Structural reform in the Netherlands 2013-2018

Final report

Written by: Ecorys Nederland B.V., main authors:

Lars Meindert, Mathijs Hageraats, Patrick de Bas, Stephanie Bouman, Martin van der Ende, Laura Heidecke

In cooperation with:
Henri de Groot (VU University - Amsterdam)

Date: 20 September 2018

EUROPEAN COMMISSION

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
Directorate A — Competitiveness and European Semester
Unit A.2 — European Semester and Member States' Competitiveness

Contact: Mr. Thomas Brannström

E-mail: GROW-A2@ec.europa.eu

European Commission
B-1049 Brussels

EUROPEAN COMMISSION

Structural reform in the Netherlands 2013-2018

Final report

2018

EUR [number] EN

Europe Direct is a service to help you find answers to your questions about the European Union.

Freephone number (*)**:**

00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

More information on the European Union is available on the Internet (http://europa.eu).

Luxembourg: Publications Office of the European Union, 2015

PDF	ISBN XXX-XX-XX-XXXXX-X	ISSN XXXX-XXXX	doi:XX.XXXX/XXXXXX	DS-AU-XX-XXX-EN-N

Table of Contents

1 Introduction to the study

1.1 Study context: structural reforms to strengthen the economic future of the EU

In response to the severe economic challenges in the aftermath of the 2008 economic crisis, the European Commission presented in September 2010 a broad set of measures to regain and strengthen the economic position of the European Union. These measures consisted of two main pillars. First of all, legislation was introduced to secure and improve budgetary discipline among the Member States and to strengthen the EU Stability and Growth Pact (SGP).[1] Besides that, the Member States agreed upon provisions to strengthen the stability, coordination and governance in the EU economic and monetary union.[2] This agreement on strengthened coordination among Member States builds upon existing mechanisms that link directly to the Treaty on the Functioning of the European Union (TFEU) or its legal predecessors.[3]

The European Semester: coordination of economic and budgetary plans of Member States

One of the main instruments for this extended coordination is the **European Semester**, within which the European Commission and Member States discuss and coordinate their economic and budgetary plans. This includes the EU's overall ambitions for long-term economic growth, the creation of jobs and policies to foster innovation. The European Semester pursues four goals:[4]

- Ensuring sound public finances;
- Preventing excessive macroeconomic imbalances in the EU;
- Supporting structural reforms to create more jobs and growth;
- Boosting investment.

Each year's semester runs from November to July and is built upon five main phases: (i) in November the European Commission presents the general economic priorities for the EU and provides policy guidance to Member States for the next year. This is (ii) followed by the publication of specific country reports by the European Commission in February/March. These reports provide an overview of the economic and social developments in the respective Member State, and take stock of the budgetary situation as well as the progress made with regard to the implementation of the previous year's recommendations. (iii) National governments subsequently present their national reform programmes and stability programme to the European Commission in March/April. Based on these programmes (iv) country-specific recommendations are prepared, which are endorsed and formally adopted by the Council around June/July. Finally (v), the national governments consolidate the recommendations within their reform programmes.

The objective of this study: assessment of structural reforms in the Netherlands

---

1 See Council Directive 2011/85/EU on requirements for budgetary frameworks of the Member States, and Regulation (EU) no 473/2013 on common provisions for monitoring and assessing draft budgetary plans and ensuring the correction of excessive deficit of the Member States in the euro area.

2 Treaty on stability, coordination and governance in the economic and monetary union, February 2012.

3 Article 5 refers to coordination of economic, employment and social policies. Also the applicable TFEU titles refer to coordination among Member States, see specifically title VIII (economic and monetary policy), title IX (employment) and tile X (social policy).

4 European Commission, "The European Semester: the framework", see: https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/framework_en.

