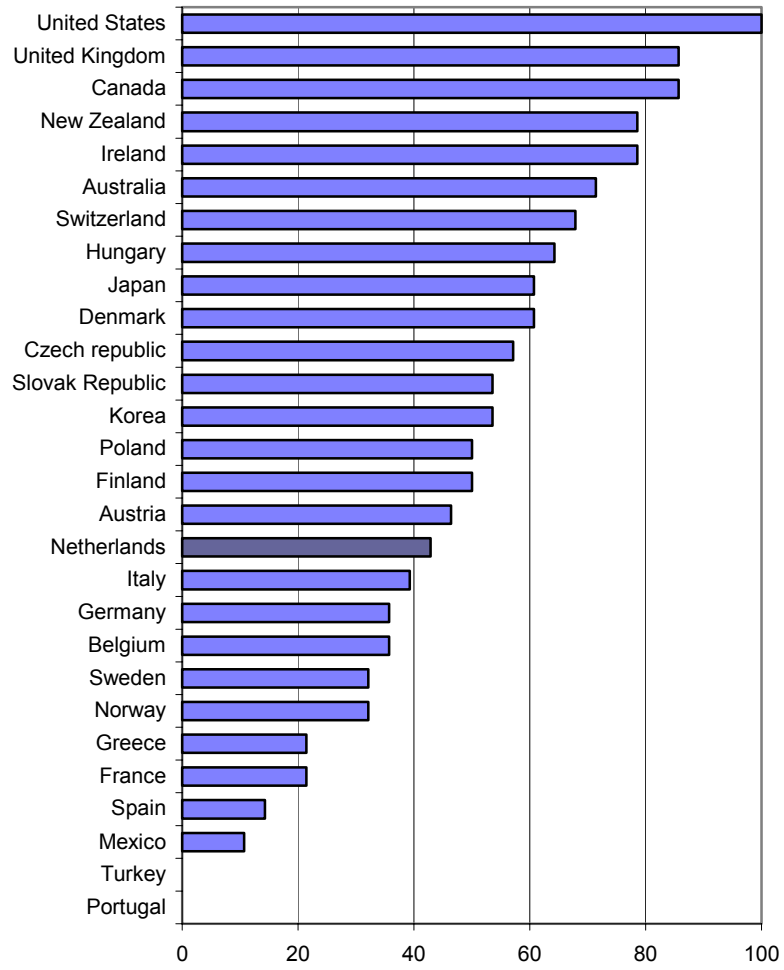
Effective labour markets are essential in ensuring the rapid and efficient reallocation of labour resources across industry sectors and geographies. The index for labour market flexibility is comprised of three indicators from OECD's Employment Protection Legislation (EPL) Index.

One indicator refers to provisions for workers with regular contracts; another refers to provisions affecting workers with fixed-term contracts or contracts with temporary work agencies, while the third indicator refers to the strictness regarding collective dismissals.

The Dutch performance is below average mainly due to a strict protection of individual workers against dismissal.

The United States, the UK and Canada are on one side of the spectrum with relatively lax employment protection legislation. Continental European countries and Japan have an intermediate level of stringency of the employment protection legislation system. Southern European countries have the least flexible labour markets.

Figure 16: Level of labour market regulation, 2003 (100 = least regulated)



Source: OECD and own calculations

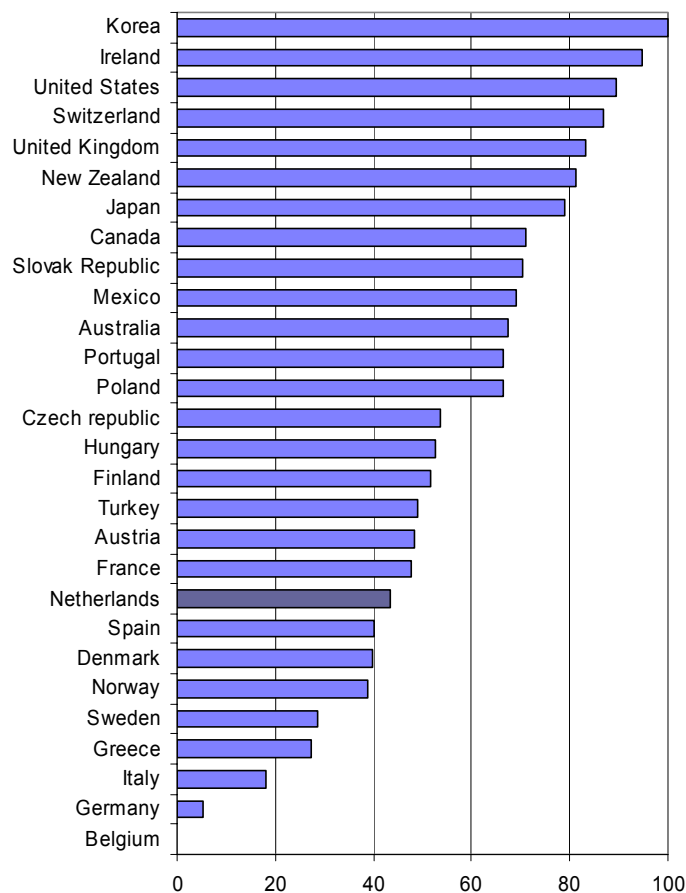
## Tax structures

FORA has constructed a simple tax-index to illustrate diverging tax regimes across the industrialised countries. The index is comprised of five indicators that all are believed to have an impact on investments in physical capital and supply of labour (Please refer to Appendix 5 for a description of the indicators).

There is a tendency towards an Asian, Swiss and Anglo-Saxon dominance of this index. Korea is leading the index followed by Switzerland and a group of English-speaking countries as well as Japan. All these countries have managed to deliver relatively low tax rates (Figure 17).

The Netherlands is ranked 22nd of the 28 countries included in the index. This is primarily due to a high taxation of married couples with two incomes as well as relatively high corporate tax rates.

**Figure 17: Composite tax indicator, 2004 (Lowest tax level=100)**



Note: See Appendix 5 for data description

Source: OECD, Ernst & Young Corporate tax guide and own calculations

Although no clear-cut conclusion has been made as to the impact of tax regimes to economic growth, a heavy tax load may be detrimental to economic growth. Lower tax rates in the Anglo-Saxon economies have been seen as instrumental in supporting growth. On the other hand, countries such as Sweden and Finland have relatively high taxation levels but have still been able to make remarkable progress in the global knowledge economy.

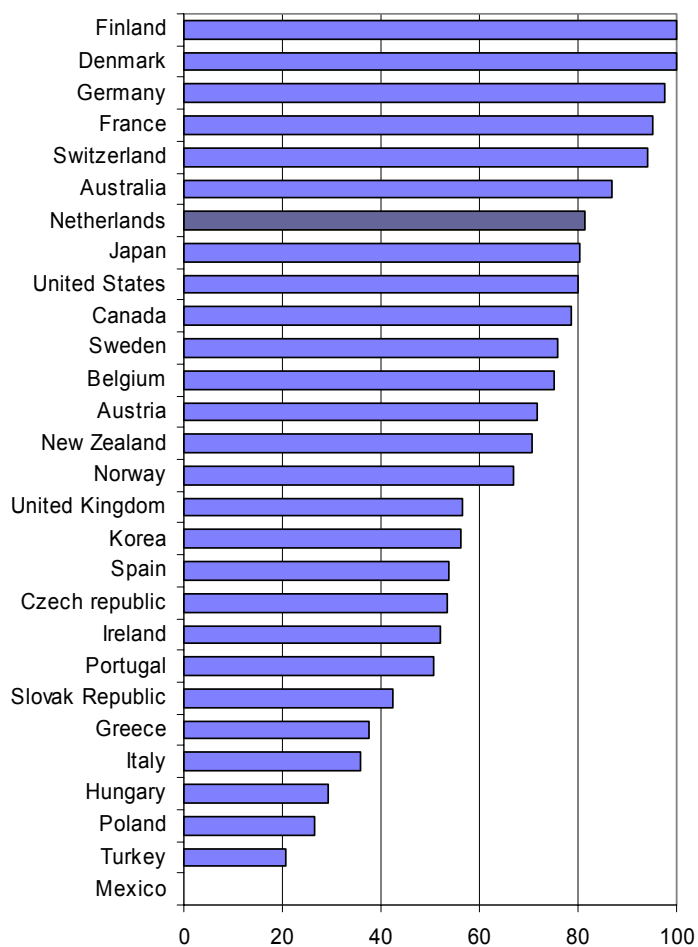
### Efficient infrastructure

Growing economic demand, increasing population as well as the tendency to outsource products to subcontractors in other countries increase the demand for roads, bridges, harbours and airports. Consequently, FORA has constructed a composite index for effective infrastructure.

The index is based on indicators from World Economic Forum and IMD, and contains four indicators that all relate to the quality of domestic infrastructure (*railroad infrastructure development*, *port infrastructure quality*, *air transport infrastructure quality* and *maintenance and development*). Based on equal values the four indicators have been weighted into a composite index.

The Netherlands is ranked seventh of the 28 OECD countries. The quality of the Dutch airports and harbours is very high, whereas the maintenance and development of roads, bridges and railroads is mediocre. Denmark, Finland, France, Germany and Australia are the five countries with the most effective infrastructures, whereas the infrastructure in other European countries (Ireland, Greece, Italy and Portugal) is lacking behind.

**Figure 18: Composite Infrastructure indicator, 2003 (*Most effective infrastructure level=100*)**



Source: World Economic Forum and IMD and own calculations

## 6. Efficient Micro Structures – Stimulating the Four Micro-Drivers of Growth

This section presents FORA's model for evaluating the Dutch performance and framework conditions for each of the four drivers of growth. For a comprehensive review of the definition of the four drivers of growth, please refer to the following reports. The first three reports are available at [www.foranet.dk](http://www.foranet.dk) and the entrepreneurship report is available at [www.naec.dk](http://www.naec.dk):

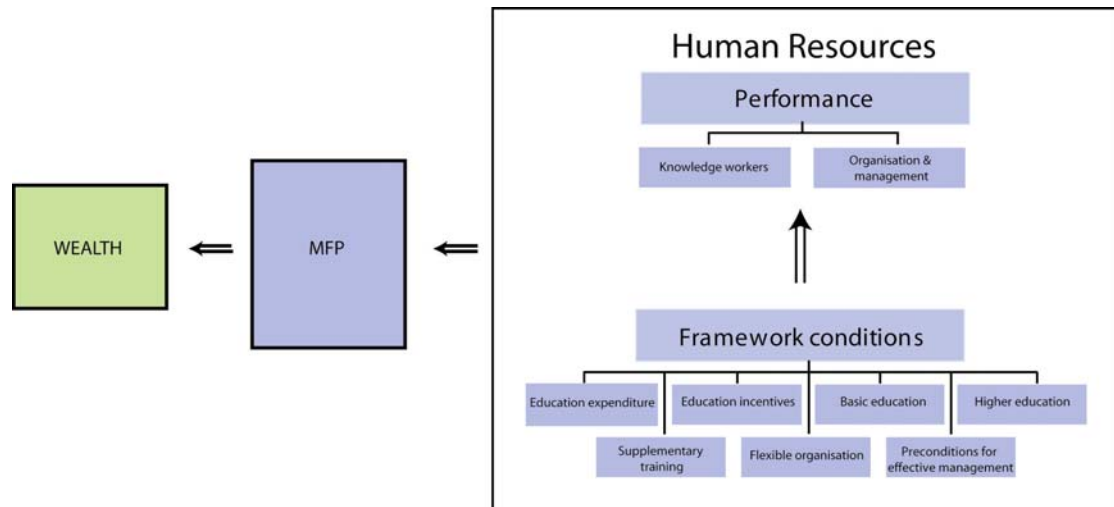
- "A benchmark study of human resources – What can Denmark learn?" (September 2004).
- "A benchmark study of innovation and innovation policies – What can Denmark learn?" (September 2003).
- "A benchmark study of ICT – What can Denmark learn?" (September 2004).
- "Entrepreneurship Index 2004 – Entrepreneurship conditions in Denmark" (December 2004).

The background reports focus on Denmark but use a general methodology that in this study is applied to the Netherlands. The drivers will be discussed separately using the four-step method discussed in chapter 2.

### Human Resources

The production of goods and services is becoming increasingly knowledge-intensive, underlining the need for a highly qualified work force. Today, knowledge workers must be able to identify trends and challenges and be instrumental in sharing knowledge within and outside the boundaries of the organisation. Effective management and a flexible organisation are vital in establishing a framework that motivates employees and supports knowledge sharing across the organisation

**Figure 19: Measuring performance and framework conditions – Human resources**



### Step 1: Defining and Measuring Performance

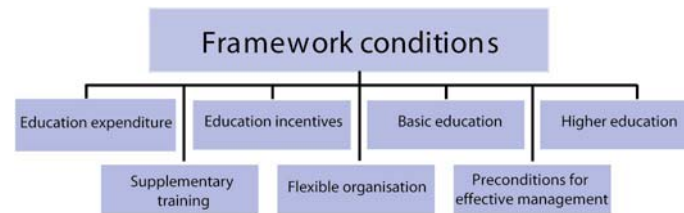
The performance index is comprised of two sub-indices: *The share of knowledge workers* and *organisation and management*. The latter is composed of *flexible organisation* and *strategic management*. A total of 10 indicators are used to benchmark performance. Please refer to Appendix 1 for a complete list of indicators. A run-down of country rankings on the performance indices and the sensitivity analysis identifying the top performing countries can be found in Appendix 4.

- The United States, Sweden and Finland are identified as top-performers regardless of the weights applied to calculate the composite index of performance. The Netherlands is ranked in a second group following the top-3 together with Belgium, Denmark Japan and Switzerland.
- On the index for *share of knowledge workers* in the private sector the Netherlands is ranked eighth, with Finland, Sweden and the United States making up the top-3. A rather low share of researchers in the private sector is the Netherlands weakest spot in this area.
- The Netherlands ranks among the top-5 on the index for *organisation and management* with the United States, Sweden and Switzerland identified as top performers. The Netherlands has no major weak spots among the underlying indicators used to measure *organisation and management*.

### Step 2: Collect and Analyse Indicators for Framework Conditions

The index for framework conditions is constructed by weighting the seven policy areas identified as important for the productive use of human resources into one index (Figure 20). Each policy area is measured by several indicators.

**Figure 20: Framework conditions – Human resources**



The robustness analysis identifies the United States, Canada, Finland and New Zealand as top-performing countries, while the Netherlands is ranked below the OECD average, which is surprising given the relative high Dutch ranking on the performance indicators (Appendix 4).

The low average Dutch ranking on framework conditions covers some major differences among the policy areas that will be discussed in the following section. The main weakness is *incentives to education*, whereas the main strength is preconditions for *organising the work in a flexible manner*.

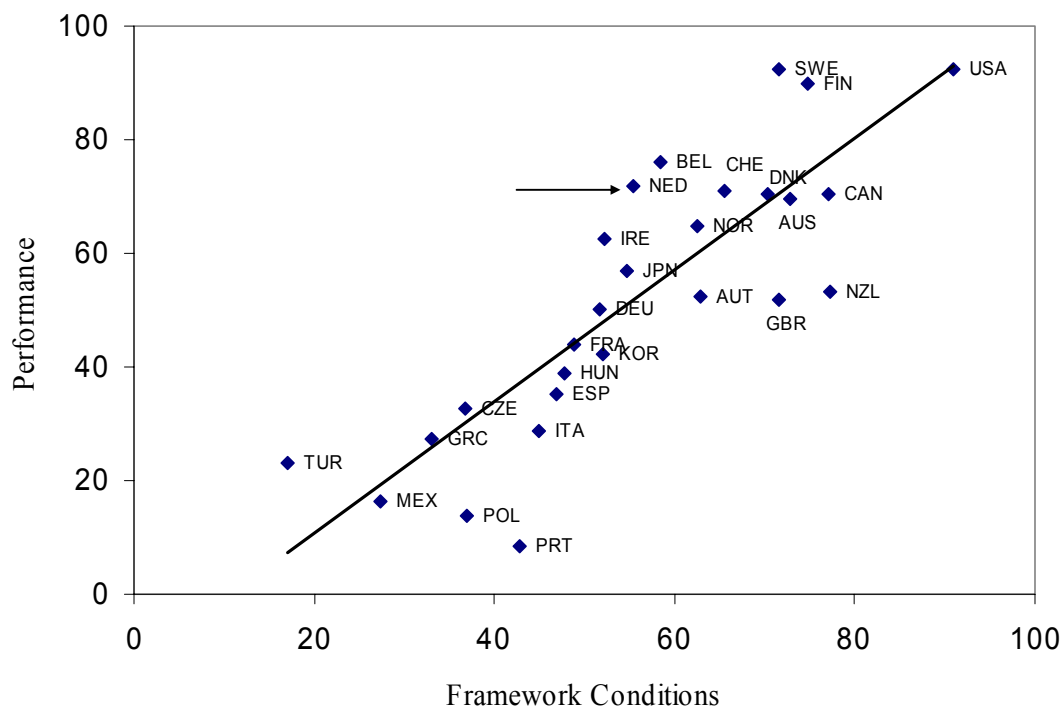
The strong showing of the United States on the index for framework conditions can be accredited to strong showings in *flexible organisation* and *management skills*, while Finland performs well in *scope and quality of basic education* and *scope and quality of higher education*.

### Step 3: Correlation between Performance and Framework Conditions

A strong correlation between performance and framework conditions indicates that effective policies lead to strong performances. The analysis shows a solid correlation between the two indices leaving us to conclude that efficient policies may have a positive effect on the productive use of knowledge workers (Figure 21).



**Figure 21: Correlation between performance and framework conditions – Human resources**



Note: The correlation is 0,84

A group of small European countries including the Netherlands seems to be over-performing. This is mainly due to very high rankings on the indicators for *management* and *organisation*. There might therefore be a bias in the indicators, which in part can be explained by the size of the countries combined with the presence of large multinational firms. The Dutch performance in this driver might therefore be overrated and should be treated with some caution.

#### Step 4: Dutch strengths and weaknesses

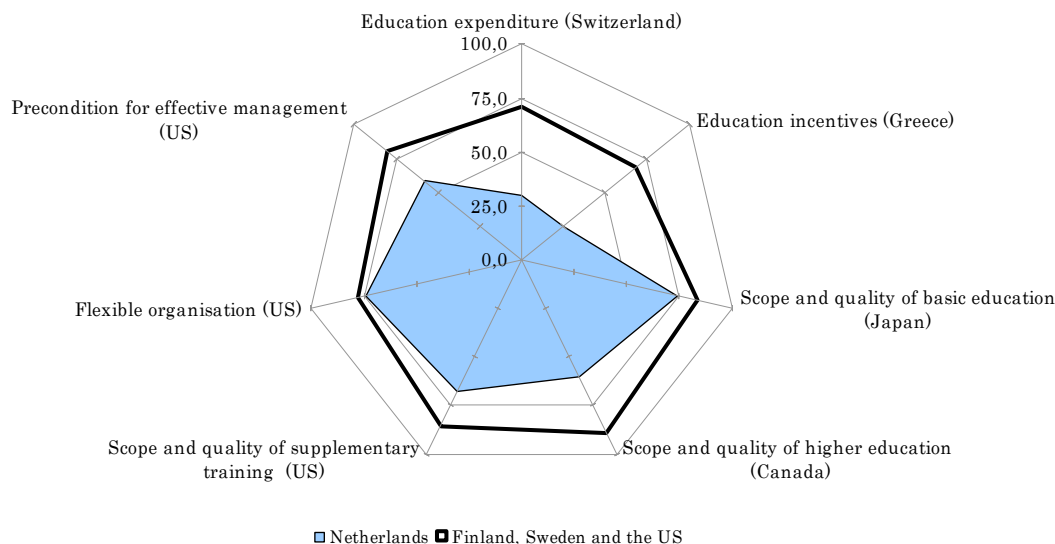
No direct method exists in determining the relative importance of a given policy area. The first step in identifying important framework conditions is to chart the individual areas against the performances of best-practice countries.

Figure 22 shows the index values for the Netherlands compared with the top-3 countries in a spider diagram (Box 1). Top-3 countries are the countries with the highest values for the performance indicators. For this driver these countries are the United States, Sweden and Finland.

The analysis shows that the top performing countries give high priority to all policy areas. However, five of the seven do stand out with slightly higher values (*scope and quality of basic education, scope and quality of higher education and scope and quality of supplementary training, flexible organisation and preconditions for effective management*), while *education expenditure* and *education incentives* are not given top-priority. Furthermore, the correlation

between the simple average of all performance indicators and the policy areas with high priority is above 0.65 for the five areas, whereas it is below 0.35 for education expenditure and education incentives.

**Figure 22: The Netherlands vis-à-vis the top-3 – Human resources**



### Box 1. How to read a spider diagram

The spider diagram illustrates how framework conditions are prioritised among the top-3 countries. The country with the highest value for the given policy area is assigned the value 100. For example, Switzerland has the highest educational expenditures among the OECD and has been assigned the value 100, whereas Ireland has the lowest and is assigned the value 0. The relative importance of a given policy areas is determined by the average value of the top-3 performance countries, as illustrated by the black line combined with a check of the correlation between the policy area and the performance indicators. The Dutch position is illustrated by the blue area. The best-performing country for each of the policy areas is shown in ( ) following the name of the policy area.

Depending on their relative importance in the top-performing countries, framework conditions for the productive use of knowledge workers can be split into two categories. Table 2 highlights the Dutch position vis-à-vis the top-performing countries using the colours **green** (framework conditions are better or equal to the top-3), **yellow** (framework conditions are average compared to the top-3) and **red** (the quality of the Dutch framework conditions are significantly lower than in the top-3 countries). Major challenges appear for the Netherlands in the framework conditions for human resources.

To a large extent this exercise is based on a quantitative judgement, and the ranking should be treated with some caution. Although a green marking would indicate that the performance of the policy area in question is equal to or better than the top-3, it may be the case that the top-performing countries could benefit from strengthening the policy area in question.

**Table 2: Importance of framework conditions for human resources – and the Dutch position vis-à-vis the top-3**

I – High priority policy areas in the top-performing countries	
Scope and quality of higher education	
Preconditions for effective management	
Scope and quality of supplementary training	
Scope and quality of basic education	
Flexible organisation	
II – Lower priority policy areas in the top-performing countries	
Education expenditure	
Education incentives	

In particular, the Dutch ranking in *scope and quality of higher education* is significantly lower compared to the top-performing countries. As far as scope of higher education the underlying indicators show that the low values mainly can be accredited to the fact that few people in the Netherlands enrol in higher education. For example, the share of the Dutch population with a tertiary education is only 23% compared to 41% in Canada. The quality of higher education can also be questioned as the unemployment rate for highly educated (corrected for the average unemployment rate) is rather high in the Netherlands. This could suggest a lack of quality or a miss-match in the types of education supplied and the types of education demanded by Dutch firms.

The other real weakness is the *preconditions for effective management*. The indicators used in this area cover a wide variety of factors. The main weakness is a low share of female managers suggesting that the Netherlands has an unexploited management potential. Furthermore, the Netherlands scores low on composition and external influence on company boards, which means that the pressure on the management to perform could be improved in the Netherlands by improving the corporate governance of Dutch firms. The weak corporate governance in the Netherlands is also highlighted in the latest OECD country review of the Netherlands (OECD, 2004a).

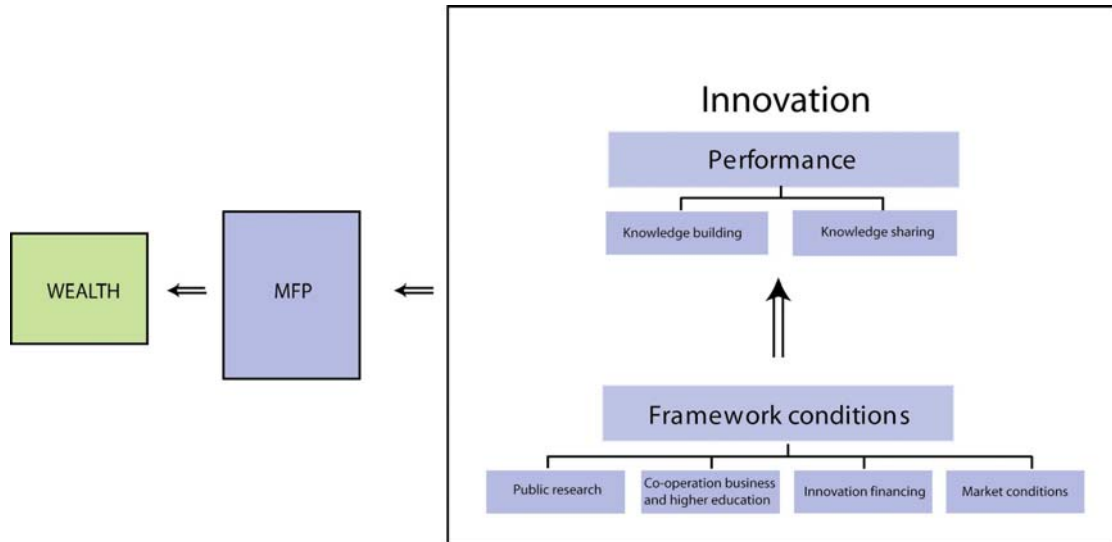
*Scope and quality of supplementary training* gets a low score due to a low share of Dutch employees participating in job-related education – only 24%. The share is, for example, twice as high in Denmark. The Netherlands is doing relatively well on the other three indicators (course hours per participant, participation in self-directed learning and availability of specialised job-related education) included in the index.

It appears from figure 22 that the Netherlands could benefit from improvements in *scope and quality of basic education*. This result is based on the 2000 PISA, where the data for the Netherlands were attached with many problems. The new PISA study shows that the Netherlands is performing relatively well in the various areas so this should probably not be considered as critical although it appears so in Figure 22.

# Innovation

A country's ability to innovate by building and sharing knowledge is a vital element in introducing new products and services. Today global competition is all about new ideas and innovation. It has become vital to build and share knowledge in response to sophisticated consumer demand and growing competition (Figure 23).

**Figure 23: Measuring performance and framework conditions – Innovation**



## Step 1: Defining and Measuring Performance

The composite performance index for innovation is comprised of two sub-indices; knowledge building and knowledge sharing. A total of 6 indicators are used to benchmark performance. Please refer to Appendix 1 for a complete list of indicators. A run-down of country rankings on the performance indices and the sensitivity analysis identifying the top performing countries can be found in Appendix 4.

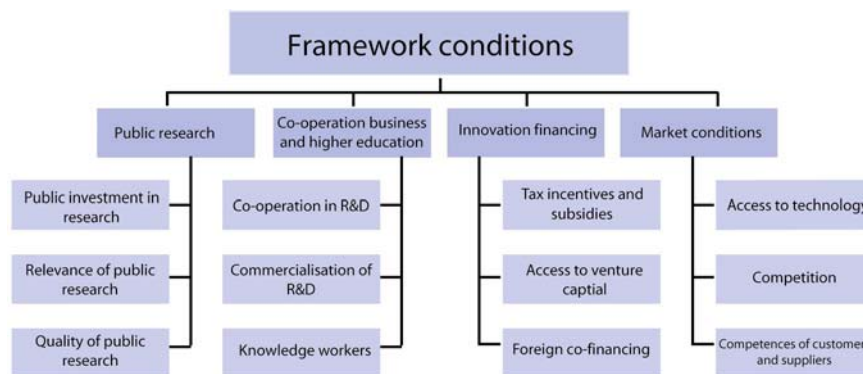
- Sweden, Switzerland and Germany claim top-3 rankings and are identified as top performers. The top-3 is closely followed by four countries; Germany, Finland, Denmark and Ireland.
- Overall, the Netherlands ranks in a third group following the seven countries mentioned above. The Netherlands can (for some combinations of weights) make a top-5 ranking but never a top-3. Countries with similar performance include the United States, Japan and Austria. The Dutch performance is affected positively by the share of Dutch firms introducing new or improved products and by a high number of patents, and negatively by the business assessment of the application of new technology in Dutch firms.

- The Netherlands ranks ninth on the index for *knowledge building*, while Germany, Switzerland and Sweden are identified as top-performing countries.
- The Netherlands is ranked eleventh in *knowledge sharing*, with Finland and Ireland claiming top position.

## Step 2: Collect and Analyse Indicators for Framework Conditions

Considerable academic and business literature exist on factors affecting innovation. Most policy analyses build on the framework of a National Innovation System or NIS. For the purposes of assessing the factor determining national performance it can be assumed to include twelve areas (Figure 24).

**Figure 24: Framework conditions – Innovation**



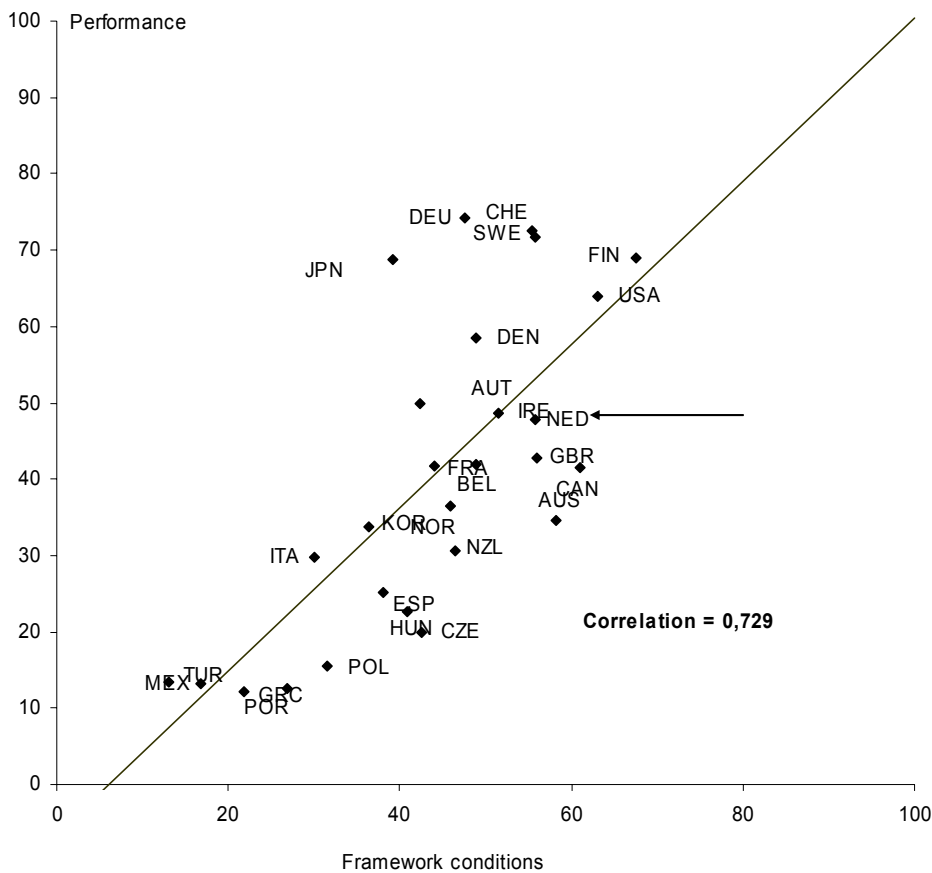
The 27 OECD countries fall into four groups. The United States and Finland are identified as having the best framework conditions, and claim top-3 rankings more than 80% of the time (Appendix 4).

Canada, Switzerland, the UK and Australia are in the top-5 in more than half of the calculations, while the Netherlands, Sweden, Belgium and Denmark make up a third group that often claims top-10 rankings.

## Step 3: Correlation between Performance and Framework Conditions

The majority of countries analyzed in this section falls close to the correlation line between performance and framework conditions, i.e. a high performance ranking is matched by a high ranking on framework conditions. When comparing the two indices, the correlation appears solid (Figure 25).

**Figure 25: Link between performance and framework conditions – Innovation**



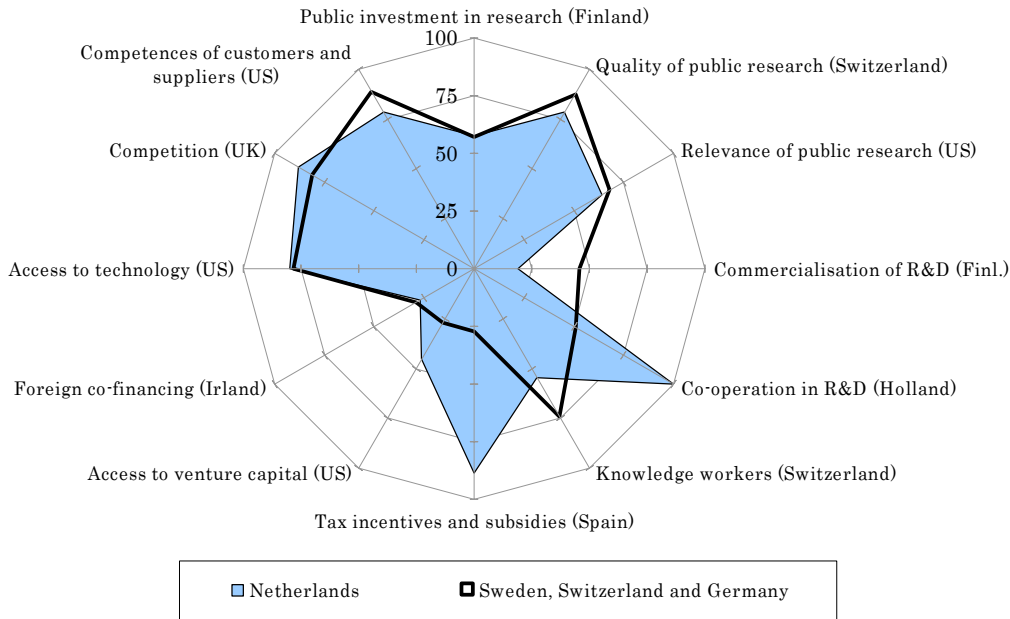
Note: Except for Germany and Japan, all countries are located within the errors bars (95 % confidence interval)

Germany and Japan are candidates for further analysis since they differ from the general rule that performance and framework conditions go hand-in-hand. The indicators used in sizing knowledge building and knowledge sharing are primarily technology-based. While technology is important in driving innovation it fails to take into account the importance of understanding market dynamics and consumer demands, factors that are prevalent among many firms in Japan and Germany. The analysis also shows that in Japan cooperation in R&D is limited. Japanese companies have a long-standing tradition for carrying out R&D within the boundaries of the company, instead of collaborating with external knowledge institutions.

## Step 4: Dutch Strengths and Weaknesses

Sweden, Switzerland and Germany were identified as the top-performing countries in the area of innovation. The spider diagram below plots the average ranking of the Netherlands against the top-3 for each of the policy areas identified in the analysis (Figure 26).

**Figure 26: The Netherlands vis-à-vis the top-3 – Innovation**



In the top-performing countries *quality and relevance of public research, knowledge workers, access to technology, competition policies and competences of customers and suppliers* are given higher priority *than commercialisation of R&D, co-operation in R&D, tax incentives and subsidies, access to venture capital, and foreign co-financing.*

It should be stressed that although the latter appear to be less important in building and sharing knowledge it only implies that these areas have been given lower priority in the top-performing countries. For example, many countries have focused much policy effort on developing venture capital markets. These efforts should not be abandoned due to this analysis, as this analysis only focus on innovation. Venture capital can be very important for a few high-growth firms. For example, in the US only 1000 firms in seed and early stage received venture capital investments in 2004 (PricewaterhouseCoopers, 2004). In the Netherlands around 100 venture capital investments in seed and early stage where made in 2003.

Again, framework conditions are grouped based on their relative importance. The Netherlands is doing relative well in this driver. Six policy areas are at level with the best performing countries and the Netherlands is even leading in *co-operation in R&D*. This is due to a very high degree of public research financed by the private sector in the Netherlands (the highest share in OECD).

The major weakness among the important areas is a lack of *knowledge workers*. This is mainly due to a low number of researchers in Dutch firms combined with a low share of foreign professionals in the Netherlands. A country like the United States has for example almost three times as many researchers per 10 000 employees than the Netherlands. The lack of knowledge workers was also evident in the section on human resources.