Structural reforms are an important element of the European Semester, as they aim to raise productivity, economic growth, employment, social welfare, etc. Specific fields of attention within the European Semester are, amongst others, the business environment, labour markets and skills, the green economy and fiscal stability. In early 2019 the European Commission will publish further country reports for the various Member States. In order to prepare and inform the work on these publications, the Commission requested to assess the (need for) structural reforms in the Netherlands. The **specific objective** of this study is "*to identify past, present, and pending structural reforms in the Netherlands for the period 2013-2018 and to analyse and report on their origins and the intended and actual impacts*". Due to the forward-looking character of this study, specific attention is given to "pending structural reforms" and whether these can contribute to the overall prosperity of the Netherlands and the European Union.

1.2 Putting structural reform in a broader perspective

1.2.1 The economic performance of the Netherlands

Various international rankings indicate that the Netherlands is performing well in terms of international competitiveness, which the World Economic Forum (WEF) defines as "*the total set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can earn*".[5]

Global competiveness index: high ranking for the Netherlands

The Netherlands is ranked fourth out of 137 economies in the WEF's most recent (2017-18) Global Competitiveness Report[6], behind Switzerland, the US and Singapore. Arguably the most prominent and influential survey of its kind, the Global Competitiveness Report is based on 12 indicators (pillars), including the macroeconomic environment, labour-market efficiency and business sophistication.

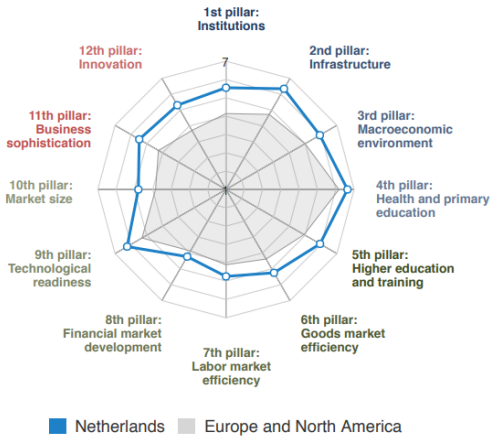
[5] World Economic Forum (2015). "The Global Competitiveness Report 2015-2016". See: http://reports.weforum.org/global-competitiveness-report-2015-2016/methodology/.

[6] World Economic Forum (2017). "The Global Competitiveness Report 2017-2018". See: http://reports.weforum.org/global-competitiveness-index-2017-2018/. Note: while prominent and influential, the World Economic Forum Global Competitiveness Report is not without issues. Being heavily based on a perception survey, it is for example not clear to what extent perceptions are objective reflections of competitiveness, and are comparable across countries and over time.

Figure 1.1 The Netherlands - WEF Global Competitiveness Report (2017-2018)

Index Component	Rank/137	Score (1-7)	Trend	Distance from best
Global Competitiveness Index	4	5.7		
Subindex A: Basic requirements	4	6.2		
1st pillar: Institutions	7	5.8		
2nd pillar: Infrastructure	3	6.4		
3rd pillar: Macroeconomic environment	14	6.1		
4th pillar: Health and primary education	4	6.7		
Subindex B: Efficiency enhancers	8	5.5		
5th pillar: Higher education and training	4	6.1		
6th pillar: Goods market efficiency	5	5.5		
7th pillar: Labor market efficiency	13	5.1		
8th pillar: Financial market development	28	4.6		
9th pillar: Technological readiness	3	6.3		
10th pillar: Market size	23	5.1		
Subindex C: Innovation and sophistication factors	4	5.6		
11th pillar: Business sophistication	4	5.7		
12th pillar: Innovation	6	5.6		

Edition	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rank	5 / 144	8 / 148	8 / 144	5 / 140	4 / 138	4 / 137
Score	5.5	5.4	5.5	5.5	5.6	5.7



Source: World Economic Forum.