A minor weakness in the Netherlands seems to be *quality of public research*. However, similar to the *relevance of research* this area is difficult to measure, so the results should not be over interpreted. *Quality* is measured as publications per inhabitant combined with a qualitative judgement by the managers of Dutch firms. *Relevance* is measured in terms of allocation of government funds in technology/natural sciences, the number of scientific papers cited in patents and the number of scientific and technical articles published in industry-relevant periodicals.

The Dutch performance in *relevance of public research* is close to the best (Figure 26). The main reason for this high value is a high share of *publications in industry-related periodicals*. However, this is only a poor indication of public research being more or less relevant compared to other countries. The indicators appear to be biased towards small countries failing to take into account the industry structure of the economy. This example serves to illustrate that in many instances quantitative analyses are insufficient in explaining cross-country differences. For that purpose in-depth cluster analyses of business structures across countries are more relevant

The various policy areas concerning public research should be seen together. The good performance in *relevance of public research* is in contrast to the low ranking on *commercialisation of R&D*. Public research in the Netherlands might be relevant but for some reason not transferred to private firms. Data looking at spin-offs from universities support this hypothesis (OECD, 2002a). Policy ideas for strengthening commercialisation are presented in chapter 9.



**Table 3: Importance of framework conditions for innovation – and the Dutch position vis-à-vis the top-3**

<b>I – High priority policy areas in the top-performing countries</b>	
Quality of public research	Yellow
Knowledge workers	Red
Access to technology	Green
Competition policies	Green
Competences of customers and suppliers	Yellow
<b>II – Lower priority policy areas in the top-performing countries</b>	
Public investment in research	Green
Relevance of public research	Yellow
Commercialisation of R&D	Red
Co-operation in R&D	Green
Tax incentives and subsidies	Red
Access to venture capital	Green
Foreign co-financing	Yellow

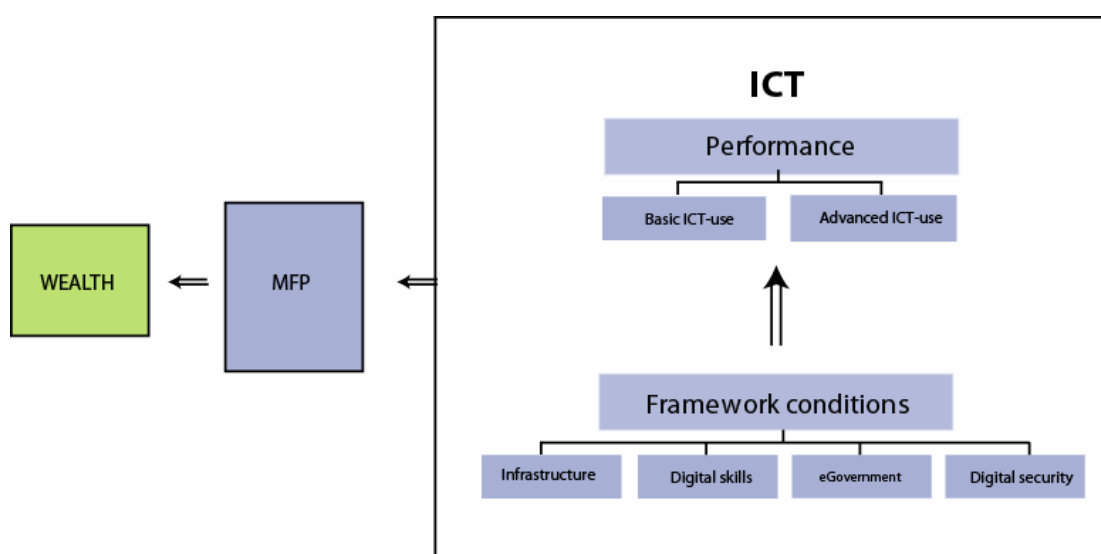
Determining the prioritisation of policy areas has primarily been based on a quantitative judgement (high value in top performing countries combined with a high correlation with performance indicators). A qualitative assessment has also been applied to ensure a balanced conclusion in areas where data coverage is limited.

This may be exemplified by further analysing specific policy areas. The area of *tax incentives* has a relative low weight in the top performing countries but a relative high weight in the Netherlands. This could perhaps suggest that the Netherlands is over-investing in their R&D tax scheme compared to other instruments. Several evaluations of the tax scheme show a positive effect of the scheme, but it is still worth considering the balance among the instruments, which is the main reason for highlighting it in red.

## Information- and Communications Technology (ICT)

ICT have boosted productivity growth in three ways. First, enterprises have equipped their employees with much more computing power. These ICT investments boosted labour productivity. Second, greater use of ICT has allowed production, consumption and exchange to be reorganised in a way that have boosted multi-factor productivity. Third, the production of ICT equipment itself has seen massive productivity growth. Between them, the three channels have boosted growth. For example, it may have increased US labour productivity growth by around 1 percentage point per year between the early and the late 1990s (OECD, 2003). As MFP is the focus of the study, this analysis focuses on the use of ICT (Figure 27).

**Figure 27: Measuring performance and framework conditions - ICT**



### Step 1: Defining and Measuring Performance

Country performances are split into two separate indices: basic ICT-use and advanced ICT-use. Please refer to Appendix 1 for a complete list of indicators. Appendix 4 details country rankings on the two performance indices.

- Finland, the United States and Sweden are frontrunners in terms of ICT use and are identified as top-3 countries.
- A second group of six countries ranks in the top-10 almost regardless of the weights applied to calculate the composite performance index. The Netherlands belongs to this group.
- The Netherlands ranks thirteenth on the index for *basic ICT-use*. The United States, Sweden, Australia and Japan make up the top-4. The relative low Dutch rank on basic ICT use is due to a very low number of PCs in firms. On average, only one out of three employees has a PC. Dutch firms score around average on business use of the Internet and the share of companies with own web site.

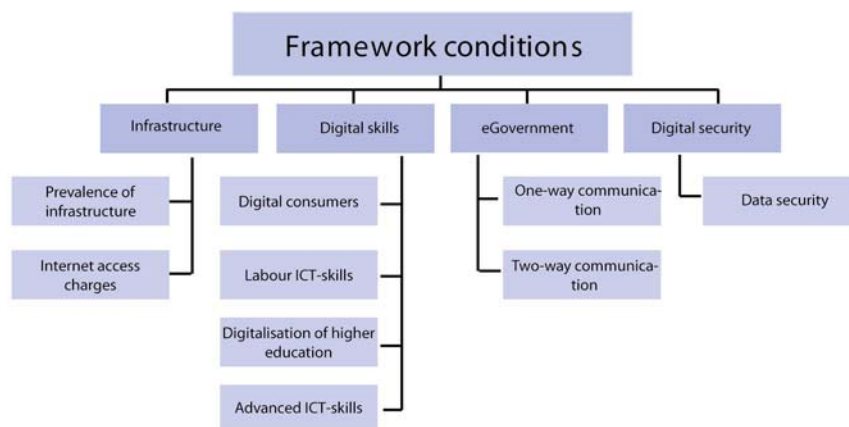
- The Netherlands ranks fifth on the index for *advanced ICT-use*, with Finland, Switzerland and Sweden heading the ranking. The relative high score on advanced ICT use in the Dutch firms is due to a high share of Dutch firms using the Internet for business. About 38% of all Dutch firms are either purchasing or selling online.

OECD's review of ICT diffusion to business in the Netherlands confirms the ranking of the Netherlands as an above average performer in business use of ICT (OECD, 2005c). However, it seems like the broader diffusion of ICT to all firms is somewhat lacking in the Netherlands, whereas the firms that do use ICT have a rather advanced use.

## Step 2: Collect and Analyse Indicators for Framework Conditions

Previous analysis has identified four factors that affect the ability to use ICT. In its simplest form, it depends on the available *infrastructure* and the *skills*. The growth of the Internet can create additional benefits by creating access to high quality digital content through *e-government*. Finally, firms with access to ICT, skills and content might not necessarily use ICT to its full potential if they do not trust the *security on-line*.

**Figure 28: Framework conditions – ICT**



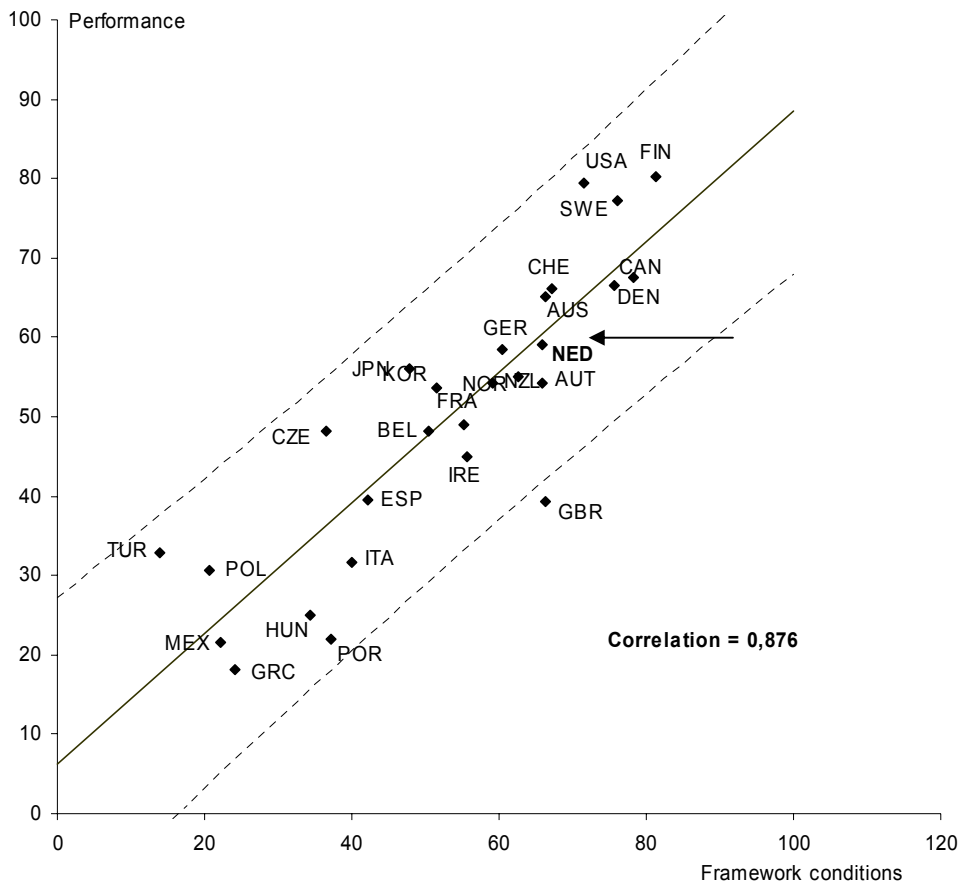
The nine identified ICT policy areas are illustrated in Figure 28 above. The policy areas are weighted into a composite index. The robustness analysis shows that Finland, Denmark, Canada and Sweden are ranked in the top-3 more than 50% of the time.

The framework conditions for ICT-use in the Netherlands are somewhat lacking compared to the top-performing countries. The Netherlands falls in the lower part of the second groups together with countries like Switzerland and the UK. The main reason for this is a lack of ICT use in the public sector (e-government and in schools).

### Step 3: Correlation between Performance and Framework Conditions

There is a strong link between the overall performance index and the index for framework conditions (Figure 29).

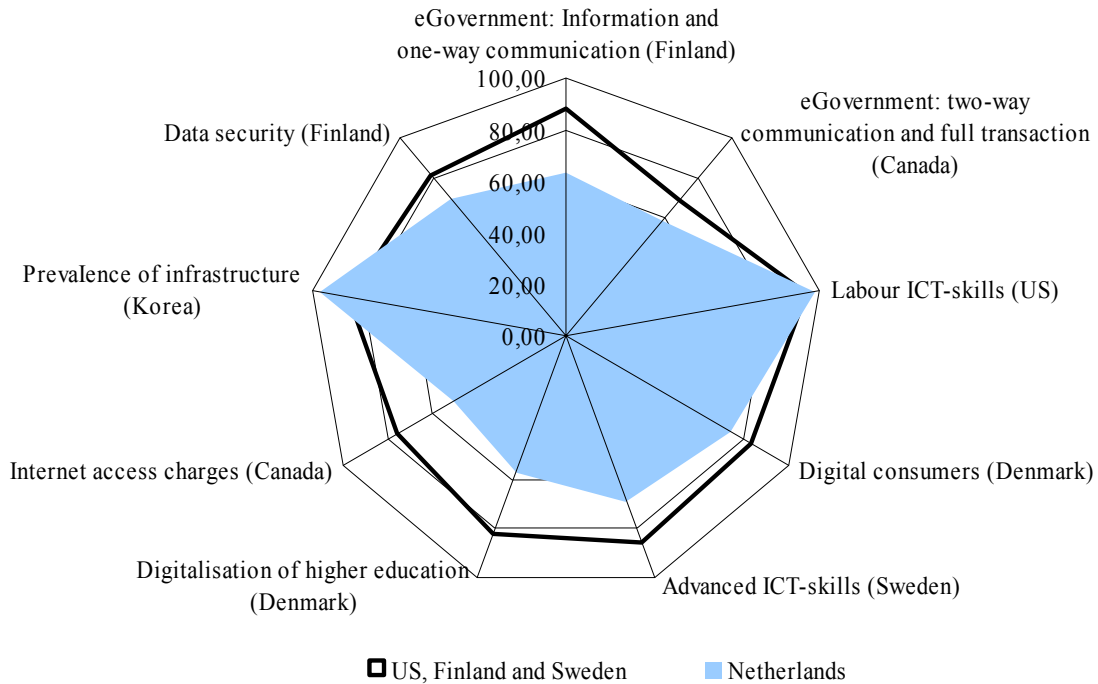
**Figure 29: Link between performance and framework conditions - ICT**



## Step 4: Dutch Strengths and Weaknesses

The top-performing countries (the United States, Sweden and Finland) have given high priority to *eGovernment (information and one-way communication)* and *labour ICT-skills* as well as *digital consumers, advanced ICT-skills, digitalisation of higher education* and *data security* (Figure 30).

**Figure 30: The Netherlands vis-à-vis the top-3 - ICT**



The Dutch business environment for ICT is lacking in almost all areas that are more or less directly under government control such as *e-government* and *digitalisation of education*. *ICT skills in the labour force* and *prevalence of infrastructure* are better than the top-performing countries. The good performance in *infrastructure* can be accredited to a high uptake of broadband. The good labour force skills can be explained by a high-degree of e-learning and an extended use of home based tele-working.

Areas that should be addressed include *eGovernment, advanced ICT-skills* and *digitalisation of the education sector*. All these areas are more or less directly under the government's control, which should make it easier to make improvements.

E-government is apparently not that developed in the Netherlands. The four indicators used in the study all show an average performance. For example, Accenture's E-government 2003 evaluation notes: "*The Netherlands seems to be in need of strong eGovernment policy and direction*" (Accenture, 2003). It is mainly the lack of co-ordination among various e-government projects that seems to be the problem.

*Advanced ICT skills* is measured both as the share highly skilled ICT employees in the workforce and the share of graduates in computer science in higher education. The Netherlands is scoring quite low on the number of graduates. Only 1.5% of graduates study computer science in the Netherlands compared to 9.4% in Ireland, which has the highest share.

The lack of internet-linked PCs creates the low ranking in the area of *digitalisation of the education sector*. The number of PCs in schools with internet access per student in the Netherlands is about half of the number of PCs in schools in Canada. The number of teachers with ICT training could also be improved.

Internet charges also seem excessively high in the Netherlands mainly for simple access through modem. This is a common problem in many European countries where the lack of competition among providers results in high prices.

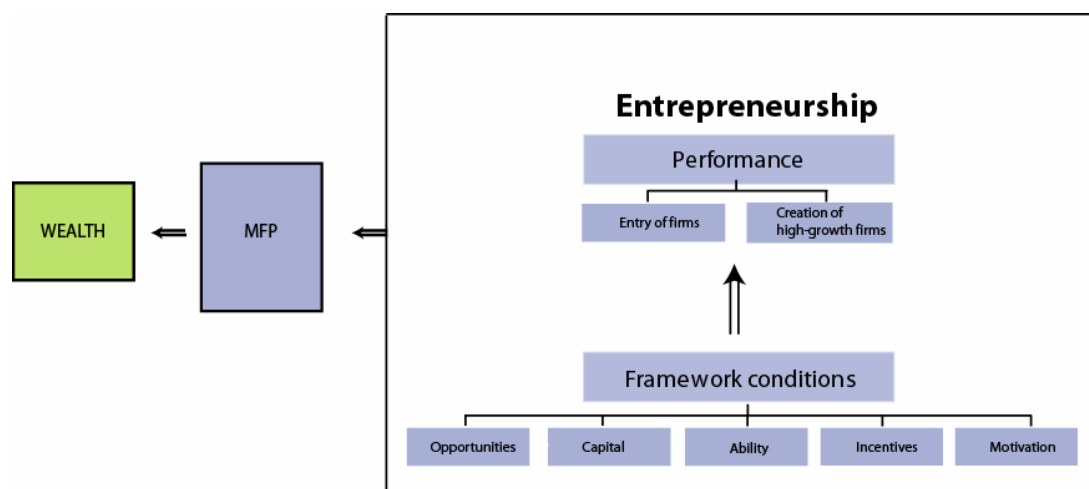
**Table 4: Importance of framework conditions for ICT – and the Dutch position vis-à-vis the top-3**

<b>I – High priority policy areas in the top-performing countries</b>	
eGovernment: Information and one-way communication	
Digitalisation of the education sector	
Advanced ICT-skills	
Data security	
Digital consumers	
Labour ICT-skills	
<b>II – Lower priority policy areas in the top-performing countries</b>	
Internet access charges	
eGovernment: Two-way communication and full transaction	
Prevalence of infrastructure	

# Entrepreneurship

Entrepreneurial activity is vital in sustaining wealth through times of rapid technological change. The shift towards a knowledge-intensive economy puts increased pressure on companies across all industry sectors to rapidly introduce new products and processes. Some succeed, others fail. The level of new firm growth reflects the ability to expand the boundaries of economic activity, shift resources and adjust to changing customer needs.

**Figure 31: Measuring performance and framework conditions - Entrepreneurship**



## Step 1: Defining and Measuring Performance

The composite performance index for entrepreneurial activity builds on two sub-indices: *start-up activity* and *new firm growth*. Please refer to Appendix 1 for a complete list of indicators. Appendix 4 details country rankings on the two performance indices.

- Available indicators for entrepreneurship performance are limited. Only 18 countries have data for more than one indicator. Korea, Ireland, Canada and the United States clearly outperform the rest of the countries. The growth data for Ireland is based on a less comprehensive sample than for the other countries. Hence, Ireland is not included among the top-3 countries.
- Overall, the Netherlands performs rather poorly in this driver and is among the laggard countries.
- On the indicator for *start-up activity* Canada, The United States and Ireland outperform all other countries. The Netherlands has an average performance on the start-up indicators.
- *New firm growth* measures the share of young firms with high growth in turnover. Ireland, Korea and the United States are ranked as top-3, while the Dutch performance is significantly below average. The low share

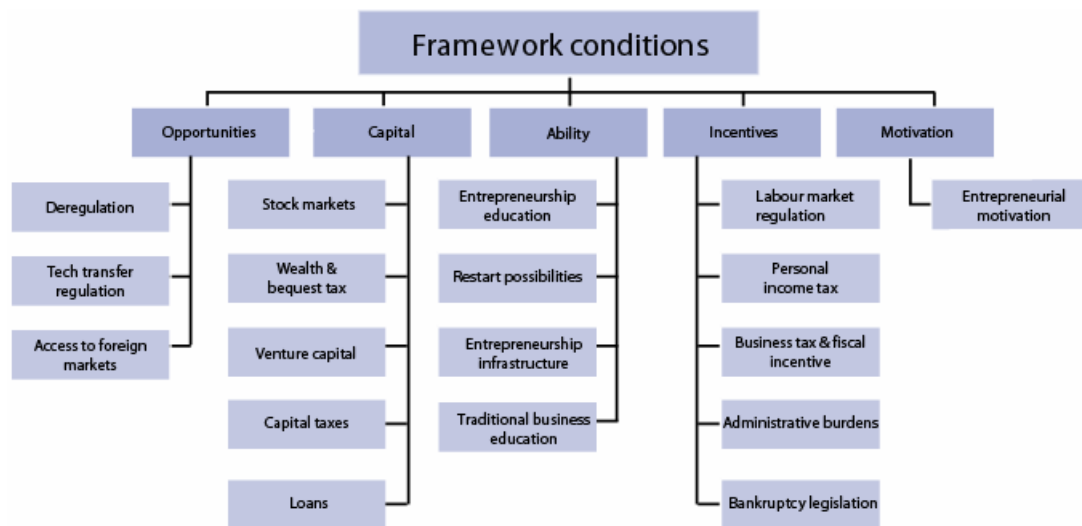
of high growth firms could be related to the low GDP growth in the Netherlands in the period 2001-2003.

## Step 2: Collect and Analyse Indicators for Framework Conditions

The number of new firms and subsequent share of high-growth firms created each year depend on a myriad of underlying factors coupled with the personal attributes of entrepreneurs. Entrepreneurs see opportunities and generate visions for what the future could hold if they get the capital to finance their venture. More important though, they have the ability to implement their visions if the incentives and motivation is right.

Consequently, the framework is based on *opportunities*, *abilities* and *capital* along with an appropriate *incentive structure* and *motivation*. The 18 policy areas are collated into a composite index for entrepreneurial activity (Figure 32).

**Figure 32: Framework conditions - Entrepreneurship**



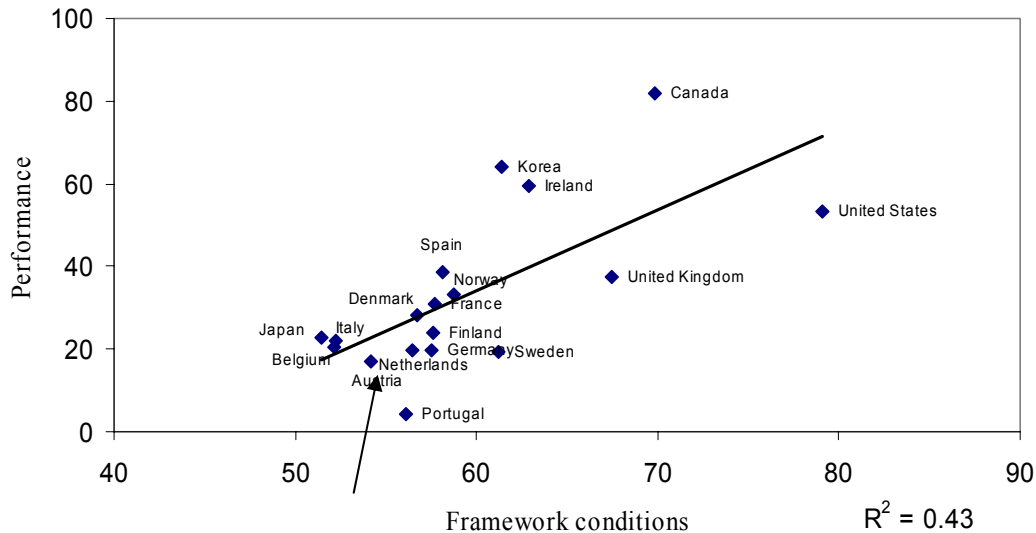
The robustness analysis identifies the United States, Canada and New Zealand as top-performers. The United Kingdom, Australia, Iceland, Ireland, Korea and Sweden make up a second group. The Netherlands has an average business environment for entrepreneurship (Appendix 4).



### Step 3: Correlation between Performance and Framework Conditions

The analysis shows a solid correlation between performance and framework conditions (Figure 33). This leaves us to conclude that efficient policies may have a positive effect on entrepreneurship.

**Figure 33: Link between performance and framework conditions - Entrepreneurship**

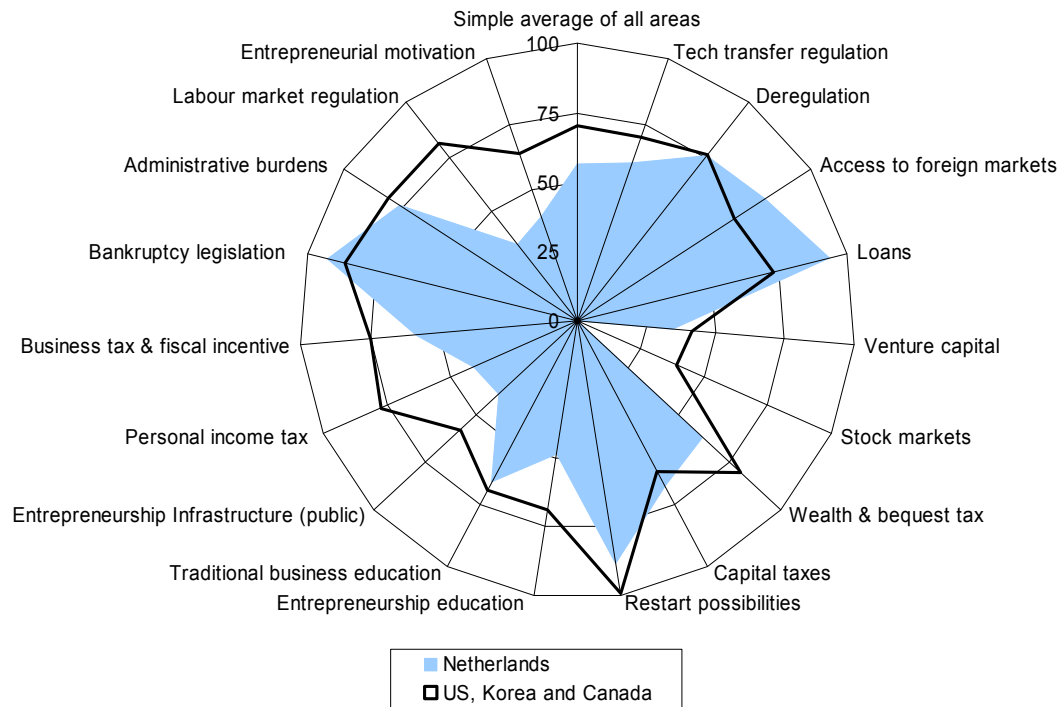


The United States, Canada, United Kingdom, Ireland and Korea claim top position on the overall performance index and on the index for framework conditions. Canada and Ireland's positions should be treated with some caution as they are based on a limited number of indicators. The Dutch framework conditions looks better than their actual performance, which is partly due to a large drop in the number of high growth firms in the 2004 update of the data. The share of high growth firms of all firms in the Netherlands dropped from 7.3% in the period 2000-2002 to 2.7% in the period 2001-2003, which given the overall GDP growth in the Dutch economy in the period might not be that surprising.

## Step 4: Dutch strengths and weaknesses

Eight policy areas have been given high priority in the top-performing countries. These areas include *taxes*, *education* and *various forms of regulations*. The remaining policy areas have been given less priority and their correlation with performance is weaker.

**Figure 34: The Netherlands vis-à-vis the top-3 - Entrepreneurship**



Note: Data is missing on stock markets

If the Netherlands is to strengthen its overall ranking on entrepreneurial activity, the following areas need to be monitored and strengthened considerably: *entrepreneurship education*, *personal income tax*, *wealth & bequest tax* and *labour market regulation*. Furthermore, the possibility of *restarting* could be improved. The Netherlands also has weaknesses in other areas but these are considered less important for performance and will not be discussed with the exception of *motivation*.

An important message emerging from the analysis is that administrative burdens are not a problem in the Netherlands relative to the top-performing countries. The indicators for the regulation affecting continuing firms do however show that this area could be improved although the Netherlands is in line with the top performing countries. It should be stressed that reducing barriers is a no-regrets policy and is important, but there might be a decreasing return to further reductions in advanced countries like the Netherlands. The barriers may have a threshold effect: if, for example, barriers are below a given level, then further reduction will have no effect on start-up activities. Reducing the time it takes to register a new company from the current 11 days to 3 days will probably have a very limited effect on the incentives to start a new firm.

**Table 5: Importance of framework conditions for entrepreneurship – and the Dutch position vis-à-vis the top-3**

I – High priority policy areas in the top-performing countries	
Entrepreneurship education*	
Personal income tax	
Wealth & bequest tax	
Labour market regulation	
Restart possibilities	
Bankruptcy legislation**	
Administrative burdens**	
Deregulation	
II – lower priority in the top-performing countries	
Entrepreneurship Infrastructure (public)	
Business tax & fiscal incentive	
Entrepreneurial motivation	
Venture capital	
Tech transfer regulation	
Traditional business education	
Capital taxes	
Access to foreign markets	
Loans	

Note:

\* Entrepreneurship education does have low value in figure 39 for the top-3 countries but this is due to a very large unexplainable drop in the indicators for Canada. In 2003, the average value of top-3 was 88

\*\* Two of the high priority areas (*bankruptcy legislation* and *administrative burdens*) do not have a significant correlation with performance and might therefore be less important than the other areas

*Entrepreneurship education* measures the integration of entrepreneurship elements in the Dutch education system. The indicators show that the main weakness of the Dutch system is at the highest levels of education. More detailed analysis shows that 6 out of 15 Dutch universities have chairs in Entrepreneurship but more is needed if the Netherlands is to match the top-3 countries (OECD, 2004b). A few policy ideas are mentioned in chapter 9 that might improve the Dutch positions in this area.

*Lower taxes* stimulate entrepreneurship but tax cuts should always be seen in the context of the entire tax system and the public sectors need for financing its expenditures. One tax rate, which is often cited as especially harmful is wealth taxation, as entrepreneurs are taxed based on the theoretical value of their firm regardless of their personal income from that company. The Netherlands has removed its general wealth tax in 2001 but it has been replaced by a 30% tax on theoretical revenue on capital, assumed to equal 4% of net assets, which potentially could be harmful. A few policy ideas are mentioned in chapter 9 that might improve the Dutch positions in this area.

The *restart possibilities* measure the time creditors have claim on a bankrupts' assets. This is important as studies show that experiences gained in the first

failure can increase the possibilities of success in a second venture. Firms started by "re-starters" also grow faster and generate more jobs than firms started by other entrepreneurs (The Boston Consulting Group, 2002). The Netherlands has a rather short period by European standards but is still far from the US and Korea. For example, in the United States, the willingness of entrepreneurs to take chances is given emphasis. The period is therefore short (less than one year) and the US laws discourage involuntary bankruptcy, since it requires that three or more creditors initiate it. The result is that more than 96% of bankruptcies are initiated on a voluntary basis in the United States.

The indicators show a low *motivation* among Dutch people to start new firms. All the indicators are based on telephone surveys that elicit people preferences for employment versus self-employment. Lack of entrepreneurial motivation/spirit is often mentioned as the key problem in Europe. However, it remains a question whether or not that is true. According to this analysis the motivation factors do *not* play a key role in the best performing countries and the indicators are not highly correlated with the performance indicators. This suggests that government should put less focus on motivation and instead improve other policy areas. Motivation might even be determined endogenous, so improvements in the other policy areas will simultaneously increase motivation (Schramm, 2004).

Not all important areas for entrepreneurship can be quantified. For example, private business services are found important for growth in new firms also in the Dutch context (Kox, 2004). The quality of these services are difficult to quantify and difficult to affect through policy. However, other studies do suggest that these services are underdeveloped in the Netherlands and need improvements (OECD, 2004a). Policies for improvement of private business service should therefore be included in the policy package. A few policy ideas are mentioned in chapter 9 that might improve the Dutch positions in this area.

## 7. Globalisation

Globalisation is becoming an increasingly important factor in the knowledge-intensive economy. A number of indicators have been identified to help measure country participation in the global economy. The indicators have been incorporated into each of the four drivers of growth. However, for the benefit of the reader, a separate globalisation index is presented in this section.

### Global knowledge sharing

*Global knowledge sharing* is central to the application of new technology and instrumental in driving productivity growth. Global knowledge sharing comes in various shapes and forms. Domestic companies can purchase licenses, patents and know-how from non-national companies, or engage in cross-border partnerships through mergers & acquisitions or international joint-ventures. They may also participate in the diffusion of leading scientific research through strategic alliances with universities, and through participation in international conferences.

The index for *global knowledge sharing* consists of 8 indicators:

- Growth in foreign R&D.
- Scientific articles with foreign co-authors.
- Scientific articles cited in US-issued patents.
- Import of disembodied technology and know-how.
- National ownership of foreign innovations.
- Share of foreign workers in the work force.
- Students enrolled in other OECD countries.
- Share of students from other OECD countries.

Ireland, Switzerland and Canada are top performers in global knowledge sharing. The Netherlands is ranked seventh (Table 6).

**Table 6: Index for global knowledge sharing**

Country	Rank	Country	Rank	Country	Rank
Ireland	1	UK	10	Turkey	19
Switzerland	2	Denmark	11	Czech Rep.	20
Canada	3	Austria	12	Germany	21
Australia	4	Sweden	13	France	22
United States	5	Greece	14	Korea	23
Hungary	6	Mexico	15	Poland	24
<b>Netherlands</b>	<b>7</b>	Finland	16	Spain	25
Norway	8	New Zealand	17	Italy	26
Belgium	9	Portugal	18	Japan	27

## Global market conduct

*Global market conduct* measures the quality of global market strategies. Companies that fail to address the challenges of the global economy will inevitably fight a losing battle as competition heats up.

The index for *global market conduct* is based on the following indicators:

- Assessment of global company strategy.
- Share of exporting companies among newly-established companies.
- Cross-border mergers and acquisitions.

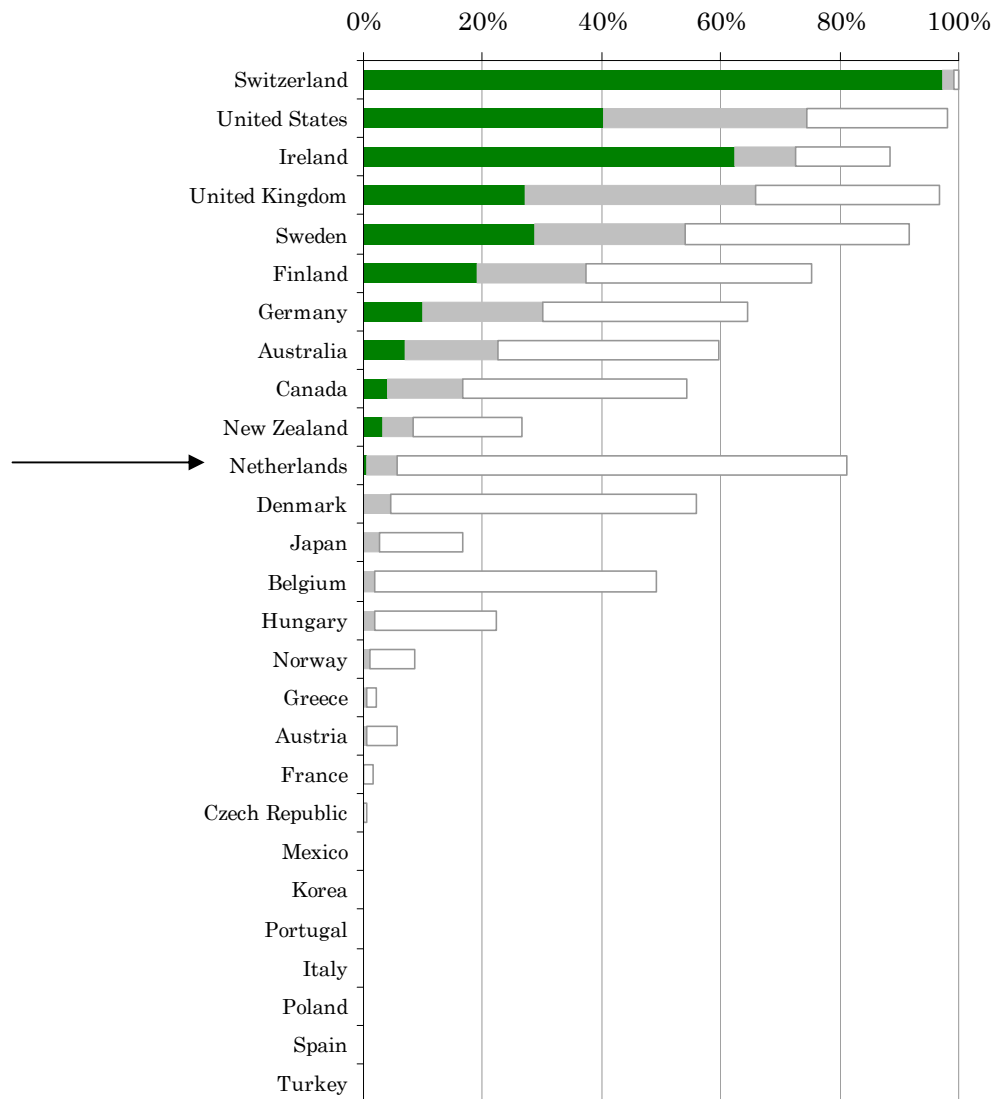
The Netherlands ranks seventh, while Sweden, the UK and Finland claim top position. Ireland (the top performer in the previous indicators) drops to number 15 on the index for global market conduct (Table 7).