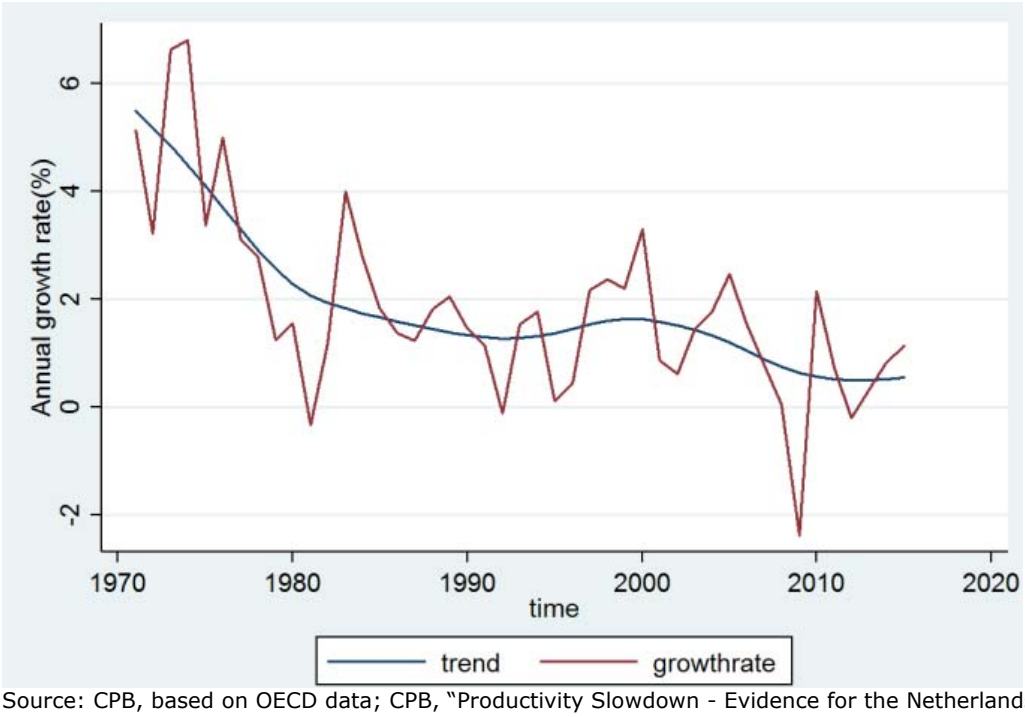
An assessment of the 12 pillars suggests various possibilities for improvement, for example in the field of financial-market development (ranked 28th), macroeconomic environment (14th) and labour market efficiency (13th).[7] Compared with other countries in Europe and North America, the Netherlands performs above average for all pillars. The Netherlands also performs strongly in the IMD's World Competitiveness Ranking, rising to 4th out of 63 economies in its 2018 edition.[8]

Productivity: evidence for a structural slowdown in the Netherlands

In line with the WEF's definition of competitiveness, the development of productivity growth is seen as one of the key indicators of long-term prosperity. The National Productivity Board for the Netherlands (CPB) concluded in March 2017 that (i) productivity growth in the Netherlands has slowed since 1970 (although it picked up around 2000), (ii) that this slowdown has a structural character[9] and (iii) that productivity growth differs by sector.[10] The long-term trend is shown in Figure 1.2.

[7] The "market size" (rank 23) is less relevant in this context, as it is mainly based on domestic market size and GDP.
[8] IMD (2018). "World Competitiveness Yearbook 2018".
[9] This implies that the CPB corrected for business cycles.
[10] CPB (2017), "Productivity Slowdown - Evidence for the Netherlands". See also: CPB (2016). "Evidence on macroeconomic and sectoral productivity performance".

Figure 1.2 Productivity growth (GDP per hour worked), the Netherlands, 1970-2015



Source: CPB, based on OECD data; CPB, "Productivity Slowdown - Evidence for the Netherlands", March 2017.

The CPB referred to various studies that show that (i) for the US the productivity growth accelerated after 1995 and slowed again around 2000, and (ii) also OECD countries show a productivity slowdown, but later than the US. For the Netherlands, the CPB observed that the productivity growth slowed, which is in line with the trend in other EU countries. The data show variety in the productivity growth patterns among sectors: while business services and post and telecommunications have experienced a slowdown in productivity growth since 2000, it has increased in transport, agriculture and ICT intensive manufacturing in that period. The CPB was not able to determine any "satisfactory explanations of why the productivity growth has slowed down", due to limitations in the available productivity data. The CPB refers to an OECD-conclusion as a potential explanation: "*the productivity growth of the most productive firms has not slowed, but the transmission of the successful technologies employed by the frontier firms to the other firms in the economy has slowed*." Recently, the CPB published a follow-up study[11] which, based on microdata, analysed the productivity of frontier firms and laggard firms. In contrast to the previous analysis, they found no divergence between the national frontier firms and laggard firms in terms of productivity and found evidence that all sectors are catching up.[12]

1.2.2 The need for structural reform in the Netherlands

Besides the WEF competitiveness report, other stakeholders also emphasise the need to structurally reform the Dutch economy in specific areas. Within the context of the European

[11] CPB (2018), "Frontier firms and followers in the Netherlands - Estimating productivity and identifying the frontier", CPB Background Document, July 2018.

[12] The authors briefly describe that they were not able to link their dataset to the OECD dataset and found different results. They link this (amongst others) to differences in the way labour input or value added is measured.

Semester, the recommendations of the **European Commission**[13] cover several recurring themes, including reform of the labour market[14], private investment in research, development and innovation (RDI), the housing market[15], fiscal policy and the pension system. In 2017, the European Commission also referred to potential reforms in the field of public procurement and access to finance for SMEs. In its 2018 Economic Survey, the **OECD** emphasised the need to further improve and reform the tax system (e.g. on VAT and tax exemptions), as well as the need to reduce the excessive incentive to self-employment and to make the labour market more inclusive for certain groups.[16] The need to reform the labour market is also emphasized by the IMF, which points to the challenges associated with the increasing labour duality. In addition, they referred to the rapidly increasing house prices, weak growth in wages and weaknesses in pension schemes.[17] Further, **various Dutch institutions and organisations** provided suggestions to further strengthen the functioning of the Dutch economy. A brief overview of suggestions by various stakeholders is provided below.

The Dutch Council of State noted in September 2016 the need of structural reforms in four areas: (1) strengthened cooperation at EU-level in order to control various international problems, for example migration, (2) reform of the labour market, especially with regard to flexible labour, skills gaps and social inclusion, (3) intensified policy development on climate and the energy transition and (4) further restructuring of government expenditures, e.g. in the context of health care, the housing market and pension policies.[18] The CPB Netherlands Bureau of Economic Policy Analysis identified, in the context of the stagnation of the economic growth in the Eurozone, the following priorities: (1) improved bank supervision, (2) improved budgetary and monetary policy rules, (3) labour- and product-market reforms and (4) more public investment.[19] The Dutch Central Bank prioritized similar reforms: (1) tax distortions (mortgage interest deduction and postponed pension savings taxation), (2) budgetary rules, (3) financial bubbles and house mortgage limits, (4) ecological sustainability, (5) reduction of differences between permanent and flexible jobs.[20] In March 2017, three large branch organisations (VNO NCW, MKB Nederland and LTO Nederland) presented the "Netherlands Next Level" reform programme, which emphasised the need for (1) extended coordination of private and public investments in key transitions such as sustainability and digitalisation, (2) tax reductions, (3) labour-market reforms, (4) reduction of regulatory burdens, (5) strengthened EU cooperation and (6) strengthened investment climate.[21] The Social Economic Council (SER) suggested various reform opportunities, for example, on the improved combination work/care/training and reform of the pension structure. Last, but not least, the Dutch government aims to structurally reform the following areas of the economy to the Coalition Agreement of 2017[22]: (1) tax reforms, (2) "light"

[13] The European Semester documents for the Netherlands are accessible via the following link: https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/european-semester-your-country/netherlands/european-semester-documents-netherlands_en.

[14] The recommendations include: reducing fiscal disincentives for second-income earners, support for vulnerable groups to reintegrate in the labour market, and reforms of employment protection legislation and the unemployment benefit system.

[15] The European Commission recommends, for example, to strive for a more market-oriented pricing mechanism for rental houses, to align rents with household income for social houses, and to reduce the mortgage interest tax deductibility.

[16] OECD (2018). "Economic Survey 2018".