**Table 7: Index for global market conduct**

Country	Rank	Country	Rank	Country	Rank
Switzerland	1	New. Zealand	10	Hungary	19
Sweden	2	Belgium	11	Italy	20
UK	3	France	12	Czech Rep.	21
Finland	4	Australia	13	Portugal	22
Germany	5	Canada	14	Poland	23
United States	6	Ireland	15	Mexico	24
<b>Netherlands</b>	<b>7</b>	Austria	16	Turkey	25
Japan	8	Norway	17	Greece	26
Denmark	9	Spain	18	Korea	27

When looking at the *composite globalisation index* Switzerland ranks in the top-3 in all but a few of the calculations. The United States, Ireland, the UK, Sweden and Finland are in the top-3 in more than 20% of the outcomes. Netherlands, Germany, Australia, Canada, New Zealand and Denmark make up a third group (Figure 35).

**Figure 35: Robustness analysis – Globalisation**






The Dutch performance on the globalisation index is average. In the areas of *import of disembodied technology and know-how* and *national ownership of foreign innovations* the Dutch performance is solid. On the indicators for students' international mobility in both directions the Dutch performance is well below average.

## 8. From Benchmarking to Policy Priorities

In this section, all 46 policy areas identified in the analysis are summarized into one table providing an instant image of the Dutch capacity for productivity growth. Future PolicyMonitors could register changes in the Dutch ranking in each of the identified areas.

The Netherlands' current position is rated using the colours green, yellow and red (Box 2).

### Box 2. Quality of Dutch framework conditions

	Framework conditions are on a level with the top-performing countries
	There is room for improvement in the Dutch framework conditions
	The top-performing countries have significantly better framework conditions. In-depth studies should be conducted to detect common characteristics in the framework conditions of top-performing countries

The ranking should be treated with some caution. Although a green marking would indicate that the Dutch performance is equal to or better than the top-3, it may very well be the case that the top-performing countries could benefit from strengthening the policy area in question. The areas determined as most important are highlighted in **bold**.



## Policy Priorities

	NL2005	Rating
<b>Human resources</b>		
Scope and quality of higher education	13	
Prerequisites for effective management	13	
Scope and quality of supplementary training	12	
Flexible organisation	7	
Scope and quality of basic education	14	
Education expenditures	22	
Education incentives	25	
<b>Innovation</b>		
Knowledge workers	13	
Quality of public research	7	
Competences of customers and suppliers	11	
Access to technology	7	
Competition policies	7	
Public investment in research	8	
Tax incentives and subsidies	5	
Commercialisation of R&D	21	
Relevance of public research	14	
Foreign co-financing	22	
Co-operation in R&D	1	
Access to venture capital	3	
<b>ICT</b>		
eGovernment: Information and one-way communication	10	
Advanced ICT-skills	8	
Digitalisation of the education sector	10	
Digital consumers	7	
Data security	10	
Labour ICT-skills	2	
Internet access charges	17	
eGovernment: Two-way communication and full transaction	8	
Prevalence of infrastructure	3	
<b>Entrepreneurship</b>		
Entrepreneurship education	9	
Personal income tax	20	
Wealth & bequest tax	12	
Labour market regulation	28	
Restart possibilities	4	
Bankruptcy legislation	6	
Administrative burdens	16	
Deregulation	10	
Entrepreneurship Infrastructure (public)	11	
Business tax & fiscal incentive	21	
Entrepreneurial motivation	18	
Venture capital	9	
Tech transfer regulation	14	
Traditional business education	11	
Capital taxes	12	
Access to foreign markets	5	
Loans	1	

## 9. Good-Practice Initiatives

The PolicyMonitor identified a number of weaknesses in the Dutch framework conditions. This chapter lists a number of good-practice policy examples based on a review of micro-policies in the top performing countries. Four areas (commercialisation of public research, business services, tax treatment of entrepreneurs and entrepreneurship education) are discussed

### **Commercialisation of public research**

When measuring the extent of commercialisation of research (patents, licenses and royalties), the Netherlands is far behind the top-performing countries. This is by no means related to the size or quality of public research, but rather suggests a missing link in the organisation of the transfer.

Interviews with Dutch universities, which were held in the context of a survey carried out in 2001 for the Dutch Ministry of Economic Affairs, showed that they experienced various problems in applying for patents. The most important were: the length of time taken to apply for a patent, the high costs of patent applications and of managing a patent portfolio, the long lead-time before income is generated and the low yields, the difficulty of finding suitable buyers, and the lack of incentives within the institute for applying for a patent (Dutch Ministry of Economic Affairs, 2002).

These companies or transfer units are only created if the university gains by more spin-offs and licenses. A cross-country view shows that assigning ownership to the research institution tends to generate more spin-offs than other ways of assigning ownership (OECD, 2002b). Assigning ownership to the institution creates an incentive to construct an efficient infrastructure for handling spin-offs and patents. The current Dutch regulation does assign the ownership to universities, so this cannot explain the relatively low number of spin-offs and licensing agreements from Dutch universities despite good potential. Another possible explanation could be restrictions on university ownership of firms, or on their possibility to interact with private firms.

However, most countries experiences similar problems regardless of regulations. Licensing offices are costly to maintain and may lack sufficient scale to be efficient. Germany is therefore now supporting regional patent and licensing agencies, which will function as for-profit entities and service several research institutions. Government support will be phased out as they become self-financing (BBF, 2001). Similarly, a central office serves 80 Max Planck institutes and is constructed after models used for US universities. This office has made the Max Planck institutes some of the most successful in the area of commercialisation in Europe.

Another way to strengthen the Dutch commercialisation effort is to develop well-functioning incubators. Incubators attached to universities or other educational establishments maintain a strong focus on the areas of commercialisation of

research and the development of new enterprises based on research and university-based business ideas.

Good practice examples for top performing countries show that government support are needed in the early stages to jumpstart incubators, although this should be phased out as incubators become more self-supporting. In the United States, federal funding to initiate incubators – largely construction or renovation costs – has to be matched by local governments (the US Department of Commerce spends app. \$350m on jumpstarting incubators).

European incubators tend to be mostly dependent on public support whereas many incubators in the US are privately owned. Four to five times as many US incubators as European have an equity position in their firms, which could explain some of the differences in the need for support. The lack of equity ownership in Europe is more a matter of tradition than regulation, but could harm the longer-term success of incubators.

Based on FORA's analysis of incubators in the US and Denmark three more specific recommendations emerged (EBST, 2004):

- Incubators should work closely together with the local communities to foster entrepreneurship motivation and coordinate local entrepreneurship activities, including the education of business advisors, professors and students etc. in the challenges and possibilities of entrepreneurship.
- Entrepreneurial counselling should be managed by skilled external advisers that operate in tightly knitted networks and are specialised in specific sectors or technologies.
- Incubators gain from engaging in strategic co-operation with knowledge institutions and should offer a high degree of specialisation within technologies or branches where the knowledge institution has a strong academic record.

### **The business service system**

It takes talent, energy and courage to turn a business idea into a successful company. The successful launch of a company is a complicated endeavour, and the challenges of the global knowledge economy make it no less difficult. The pool of skills required surpasses that of the individual entrepreneur or entrepreneurial group, and is particularly critical to high-growth companies. The scope and quality of entrepreneurship guidance (i.e. the available business service) is critical to entrepreneurial activity.

The pool of skills available to entrepreneurs and new firms typically encompasses both public and private providers of business services relating to entrepreneurship. It is very important that the various providers of entrepreneurial services are integrated into a strong entrepreneurship infrastructure that covers both private and public actors.

Most countries have focused on developing the public business service system. Finland provides an interesting case in this respect. Many reports highlight the

public Finnish system (the so-called TE centres) as a best-practice example. The system is regionally integrated and includes several aspects of guidance from IT to export guidance. However, Finnish evaluations show that the system is not working properly. A possible explanation could be that the very nature of the system is wrong. Public employees might not be well suited for guiding firms on significant business decisions, whereas the public employees can play a crucial role advising firms in their early stages on how to deal with the various public bodies. A Danish expert group came up with a similar conclusion when looking at the Danish system.

Governments can employ various policies to induce the private supply of business services and to expand the entrepreneurial demand for such services. In the United States the development of strong regional entrepreneurship business services is often carried out in close co-operation with entrepreneurship centres at regional universities. For example, Connect was founded in 1985 on the initiative of the University of California, San Diego. The organization was formed with the objective of creating new jobs by creating a mechanism by which entrepreneurs get an opportunity to obtain the advice and support they require to start up a new business, primarily in high technology. The assistance ranges from creating a business plan and establishing the company through to seeking the necessary finance. 10 years after it was created, over 400 new businesses had been set up in the San Diego region, representing a turnover of USD 2 billion and more than 100,000 employees. This success led to the establishment of similar organizations in Scotland in 1996, in Sweden in 1998, and more recently in Denmark, Norway and England. CONNECT operations are also being established in Finland, Latvia and Estonia and could easily be established in the Netherlands.

Other possibilities include time-restricted subsidies. Some countries subsidised private firms to supply the needed services for entrepreneurs. The government provides a grant to small firms that want to buy a predefined consulting service. Private consulting firms develop relevant services, and after a few years, the market develops to a level where the subsidy can be removed. This technique of time-restricted intervention or "pump-priming" is an effective way of testing programmes in new markets. The public intervention is limited in time, evaluations can be made as the subsidy period ends, and the goal of the intervention is to make further intervention unnecessary. The United Kingdom has for example used this method to create the National Business Angel Network and the Business Angels Network Association in partnership with a number of clearing banks and other sponsoring organisations.

However, 'good-practice' for improving the entrepreneurship infrastructures has not yet been clearly identified. Therefore, the Netherlands and Denmark have initiated a joint in-depth study of business services. Future analysis will therefore be able to guide policy makers more in this new field.

### **Tax legislation**

The effect of income taxes on entrepreneurial activity has been the subject of much debate. However, there is little doubt that the high income tax levels in the Netherlands have to some degree been detrimental to entrepreneurial activity. General changes in the tax system require detailed cost-benefit analysis.

Therefore, this section focuses on two minor changes that could benefit entrepreneurs without affecting the overall structure of the Dutch tax system – taxation of business angles and taxation of stock options.

The United States and Canada offer special tax treatment for Business Angels. In the United States and Canada profits from investments in certain high-growth companies are fully deductible if reinvested within 60 days. Similar tax schemes are discussed in Denmark, where investors should be allowed to invest, sell and reinvest their capital without taxation if the money is kept in a special investment deposit. All capital withdrawn from the deposit for consumption would be taxed. Currently, a system like this exists for pension savings in special deposits.

Several case studies show that the success of Silicon Valley firms in some instances has been significantly enhanced through the use of stock options. The use of options is also often a requirement of venture investors who want to share risks with the employees of the firm. While it is preferable that all options are taxed as employment income, there may be one exception. Introducing tailored schemes for employees of small high-growth firms may be a good way of stimulating firm growth without changing the structure of the tax system.

Preferential schemes already exist in some countries such as the UK, where the gains from options are taxed as capital gains at the time the shares are sold. The UK scheme is targeted at fast-growing firms. These firms can use the options to attract key employees without putting a strain on their liquidity. Moreover, such firms often have problems attracting capital to their investments, so compensating employees with stock options would free up resources.

### **Education in entrepreneurship**

Entrepreneurship education should be given a higher priority in the Netherlands. The indicators show that the main weakness of the Dutch system is at the high levels of education. In the best performing countries education in entrepreneurship is given a high priority at the university level.

In the United States there is a long tradition for offering courses and programmes at universities and business schools. The majority of the United States' renowned universities offer courses and programmes through entrepreneurship-centres (often funded by alumni or regional companies), aimed at developing and refining student entrepreneurship skills. The US system is based on the simple premise that anyone can become a successful entrepreneur, and that entrepreneurial skills may be relevant in other aspects of life.

There does not seem to be a one 'best-practice' approach for integrating entrepreneurship education at universities. At some universities the entrepreneurship programs are administered by one unit, while the activities are attended by students from all over the university. At other universities entrepreneurship activities can be found across the entire university offered by the individual institutes and faculties.

While there are many different approaches to integrating entrepreneurship at universities, it is very important that the chosen model fits the culture and traditions of Dutch universities.

An interesting way of expanding entrepreneurship education is found in the United States. The Kauffman Foundation launched its Kauffman Campuses initiative—a \$25 million grant program -- to transform the way colleges and universities prepare students for success in the American economy. In December 2003, eight universities were awarded up to \$5 million each to make entrepreneurship education available across their campuses, enabling any student, regardless of field of study, to access entrepreneurial training. As part of the initiative's matching funds requirement, the eight Kauffman Campuses schools have pledged a three-to-one match, which, combined with the Kauffman grants, will direct a minimum of \$100 million for the creation of new interdisciplinary entrepreneurship education programs in American higher education (Kauffman's Webpage)

In a small open economy as the Dutch it is vital that entrepreneurs and new firms are 'born globals'. Entrepreneurs have to be able to compete in global markets if they are to be successful and entrepreneurship education should reflect this. International aspects should have a central place in the entrepreneurship activities at universities.

The international dimension can be build into the education in entrepreneurship through the hiring of international experts as well as through cooperation agreements and strategic alliances with leading international universities. These cooperative arrangements might furthermore help build the necessary entrepreneurship skills at the Dutch universities.

Finally, it is important that education in entrepreneurship at the universities has a broad focus. The courses and activities should not only strengthen the entrepreneurial skills among future entrepreneurs, but should also strengthen the knowledge of entrepreneurship among future entrepreneurship advisors and employees in entrepreneurial firms.

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# Appendix 1: Data Description

InnovationMonitor relies on data from a number of international institutions including the OECD, Eurostat, World Economic Forum (WEF), International Institute of Management Development (IMD), Accenture and CapGeminiErnst&Young. More detail on data can be found in the background reports.

## Human Resources

### 1. Performance

#### 1.1. Share of knowledge workers

- *Share of employees in high-skilled jobs.* International Labour Organizations (ILO) database (laborsta.ilo.org) and "Measures of Skills from Labour Force Surveys - an Assessment", Table 1a. OECD (2002).
- *Private sector researchers per 10 000 labour force.* STI Scoreboard OECD (2003).
- *Adult literacy skills.* "Literacy in the information age", Table 2.1. OECD (1999).

#### 1.2. Flexible organisation

- *Delegation of authority within companies.* "The Global Competitiveness Report 2002-2003", Table 10.13. WEF (2003).
- *Employees are managed by objectives.* European Survey on Working Conditions. SIBIS (2000).
- *Worker motivation.* "World Economic Yearbook", Table 3.2.07. IMD (2003).
- *Companies' adaptability to market changes.* As above.

#### 1.3. Strategic management

- *Management by a clear corporate strategy.* "The CRANET Survey". CRANET (1999).
- *Competent top-managers.* "World Economic Yearbook", Table 3.2.20. IMD (2003).
- *Top-managers have international experience.* "World Economic Yearbook", Table 3.2.19. IMD (2003).

## 2. Framework conditions

### 2.1. Education expenditure

- *Expenditure on educational institutions as a percentage of GDP.* "Education at a Glance" Table B2.1a. OECD (2003).
- *Expenditure on educational institutions per student relative to GDP.* "Education at a Glance", Table B1.2. OECD (2003).
- *Expenditure on educational institutions per student relative to GDP – primary education.* "Education at a Glance", Table B1.2. OECD (2003).
- *Expenditure on educational institutions per student relative to GDP – secondary education.* "Education at a Glance", Table B1.2. OECD (2003).
- *Expenditure on educational institutions per student relative to GDP – tertiary education.* "Education at a Glance", Table B1.2. OECD (2003).

### 2.2. Education incentives

- *Public subsidies for students, families etc. as a pct. of GDP.* "Education at a Glance", Table B5.2. OECD (2003).
- *Relative earnings of the population with income from employment, all tertiary education.* "Education at a Glance", Table A14.1. OECD (2003).
- *Tax treatment of training - after tax returns to training relative to bank deposit.* "Intangible Investment, Growth and Policy", Table 5. OECD (2001).
- *Percentage of 15-year olds expecting to have a white-collar occupation.* "Education at a Glance", Table A11.1. OECD (2003).

### 2.3. Magnitude and quality of basic education

- *Percentage of the 25-34 year olds that has attained at least upper secondary education.* "Education at a Glance", Table A1.2. OECD (2003).
- *Reading literacy of 15-year olds.* "Outcomes of Learning", Figure 3. OECD (2001).
- *Mathematics literacy of 15-year olds.* As above, Figure 10.
- *Scientific literacy of 15-year olds.* As above.
- *Preference for co-operative learning.* "Learners for Life – Student Approaches for Learning – Results from PISA", Table C3.2. OECD (2000).