[17] IMF (2018). Press release, 28 February 2018 "Kingdom of the Netherlands: Concluding Statement of the 2018 Article IV Consultation". See: www.imf.org/en/News/Articles/2018/02/28/ms022818-kingdom-of-the-netherlands-concluding-statement-of-the-2018-article-iv-consultation.

[18] Raad van State (2016). Press release, 20 September 2016 "Structurele hervormingen blijven nodig en zijn urgent" (Structural reforms remain necessary and are urgent). See: www.raadvanstate.nl/pers/persberichten/tekst-persbericht.html?id=980.

[19] CPB (2015). "Lessen uit zeven jaar stagnatie in de eurozone" (Lessons from seven years of stagnation in the Eurozone). See: www.cpb.nl/publicatie/lessen-uit-zeven-jaar-stagnatie-in-de-eurozone.

[20] DNB (2018). "Jaarverslag 2017" (Annual report 2017). See: www.dnb.nl/nieuws/publicaties-dnb/jaarverslag/index.jsp (Dutch version, the English version is expected end of May 2018).

[21] VNO NCW (2017). Press release, 29 March 2017 "MKB Nederland, LTO Nederland" (SME Netherlands, LTO Netherlands). See: https://www.vno-ncw.nl/brieven-en-commentaren/inbreng-voor-de-kabinetsformatie-2017-brief-aan-de-informateur-mw-schippers.

[22] VVD, CDA, D66 & ChristenUnie (2017). "Regeerakkoord 2017 - Vertrouwen in de toekomst" (Coalition agreement 2017 - Faith in the future). See:

bank licences, (3) energy transition, (4) making permanent jobs more attractive to employers and (5) transition from Pay-As-You-Go to capital funded pension savings with a risk-sharing mechanism.

Table 1.1 summarizes potential recurrent reform themes and areas for the Netherlands.

Table 1.1 Recurrent areas of potential reform (summary)

Recurrent theme	Principal reform area	Related reform areas
Investment and research	➢ Volume of (public/private) investments; ➢ Upscaling/marketing of innovations.	➢ Intellectual property rights protection; ➢ Public funding (education); ➢ Training of workers; ➢ Attracting Foreign Direct Investments.
Labour market	➢ Labour market segmentation (flexible labour, exclusion of groups)	➢ Technology and skills gaps; ➢ Ageing population; ➢ Work/life balance; ➢ Wage development.
Public finances	➢ Budget deficits (mainly 2013-15); ➢ Budget coherence.	➢ Tax distortions (labour, housing and corporate taxes); ➢ Automatic stabilizers (e.g. anti-conjuncture policy).
Related: Public procurement	➢ Access to public tendering by SMEs.	➢ Public procurement as stimulation for innovation and market development; ➢ Public procurement as solution for societal issues (e.g. environment, social inclusion, etc.); ➢ Sector exemptions (hospitals, housing corporations).
Housing market	➢ Affordability for low and medium incomes.	➢ Social housing corporations; ➢ Supply / planning zone restrictions; ➢ Subsidies on housing rents; ➢ High debt ratio due to tax rules on mortgages.
Pension system	➢ Second pillar pensions.	➢ Overall pension system (risk-sharing, young versus old); ➢ Retirement age; ➢ Required pension assets.
Access to finance	➢ Access to capital for SMEs.	➢ Market functioning; ➢ Non-bank funding; ➢ Access to public funding.
Energy transition	➢ Lacking investments (in infrastructure, in R&D, etc.).	➢ Issue of cost distribution: how will the energy transition be financed? ➢ Industry competitiveness (level playing-field).

Source: Ecorys, based on various publications.

www.kabinetsformatie2017.nl/documenten/publicaties/2017/10/10/regeerakkoord-vertrouwen-in-de-toekomst.

1.2.3 Followed approach and structure of the report

In order to streamline the analysis, **five high-level reform themes** were selected at the start of this study.[23] These relate to the annual European Semester country report(s) that were published in recent years and are seen as (potentially) important areas for structural reform. The following five themes were pre-selected:

- Innovation and investment in R&D&I and energy transition (theme 1);
- Employment and productivity (theme 2);
- Taxation and income shares (theme 3);
- Access to finance and competition in financial services (theme 4);
- Public procurement (theme 5).