#### 2.4. *Scope and relevance of tertiary education*

- *Percentage of the population aged 25 to 64 that has attained tertiary type-B education or tertiary type-A and advanced research programmes.* "Education at a Glance", Table A2.3. OECD (2003).
- *Percentage of the population aged 25 to 34 that has attained tertiary type-B education or tertiary type-A and advanced research programmes.* "Education at a Glance", Table A2.3. OECD (2003).
- *Entry rates to tertiary education.* "Education at a Glance", Table C2.1. OECD (2003).
- *Survival rate in tertiary education.* "Education at a Glance", Table A2.2. OECD (2003).
- *Tertiary graduation rates – advanced research programmes.* "Education at a Glance", Table A2.1. OECD (2003).
- *Unemployment rate for highly educated.* "Employment Outlook 2003", Table B og D. OECD (2003).
- *University/industry research collaboration:* "The Global Competitiveness Report 2002-2003", Table 3.09. WEF (2003).

#### 2.5 *Scope and relevance of supplementary training*

- *Participation in job-related education.* "Education at a Glance", Table C4.1. OECD (2003).
- *Course hours per participant.* "Statistics in Focus, Theme 3", Figure 2. Eurostat (2003).
- *Participation in self-directed learning.* Pocket Books 2002/03", p. 145 SIBIS (2002).
- *Local availability of specialised research and training.* "The Global Competitiveness Report 2002-2003", Table 9.10. WEF (2003).

#### 2.6 *Flexible organisation*

- *Flexibility in hiring and firing.* <http://rru.worldbank.org/doingbusiness> "Doing Business". World Bank (2003).
- *Workplace at home.* SIBIS (2002).
- *Employees' discretion over working time.* (SIBIS) 2002.
- *Adaptability of labour force when faced with new challenges.* "World Competitiveness Report", Table 4.5.02. IMD (2001).

## *2.7 Management skills*

- *Quality of management schools.* “The Global Competitiveness Report 2002-2003”, Table 10.16. WEF (2003).
- *Share of female managers.* UN Human Development Report (2002).
- *Extent of incentive compensation.* “The Global Competitiveness Report 2002-2003”, Table 10.14. WEF (2003).
- *Composition and external influence on company boards.* “The Global Competitiveness Report 2002-2003”, Table 10.17. WEF (2003).

# ICT

## 1. Performance

### 1.1. Basic ICT-use

- Number of workers using PCs at work, OECD (2003).
- *Number of PCs per office worker.* IDC, Eurostat, US Bureau of Labour Statistics and ILO.
- *Percentage of businesses with ten or more employees using the Internet.* STI Scoreboard, Figure B.4.4.1. OECD (2003).
- *Percentage of business with ten or more employees that have Internet access.* STI Scoreboard, Figure B.4.4.1. OECD (2003).

### 1.2 Advanced ICT-use

- *Internet purchase and sales.* STI Scoreboard, Figure 4.6.1 OECD (2003).
- *Business assessment of advanced ICT-skills in companies.* The indicator is composed of three indicators:
  - *Business assessment of extent to which the Internet is used for marketing purposes.* WEF, Table 8.04.
  - *Business assessment of extent to which the Internet has contributed to lower inventory costs.* WEF, Table 8.01.
  - *Business assessment of the application of wireless e-business application among customers and suppliers.* WEF, Table 8.05.
- *Share of companies that use Internet for sophisticated services.* Eurostat (2003): "Statistics on the information society in Europe". The indicator is composed of:
  - *Share of companies that use the Internet for financial services.*
  - *Share of companies that use the Internet to monitor markets and competitors.*

## 2. Framework conditions

### 2.1 Digital infrastructure

#### 2.1.1 Infrastructure

- *Fixed line subscriptions per 100 inhabitants.* STI Scoreboard, Table B.3.1.1. OECD (2003).
- *Mobile phone subscribers per 100 inhabitants.* STI Scoreboard, Table B.3.1.1. OECD (2003).
- *Broadband access per 100 inhabitants.* OECD's Statistical Portal (2003).
- *Availability of broadband.* "The Development of Broadband Access in Rural and Remote Areas", OECD (2004).

#### 2.1.2 Internet access charges

- *Monthly fee ADSL.* "Benchmarking Broadband Access in the OECD", OECD (2004). Minimum 256 Kbit/s and minimum 1 GB of free internet access.
- *Internet access basket for 40 hours at daytime/night time.* OECD Communications Outlook (2004), Table 6.4 and Table 6.5.
- *Internet access basket for 20 hours at daytime/night time.* OECD Communications Outlook (2003), Table 6.6. and Table 6.7.

### 2.2 Digital skills

#### 2.2.1 Digital consumers

- *Internet subscribers per 100 inhabitants.* STI Scoreboard, Table B.4.1.1. OECD (2003).
- *Number of PCs per 100 inhabitants.* OECD Communication Database. OECD (2002).
- *Digital literacy index.* "Statistical Indicators Benchmarking the Information Society Programme, SIBIS" 2002/2003 (No. 60). The digital literacy index combines four types of skills in using the Internet:
  - *Communication.*
  - *Obtaining and installing software.*
  - *Questioning the source of information on the Internet.*
  - *Searching for the required information using search engines.*

- *"Digital divide" index.* SIBIS 2002/2003 (No. 74). The index is composed of for sub indices.
  - *Gender.*
  - *Age.*
  - *Education level.*
  - *Income.*

### 2.2.2 ICT skills in the workforce

- *Expenditures on ICT training per capita.* International ICT Benchmark 2002, Table 11, Ministry of Economic Affairs, Haag, Netherlands.
- *Share of employees having received PC training.* eEurope 2002. [http://europa.eu.int/information\\_society/eeurope/2002/benchmarking/index\\_en.htm](http://europa.eu.int/information_society/eeurope/2002/benchmarking/index_en.htm)
- *Usage of eLearning.* "Statistical Indicators Benchmarking the Information Society Programme", SIBIS" 2002/2003 (No. 72).
- *Home based teleworking.* "Statistical Indicators Benchmarking the Information Society Programme, SIBIS" 2002/2003 (No. 33).

### 2.2.3 Digitalisation of higher education

- *PCs and PCs with Internet per 100 students in primary education.* eEurope 2002; (a composite of PCs per student and PCs with Internet access) [http://europa.eu.int/information\\_society/eeurope/2002/benchmarking/list/estmichel/ca/computer\\_training/index\\_en.htm](http://europa.eu.int/information_society/eeurope/2002/benchmarking/list/estmichel/ca/computer_training/index_en.htm)
- *PCs and PCs with Internet per 100 students in secondary education.* Education at a Glance. OECD (2003).
- *PCs per 100 students in higher education.* OECD Information Technology Outlook 2002, p. 194 box 1.
- *Percentage of teachers with computer and internet training.* Ministry of Economic Affairs, Haag, Netherlands, "International ICT Benchmark 2002", Table 23.

### 2.2.4 Advanced ICT-skills

- *Share of high-skilled ICT workers of total workforce.* Eurostat, Labour Force Survey database (2003).
- *Business assessment of the availability of advanced ICT-skills.* IMD, Table 4.2.14. (2003),
- *Share of computer science graduates in higher education.* OECD Information Technology Outlook 2002, Figure 6.

## *2.3 eGovernment*

### *2.3.1 Information and one-way communication*

- *Business assessment of government usage.* WEF, Table 7. (2002-2003)
- *Business assessment of government readiness.* WEF, Table 6. (2002-2003)
- *Business assessment of the availability of on-line services.* WEF, Table 9.02. (2002-2003)

### *2.3.2 Two-way communication and full transaction*

- *E-government – overall maturity score.* eGovernment Leadership: High Performance, Maximum Value (Accenture 2004) Data is based on two indicators:
  - *Service maturity.* Depth and breadth of government on-line services (weight 70%).
  - *Customer relationship management.* Degree and quality of government on-line interaction (weight 30%).

## *2.4 Digital security*

- *Business assessment of level of data security.* IMD (2003).



# Innovation

## 1. Performance

### 1.1. Knowledge building

- *Number of companies having introduced new or significantly improved products or processes.* Community Innovation Survey (CIS-III). Data covers the period from 1998 to 2000.
- *Business assessment of innovation activity.* The indicator is based on three individual indicators from the WEF survey (2001):
  - Extent to which new products and processes are developed.
  - Extent to which companies develop new designs.
  - Extent to which innovation drives revenue growth.
- *Number of patents in “triadic” patent families in the US, Japan and Europe.* STI Scoreboard, Table A.11.2. OECD (2003).

### 1.2. Knowledge sharing

- *Import of foreign technology.* STI Scoreboard. OECD (2002).
- *Business assessment of application of new technology.* Table 3.02. WEF (2003).
- *Number of companies with co-operation arrangements on innovation activities with other enterprises or institutions.* CIS-III. Data covers the period from 1998 to 2000.

## 2. Framework Conditions

### 2.1. Public knowledge building

#### Size of public research

- *Government R&D expenditures as a percentage of GDP.* STI Scoreboard, Table A.5.1. OECD (2002).
- *Government researchers per 10 000 labour force.* STI Scoreboard, Table A.5. OECD (2002).

#### Quality of public research

- *Scientific and technical articles per million population in 5 000 periodicals.* STI Scoreboard, Table A.13.1. OECD (2002).
- *Business assessment of the quality of research.* Table 3.05. WEF (2002).

## Relevance of public research

- *Number of scientific and technical articles cited in patents issued in the United States.* The indicator is based on data from the United States.
- *Number of scientific and technical articles in 19 industry-relevant disciplines per million populations.* STI Scoreboard. OECD (2001).
- *Scientists and engineers employment as a share of the labour force.* STI Scoreboard. OECD (2001).
- *Business' assessment of the relevance of research.* Table 3.10. WEF (2002).

## 2.2. Co-operation on innovation between knowledge institutions and the private sector

### Cooperation in R&D

- *Share of firms with co-operation agreements with government or higher education.* CIS-III.
- *Business assessment of collaboration with universities in R&D activities.* Table 3.08. WEF (2002).
- *Business funding of public research as a share of GDP.* STI Scoreboard. OECD (2002).

### Commercialization of research

- *Incubators per million populations.* CORDIS database for incubators. EU (2002).
- *Business assessment of knowledge transfer between universities and companies.* IMD (2002).

### Knowledge workers

- *Business researchers per 10 000 labour force.* STI scoreboard, Table A.9.2.1. OECD (2002).
- *Share of "knowledge-intensive workers".* DSTI (OECD 2002): "Measures of Skills from Labour Force Survey – An Assessment".
- *Non-national knowledge workers.*

## 2.3. Innovation financing

### Tax incentives and subsidies

- *Public financing of private R&D.* STI Scoreboard. OECD (2002).

- *Business assessment of public support to private R&D.* Table 3.07. WEF (2002).
- *Rate of tax subsidies for 1 US dollar of R&D, SMEs.* The amount of tax subsidies to R&D is calculated as 1 minus the B-index, where  $A$  = the net present discounted value of depreciation allowances, tax credits and special allowances on R&D assets, and  $\tau$  = the statutory corporate income tax (CITR). In a country with full write-off of current R&D expenditure and no R&D tax incentive scheme,  $A = \tau$ , and consequently  $B = 1$ . The more favourable a country's tax treatment of R&D, the lower its B-index. STI Scoreboard, Table A.6.6.1. OECD (2002).
- *Rate of tax subsidies for 1 US dollar of R&D, large companies.*
- *Business' assessment of government tax credits for firms conducting R&D.* Table 3.07. WEF (2002).

#### Access to venture capital

- *Venture capital investment in start-up as share of GDP.* Data National Venture Association (the US), Canadian VCA, European VCA and the Asian VC Journal. Annual average investment 1998-2001.
- *Venture capital investment in expansion as share of GDP.* As above.

#### Foreign co-financing

- *Business assessment of the role of FDI as an important source of new technology.* Table 3.04. WEF (2002).
- *Growth in foreign R&D.*

## 2.4. Market conditions

#### Access to technology

- *Business assessment of development and application of technology being supported by the legal environment.* Table 6.04. WEF (2002).
- *Business assessment of intellectual property protection.* Table 6.04. WEF (2002).
- *Business assessment of availability of specialized research and training services.* Table 6.04. WEF (2002).
- *Mergers and Acquisitions.*

- *National ownership of non-national innovations.*
- *Scientific articles co-written with non-national researchers.*

#### Competitive environment

- *Index for government regulation.* Danish Competition Authority (2002).
- *Business assessment of competition legislation in pre-venting unfair competition.* IMD (2001).

#### Quality of customers and suppliers

- *Business assessment of whether buyers are knowledgeable and demanding/buying innovative products.* Table 9.01. WEF (2002).
- *Business assessment of technological capability and international competitiveness of local suppliers.* Table 3.09. WEF (2002).
- *Business assessment of the extent to which government procurement of advanced technology products is based on price alone or encourages innovation.* Table 3.09. WEF (2002).

# Entrepreneurship

## 1. Performance

### 1.1. Start-up activity

- *Survey on entrepreneurial activity*. Global Entrepreneurship Monitor (GEM) 2005.
- Start-up rates, EUROSTAT Business Demography and national sources.

### 1.2. New-firm growth

- *Share of young companies with annual growth of more than 60% over a period of two years*. The growth indicators are based on information from the ORBIS database (Bureau van Dijk) and measures growth in two areas:
  - Growth among young firms, small to medium size, turnover, 2001-2003.

## 2. Framework conditions

### 2.1 Opportunities

#### 2.1.1 Tech-transfer regulation

- *Uni/industry research collaboration*. WEF Survey data.
- *Technological cooperation*. WEF Survey data.

#### 2.1.2 Procurement regulation

- *SMEs share of total public procurement*.

#### 2.1.3 Entry barriers

- *Barriers to competition*. OECD.
- *Public ownership*. OECD.
- *Public involvement in business operation*. OECD.

#### 2.1.4 Access to foreign markets

- *Share of new enterprises with exports*. FOR A.
- *Export credits and insurance*. WEF Survey data.

### 2.2 Capital

#### 2.2.1 Business Angels

No data available

#### 2.2.2 Loans

- *Extent of guarantees for SMEs.* Lundström and Stevenson (2003).
- *Private credit.* World Bank.
- *Interest rate spread.* World Bank.
- *Cost to Create Collateral.* World Bank.
- *Country Credit rating - 2.3.04/418.* IMD/WEC.

### 2.2.3 Venture Capital

- *Venture capital - early stage.* OECD.
- *Venture capital - expansion stage.* OECD.

### 2.2.4 Stock markets

- *Capitalization of secondary stock market.* OECD.
- *Newly listed companies in secondary stock market.* OECD.
- *Capitalisation of primary stock market.* World Bank.
- *Turnover in primary stock market.* World Bank.

### 2.2.5 Wealth & bequest tax

- *Revenue from bequest tax.* OECD.
- *Revenue from net wealth tax.* OECD.
- *Top marginal bequest tax rate.* OECD.

### 2.2.6 Capital taxes

- *Taxation of dividends – top marginal tax rate.* OECD.
- *Taxation of dividends –top marginal tax rate for self-employed.* OECD.
- *Taxation of stock options.* EU.
- *Taxation of capital gains on shares – short term.* OECD.
- *Taxation of capital gains on shares – long term.* OECD.

## 2.3 Ability

### 2.3.1 Restart possibilities

- *Claims on a bankrupt's assets - length of time.* OECD.

### 2.3.2 Entrepreneurship education

- *Entrepreneurship education at primary & secondary level.* GEM.
- *Entrepreneurship education at higher levels.* GEM.

### 2.3.3 Traditional business education

- *Quality of management schools.* WEF Survey data

### 2.3.4 Entrepreneurship Infrastructure

- *Government programs.* GEM.

## 2.4 Incentives

### 2.4.1 Personal income tax

- *Highest marginal income tax plus social contributions.* OECD.
- *Average income tax plus social contributions.* OECD.

### 2.4.2 Business tax & fiscal incentive

- *SME tax rates.* OECD.
- *Taxation of corporate income revenue.* OECD.

### 2.4.3 Bankruptcy legislation

- *Actual cost to close a business.* World Bank.
- *Actual time to close a business.* World Bank.

### 2.4.4 Social security discrimination

### 2.4.5 Administrative burdens

- *Number of procedures for starting a business.* World Bank.
- *Number of days for starting a business.* World Bank.
- *Costs required to start a business.* World Bank.
- *Regulatory and administrative opacity – Index.* OECD.
- *Enforcing contracts - number of procedures.* World Bank.
- *Enforcing contracts - time.* World Bank.
- *Minimum of capital required to start business.* World Bank.
- *Enforcing Contracts - Cost in pct of debts.* World Bank.

### 2.4.6 Labour market regulation

- *Flexibility of hiring – Index.* World Bank.
- *Flexibility of firing – Index.* World Bank.
- *Rigidity of Hours Index.* World Bank.
- *Number of administrative procedures when recruiting first employee.* EU.
- *Number of administrative procedures when recruiting additional employee.* EU.
- *The costs of firing.* World Bank.

## 2.5 Entrepreneurial motivation

- *Cultural and social norms.* GEM.
- *Entrepreneurial motivation.* GEM.
- *Selfemployment preferences*
- *The wish to own one's own business*
- *Desirability of becoming self-employed*
- *Risk*

# Appendix 2: Composite Indices and Robustness Analysis

## Composite indices

Composite indices are increasingly used in comparing and ranking countries in different areas such as industrial competitiveness, globalization and innovation.

No guidance exists as to a coherent theory for constructing composite indices. The OECD, The EU and The UN have begun collaboration on a project aimed at standardising the construction of composite indices. FORA is part of this effort and have participated in numerous workshops.

When constructing composite indices a number of issues have to be dealt with:

- Standardizing variables to allow comparisons
- Weighting variables and groups of variables and
- Conducting robustness analysis of aggregated variables

## Standardising data

Variables are often expressed in various units and have to be normalized to render them comparable. Several techniques can be used to standardize individual indicators. Commonly used methods include the following:

- *Standard deviation from the mean*, which imposes a standard normal distribution (i.e. a mean of 0 and a standard deviation of 1).
- *Distance from the mean*, where the mean value is given 100 and countries receive scores depending on their distance from the mean.
- *Distance from the group leader*, which assigns 100 to the leading country and other countries are ranked as percentage points away from the leader
- *Distance from best and worst performer*, where positioning is in relation to the global maximum and minimum and the index takes values between 0 (laggard) and 100 (leader)

In the simple ranking of performance and framework conditions the “Distance from best and worst performer” has been selected. The OECD also uses this approach in their benchmarking efforts.



## Weighting variables

Country rankings depend on how individual variables are weighted. The ranking of countries on the indices for performance and framework conditions are based on a simple weighting where individual indicators are assigned identical weights (see Box 1).

### Box 1.

In ranking countries all variables are given common weights.

When constructing a composite index (CI) for country  $i$ , using indicators  $X_1 \dots X_n$ ,  $X$  is the given indicator and  $n$  the number of indicators used for calculating the composite index. To add up indicators in the CI, data must be standardized by applying one of the four methods presented above.

The standardised variables are now shown as  $x_1 \dots x_n$ . The composite index for country  $i$ , variable  $j$  is calculated as the sum of the standardised values  $x_{ji}$ , weighted with the coefficient  $w_j$  (A1).

$$CI_i = w_1 x_{1i} + w_2 x_{2i} + \dots + w_n x_{ni} = \sum_{j=1}^n w_j x_{ji}$$

For  $w_j$  weights in CI equals 1  $\sum_{j=1}^n w_j = 1$

# Robustness Analysis

A variety of difficulties can arise with regards to selecting, weighting, standardising and aggregating variables into a composite indicator. Outcomes and country rankings may depend largely on the approach selected.

For this reason, a robustness analysis should be conducted to analyze the impact of including and excluding various variables, changing weights, and using different standardisation techniques on the results of the composite indicator.

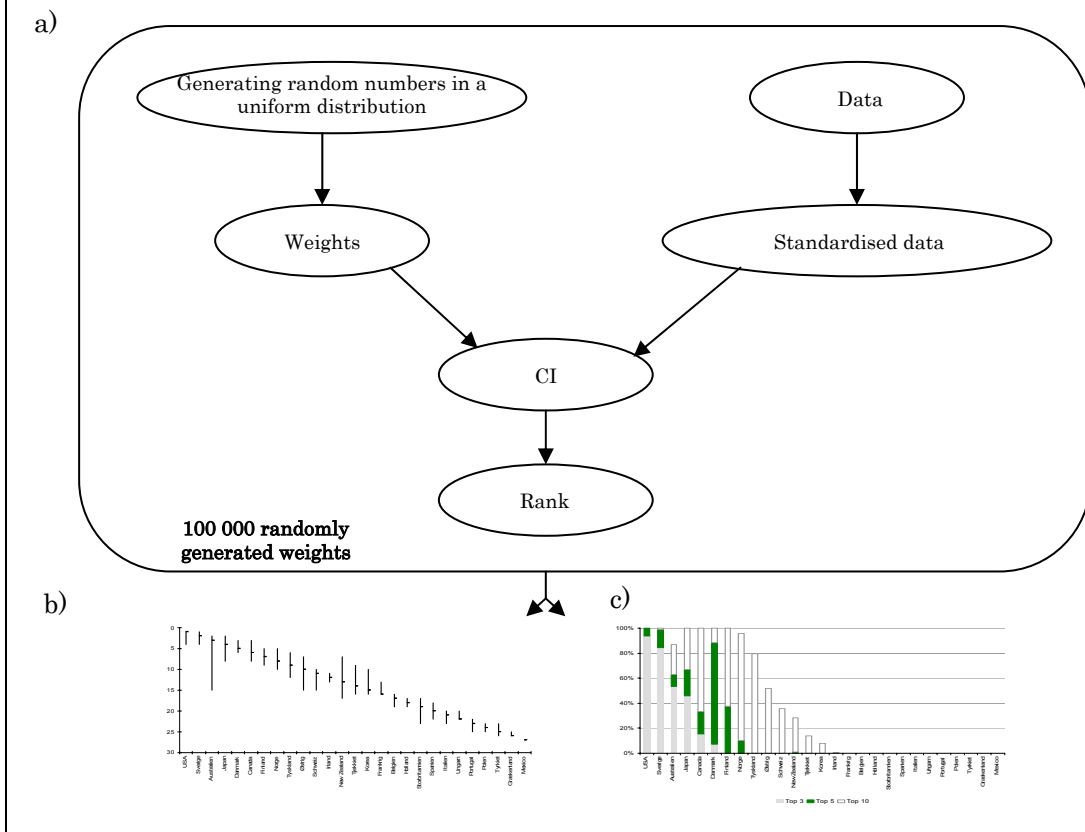
Furthermore the robustness analysis allows for identifying top three, top five and top ten performing countries on a given composite index.

To determine how the choice of weights influence country rankings on a given index a Monte Carlo simulation is conducted, i.e. a number of different combinations of weights.

The individual steps in the robustness analysis are illustrated below (a). A combination of weights based on randomly generated numbers from a uniform distribution. These weights are used to generate a composite index (CI). Based on the composite index the country rankings are calculated. This procedure is repeated 100 000 resulting in 1000 000 different combinations of weights and 100 000 different country rankings.

Figure b shows the possible spread (best and worst ranking) from the Monte Carlo simulation. The figure shows individual country rankings based on a simple weighting method where each country are given identical weights.

Figure c shows the possible ranking (top three, top five and top ten) based on the randomly generated weights.



## Appendix 3: Missing Values

Like most statistical series composite indicators are plagued by the problem of missing values. In many cases data are only available for a limited number of countries or only for certain data components. As an example EuroStat only publishes data for members of the European Union.

Missing values can be estimated by using an auxiliary variable that is subject to three requirements: 1) the auxiliary variable must have data for all countries, 2) it should be complimentary to the original variable and 3) the two variables must be highly correlated.

The EuroStat variable *share of workers having received PC-training* only has data for 14 countries. The World Economic Forum variable *business' assessment of the supply of highly skilled IT workers* covers all 27 OECD countries and is therefore used as an auxiliary variable.

The two variables show a high correlation (0, 81). A *regression analysis* is carried out to determine the missing value (see Box below).

The variable  $Y$  is assumed to contain missing values.  $M_Y$  is the number of countries with missing values. The auxiliary variable  $X$  is used to estimate missing values. Based on the two variable the following linear regression model is used:

$$Y_i = \beta_0 + \beta_1 X_i + e_i \quad , \quad \forall i \in M_Y$$

The regression coefficient  $\beta_0$  and  $\beta_1$  is estimated by applying the model using the OLS method:

$$\hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}$$

$$\hat{\beta}_1 = \frac{\sum_{i \in M_Y} (X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i \in M_Y} (X_i - \bar{X})^2}$$

Assuming that country  $j$  is missing data in variable  $Y$  we can apply the regression model to calculate the following estimate for the country's variable:

$$\hat{Y}_j = E[Y|X_j] = \hat{\beta}_0 + \hat{\beta}_1 X_j \quad , \quad j \notin M_Y$$

# Appendix 4: Composite Indices of Performance and Framework Conditions

## Human resources

### 1. Indicators for share of knowledge workers

The index for share of knowledge workers is composed of three indicators:

- Share of employees in high-skilled jobs
- Private sector researchers per 10 000 labour force
- Literacy among adults

**Table A1: Index for share of knowledge workers**

Country	Rank	Country	Rank	Country	Rank
Finland	1	Denmark	10	Korea	19
Sweden	2	Ireland	11	Spain	20
The US	3	Germany	12	Greece	21
Japan	4	Switzerland	13	Italy	22
Belgium	5	The UK	14	Hungary	23
Canada	6	New Z.	15	Poland	24
Norway	7	France	16	Portugal	25
<b>The Netherlands</b>	<b>8</b>	Czech Rep.	17	Turkey	26
Australia	9	Austria	18	Mexico	27

### 2. Indicators for flexible organisation

The index for organisation is made up of 4 indicators:

- Delegation of authority within companies
- Employees are managed by objectives
- Worker motivation
- Companies adaptability to market changes

**Table A2: Index for flexible organisation**

Country	Rank	Country	Rank	Country	Rank
Denmark	1	Austria	10	Italy	19
The US	2	Norway	11	France	20
Switzerland	3	Ireland	12	Spain	21
<b>The Netherlands</b>	<b>4</b>	Belgium	13	Turkey	22
Australia	5	The UK	14	Czech Rep.	23
Canada	6	Germany	15	Mexico	24
New Z.	7	Japan	16	Greece	25
Finland	8	Hungary	17	Portugal	26
Sweden	9	Korea	18	Poland	27

### 3. Indicators for strategic management

The index is composed of:

- Management by a clear corporate strategy
- Competent top-managers
- Top-managers with international experience

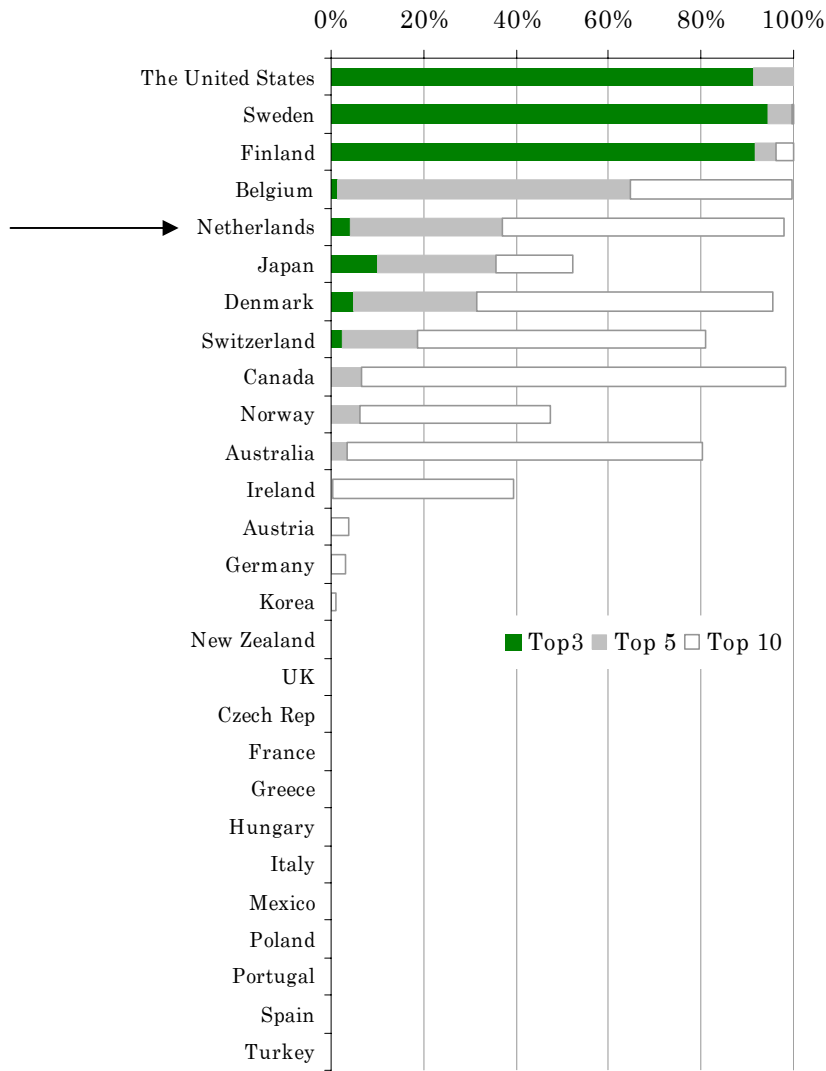
**Table A3: Index for strategic management**

Country	Rank	Country	Rank	Country	Rank
Sweden	1	Norway	10	Turkey	19
The US	2	Denmark	11	Spain	20
Belgium	3	Austria	12	New Zealand	21
Switzerland	4	Hungary	13	Greece	22
Finland	5	Korea	14	Czech Rep.	23
Australia	6	Mexico	15	Italy	24
<b>The Netherlands</b>	<b>7</b>	The UK	16	Japan	25
Ireland	8	France	17	Poland	26
Canada	9	Germany	18	Portugal	27

#### Robustness analysis

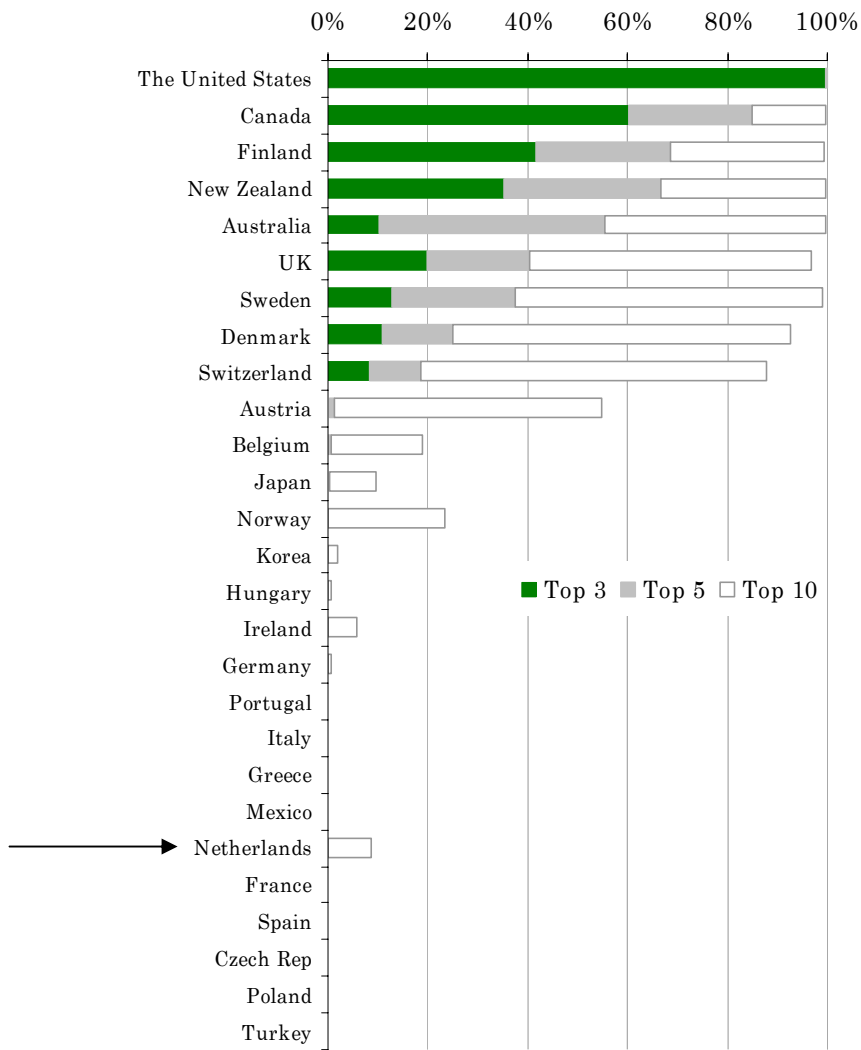
Figure A1 below shows the results of the *robustness analysis discussed in Annex 2* that details the frequency with which countries are ranked in the top-3, top-5 and top-10, respectively.

**Figure A1: Robustness analysis – Performance**



Note: All 27 countries are ranked according to the average of all performance indicators.

**Figure A2. Robustness analysis – Framework conditions**



# Innovation

## 1. Knowledge building

The index is composed of three indicators:

- Number of patents issued in the US, Japan and Europe
- The number of companies having introduced new or significantly improved products and processes
- Business assessment of innovation activity

**Table A4: Index for knowledge building**

Country	Rank	Country	Rank	Country	Rank
Switzerland	1	UK	10	Spain	19
Germany	2	France	11	Portugal	20
Japan	3	Canada	12	Czech Rep	21
Sweden	4	Norway	13	Hungary	22
Finland	5	Italy	14	Poland	23
United States	6	Ireland	15	Mexico	24
Denmark	7	Australia	16	Greece	25
Belgium	8	New Zealand	17	Turkey	26
<b>The Netherlands</b>	9	Korea	18	Spain	27

## 2. Knowledge sharing

The following indicators have been used in sizing knowledge sharing:

- Company import of technology
- Business assessment of the application of new technology
- Share of companies collaborating with other companies on innovation and technology

**Table A5: Index for knowledge sharing**

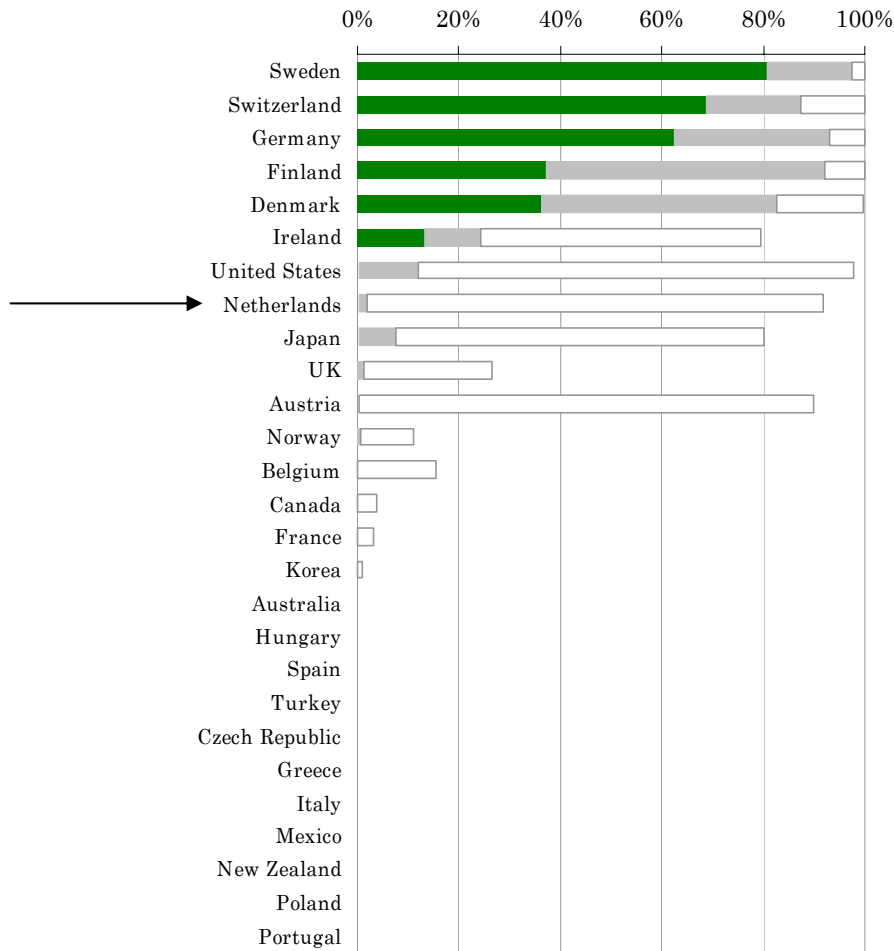
Country	Rank	Country	Rank	Country	Rank
Finland	1	Canada	10	Belgium	19
Ireland	2	<b>The Netherlands</b>	<b>11</b>	Spain	20
Germany	3	Australia	12	Turkey	21
Sweden	4	Korea	13	Czech Rep.	22
Denmark	5	Norway	14	Poland	23
The US	6	The UK	15	Italy	24
Japan	7	Hungary	16	Mexico	25
Switzerland	8	France	17	Greece	26
Austria	9	New Zealand	18	Portugal	27

The two performance indices are collated into a composite index (Figure A3). Sweden, Switzerland and Germany claim top-3 rankings more than 60% of the outcomes. The top-3 make up the top-3 on the indicator for *knowledge sharing*, while claiming the number 3, 4 and 8 rankings on the index for *knowledge building*.