Phase 1: high-level identification of reforms

The study consisted of two sequential phases. The first phase focused on the **identification and mapping** of various economic reform challenges (per theme) in the 2011-17 period and was followed by a high-level assessment of the known quantitative and qualitative **impacts** of the reforms to date. This phase mainly consisted of a review of available literature, publications and data. This part of the study started in the second half of March 2018 and resulted in the submission of an interim report in May 2018. For three of the five themes the aggregate results of this analysis are included in this main report, see section 2.2 for theme 1, section 3.2 for theme 2 and section 4.2 for theme 4. For all five themes, detailed results are presented in separate factsheets (see Annex C).

Phase 2: in-depth analysis of three selected themes

Based on the insights from the interim report, three reform challenges were selected for a more in-depth analysis (phase 2). This selection and scope of the in-depth analysis was based on various discussions among the client and the Ecorys research team. The scope and results of this in-depth analysis are described in more detail in the respective chapters (section 2.3, 3.3. and 4.3), but can be summarised as follows:

- Theme 1: review of the R&D investment levels and assessment of the main reasons for low private R&D investments;
- Theme 2: in relation to theme 1, the analysis focuses on the impact of R&D and the labour market flexibility on the overall productivity;
- Theme 3: via three case studies, some alternative (non-banking) forms of financing are assessed.

For an important part of the in-depth analysis (theme 1 and 2), the Ecorys research team used **microdata** from the Dutch Statistical Office (CBS). This CBS microdata is not publically accessible and falls under a strictly regulated user regime. Further details on the CBS microdata are provided in Annex A, accompanied with a data report with the microdata output results (Annex D).

[23] This selection was made by the European Commission (DG GROW) prior to the start of the project.

1.2.4 Key insights for theme 3 and 5

For two of the selected themes (theme 3 and 5) no further in-depth analysis was carried out and the main insights are presented below. For all five themes, separate factsheets are presented in Annex C.

Taxation and income shares (theme 3)

The developments in the field of taxation and income shares in 2011-17 have been largely driven by the previous coalition agreements of 2010[24] and 2012[25], as well as the subsequent annual Tax Plans. The impacts of the current Coalition Agreement[26] (presented in October 2017) have not yet materialised and can be expected in the upcoming period as part of an intended larger reform of the Dutch fiscal system.[27] The main identified reform areas relate to the labour market, the housing market and the corporate tax policy.

Labour market taxes and disposable income: In relation to labour market taxes and disposable income, various reform themes can be identified. First, there is a fundamental discussion on the desired shift in tax burden from labour to other taxation grounds, e.g. capital or consumption.[28] The 2017 coalition agreement indicated an ambition to lower the tax burden on labour significantly in order to reward and incentivise work.[29] This reform is now in preparation as part of a larger reform of the fiscal system and should increase income from work.[30] More details will be presented in the 2019 Tax Plan, but expected/announced measures are a reduction in income tax brackets and tax cuts for working middle-income people and companies.[31] Other initiatives in the field of labour-market taxation include stimulating labour-market participation by increasing the labour and combination income tax allowance, and limiting the portability of the general tax allowance to reduce the incentive for spouses to be economically inactive. According to the CPB, this policy has contributed to an increase in the share of two-income households and the proportion of economically independent spouses. The net impact was an increase in tax burden for one-earner households and a decrease for two-earner households, causing an increasing discrepancy in disposable income.[32]

Housing taxes: For the housing market, the presence of the home-mortgage interest deduction is considered to be a significant force behind the huge debts and associated financial risks for households and banks.[33] The IMF recently concluded that rapid increases in Dutch house prices and the number of highly indebted households reflect structural weaknesses. The main cause is argued to be the deductibility of mortgage interest

---

24 VVD, CDA (2010). "Regeerakkoord 2010 - Vrijheid en verantwoordelijkheid" (Coalition agreement 2010, freedom and responsibility).