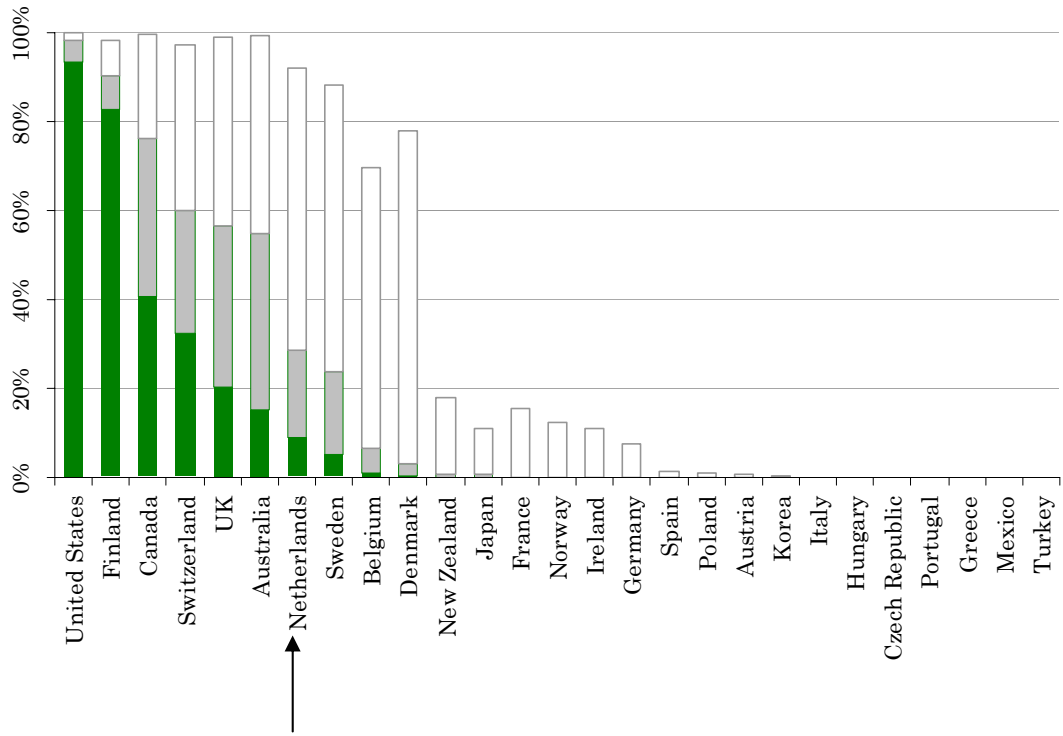


The Netherlands is in the lower part of the second group and is rarely among top-5 and never among top-3. Countries with similar performance include the United States, Japan and Austria that all rank in the top-10 in more than 80% of the outcomes.

**Figure A3: Robustness analysis – performance**



**Figure A4: Robustness analysis – framework conditions**



# ICT

## 1. Basic ICT-use

The index for basic ICT-use is based on the following indicators:

- Use of PCs in the work place
- Companies that use the Internet for purchasing or selling
- Share of companies with own Website

**Table A6: Index for basic ICT-use**

Country	Rank	Country	Rank	Country	Rank
The US	1	Austria	10	The UK	19
Sweden	2	Switzerland	11	Spain	20
Australia	3	Ireland	12	Italy	21
Japan	4	New Zealand	13	Hungary	22
Denmark	5	Czech Rep.	14	Portugal	23
Canada	6	Korea	15	Poland	24
Finland	7	France	16	Turkey	25
Norway	8	Belgium	17	Greece	26
Germany	9	<b>The Netherlands</b>	<b>18</b>	Mexico	27

## 2. Advanced ICT-use

The index is composed of the following indicators:

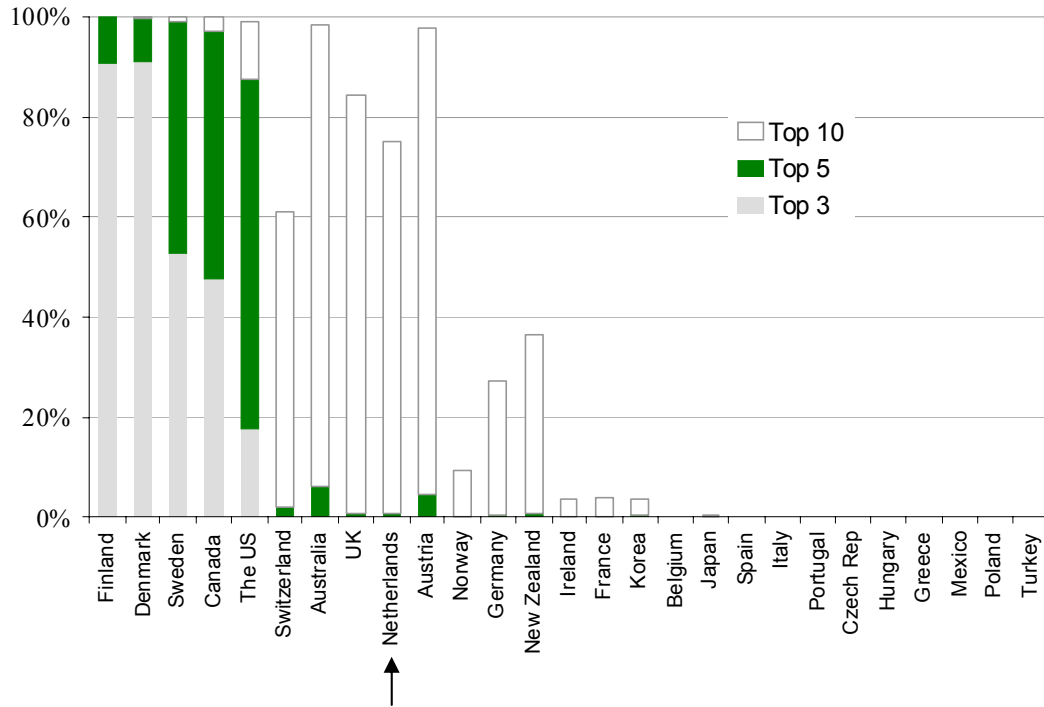
- Businesses using the Internet for purchasing and selling
- Business assessment of advanced ICT-use (composed of three indicators)

**Table A7: Index for advanced ICT-use**

Country	Rank	Country	Rank	Country	Rank
Finland	1	Austria	10	Ireland	19
Switzerland	2	Belgium	11	Spain	20
Sweden	3	Australia	12	Turkey	21
The US	4	Korea	13	Poland	22
<b>The Netherlands</b>	<b>5</b>	France	14	Mexico	23
Canada	6	Japan	15	Italy	24
Germany	7	New Zealand	16	Portugal	25
Denmark	8	The UK	17	Hungary	26
Norway	9	Czech Rep.	18	Greece	27

When collating country rankings for basic- and advanced ICT-use into a single index Finland, the United States and Sweden claim top-3 rankings more than 80% of the time (Figure A5).

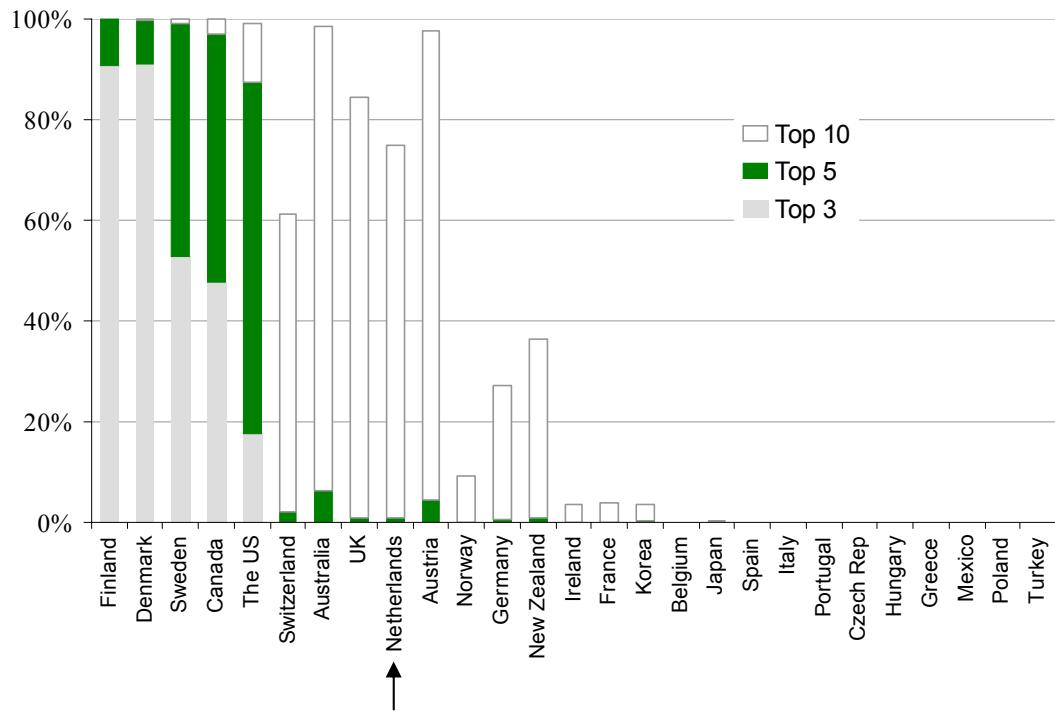
**Figure A5: Robustness analysis - Performance**



A second group of six countries rank in the top-10 more than 60% of the time. The Netherlands belongs to this group. It ranks in the top-5 in app. 6% of the calculations and in top-10 in close to 75% of the outcomes.

The 9 identified ICT policy areas are weighted into a composite index as illustrated in Figure A6. The robustness analysis shows that Finland, Denmark, Canada and Sweden are ranked in the top-3 more than 50% of the time.

**Figure A6: Robustness analysis – framework conditions**



# Entrepreneurship

## 1. Start-up activity

- The indicator for *start-up activity* is based on the Global Entrepreneurship Monitor's (GEM) Total Entrepreneurship Index (2004) (weight 1/3).
- Eurostat Business Demography Database (weight 2/3),

**Table A8: Index for start-up activity**

Country	Rank	Country	Rank
Canada	1	<b>The Netherlands</b>	<b>10</b>
Poland	2	Germany	11
United States	3	Italy	12
Ireland	4	Finland	13
Norway	5	Belgium	14
United Kingdom	6	Sweden	15
France	7	Portugal	16
Denmark	8	Japan	17
Spain	9		

## 2. New firm growth

The index for *new-firm growth* is based on the following indicators:

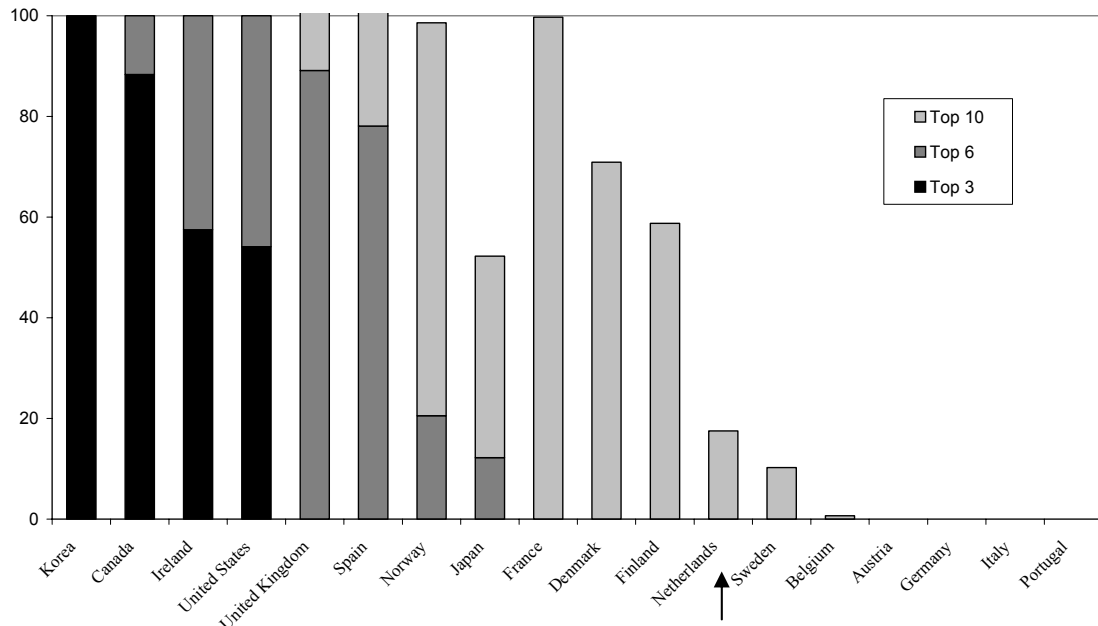
- Growth among young firms, small to medium size, turnover, 2001-2003

**Table A9: Growth among young firms, small to medium size, average turnover and employment), 2001-2003**

Country	Rank	Country	Rank
Ireland	1	France	10
Korea	2	Italy	11
United States	3	Belgium	12
Japan	4	Norway	13
Spain	5	Denmark	14
United Kingdom	6	Austria	15
Poland	7	Germany	16
Sweden	8	<b>The Netherlands</b>	<b>17</b>
Finland	9	Portugal	18

Only 18 countries have Data for more than one indicator. Korea, Ireland, Canada and the United States clearly outperform the rest of the countries. The growth data for Ireland is based on a less comprehensive sample than for the other countries. Hence, Ireland is not included among the top-3 countries (Figure A7).

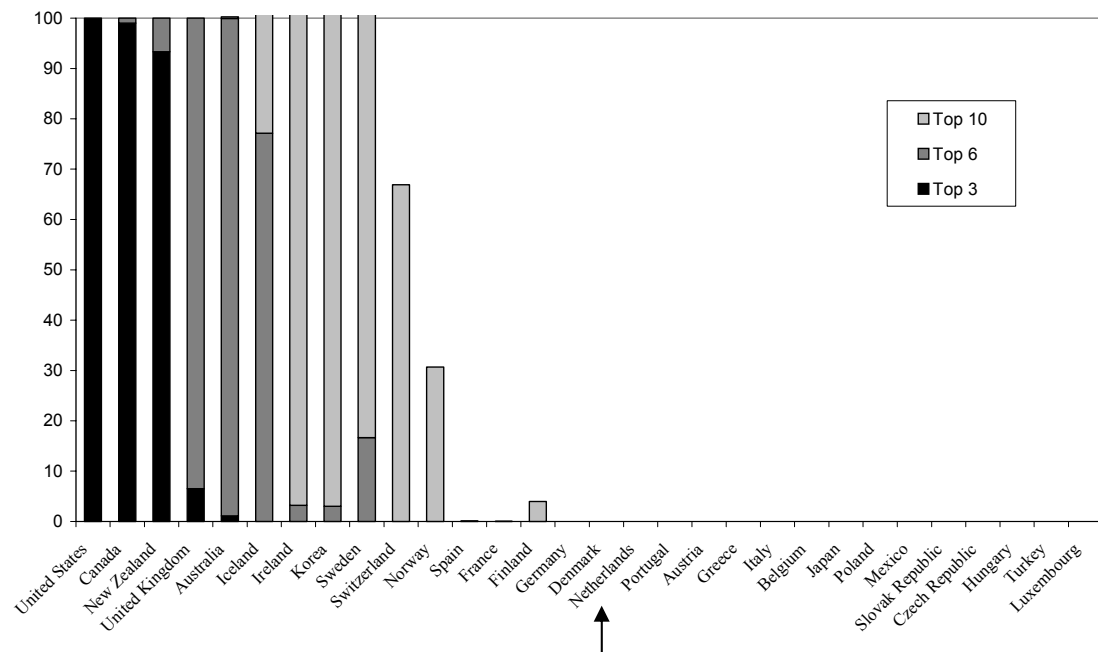
**Figure A7: Robustness analysis - performance**



The Netherlands is performing relative poorly on all indicators and does consequently have a low overall ranking.

The 18 policy areas are collated into a composite index for entrepreneurial activity (Figure A8). The robustness analysis identifies the United States, Canada and New Zealand as top-performers. The United Kingdom, Australia, Iceland, Ireland, Korea and Sweden make up a second group. The Netherlands has an average business environment for entrepreneurship.

**Figure A8 – Robustness analysis – framework conditions**



## Appendix 5: Tax Index

The tax index presented in Chapter 4 measures the built-in incentives for new investments, innovation and the supply of labour.

The indicator covers four variables:

- *Index of single average production workers (APW) without children, 2004.* Source: OECD Taxing Wages
- *Index of two-earner married couple (APW), 2004.* Source: OECD Taxing Wages
- *The effective tax ratio on second earner, 2004.* Source: OECD Taxing Wages
- *Highest marginal income tax plus social contribution, 2004.* Source: OECD Taxing Wages

*Basic central government corporate tax rate, 2000.* Source: Ernst & Young Corporate tax guide and OECD DSTI/DOC(2002) p 13

The four variables have been normalised using the method described above.

Weights are based on the contributions of each tax source to total tax revenue. It follows that if the contribution of valued added taxes to total tax revenue is twice as high as the contributions from corporate taxes then the weight assigned to values added taxes should be double that of corporate taxes.