25 VVD, PvdA (2012). "Regeerakkoord 2012 – Bruggen bouwen" (Coalition agreement 2012, building bridges).

26 VVD, CDA, D66 & ChristenUnie (2017). "Regeerakkoord 2017 - Vertrouwen in de toekomst" (Coalition agreement 2017 - Faith in the Future).

27 Government of The Netherlands (2017). "Belastingplan 2018" (Tax plan 2018). See: https://www.rijksoverheid.nl/documenten/kamerstukken/2017/09/19/belastingplan-2018.

28 IMF (2013). "Concluding Statement of the 2015 Article IV Consultation", p. 11. See: https://www.imf.org/en/Publications/CR/Issues/2016/12/31/Kingdom-of-the-Netherlands-2015-Article-IV-Consultation-Press-Release-Staff-Report-and-43694.

29 VVD, CDA, D66 & ChristenUnie (2017). "Regeerakkoord 2017 - Vertrouwen in de toekomst", p. 22 (Coalition agreement 2017 - Faith in the Future).

30 IMF (2018). "Concluding Statement of the 2018 Article IV Consultation". See: www.imf.org/en/News/Articles/2018/02/28/ms022818-kingdom-of-the-netherlands-concluding-statement-of-the-2018-article-iv-consultation.
PWC (n.d.). Press release "Regeerakkoord 2017-2021: arbeidsmarkt en pensioenen" (Coalition agreement 2017-2021: labour market and pensions). See: www.pwc.nl/nl/actueel-en-publicaties/diensten-en-sectoren/people-and-organisation/regeerakkoord-2017-2021-arbeidsmarkt-en-pensioenen.html.

31 Government of The Netherlands (2017). "Belastingplan 2018" (Tax plan 2018). See: https://www.rijksoverheid.nl/documenten/kamerstukken/2017/09/19/belastingplan-2018 and Ministry of Finance, letter to Parliamant on the tax regime reform, 32 140 nr 34, May 2018.

32 CPB (2018). "Eenverdieners onder druk" (Single earners under pressure).

33 For a recent reflection, see: DNB (2017), "Overzicht Financiële Stabiliteit" ("Overview Financial Stability").

payments from taxable income.[34] In order to address the distortion on the housing market, previous cabinets already introduced a range of measures, such as the (fiscal) retrenchment of the deductibility of mortgage interest payments and introduction of a lower maximum for mortgages. Despite these initiatives various stakeholders, including the FSC[35], the NVM[36] and ABN AMRO[37] have described the housing market as "overheated" and that far-reaching measures are needed. The mismatch between supply and demand for both privately-owned houses and (social) rental houses, is seen as one of the major drawbacks in the current market. A 'national housing agenda' was published in May 2018, which is developed in a joined cooperation of the ministry of Interior and relevant stakeholders. In the agenda various measures are announced to reduce the imbalance between supply and demand.

Corporate taxes: the Netherlands has a reputation of a fiscal-friendly climate for corporate taxation, which is supportive for (foreign) investments, but also facilitates tax avoidance.[38] The current cabinet intends to maintain a "competing investment climate", but also want to discourage international tax avoidance via Dutch enterprises.[39] New initiatives to support the Dutch business climate include a gradual reduction of the corporate tax rate for limited liability companies and the abolition of dividend tax in the Netherlands, which mainly affects non-residents and foreign investors.[40] However, recently published internal documents[41] indicate serious doubts on the stated positive effect of the abolition of dividend tax for the Dutch business climate. It may also increase the risk of the Netherlands being used for international attempts to avoid taxation.

We present further reflections on these findings in chapter 5.

Public procurement (theme 5)

The Dutch procurement system is considered to perform well, and the level of perceived corruption is quite low compared with other EU countries.[42] The latest EU Semester country report stated: *"its performance is excellent on the use of e-procurement, favouring competition among bidders, decision speed and the use of strategic procurement. The Netherlands is also one of the most experienced Member States in terms of using pre-commercial procurement."*[43] Nevertheless, four areas for potential improvement were identified: (i) the limited participation of SMEs in public procurement; (ii) a lack of procurement expertise among contracting authorities/entities and tenderers; (iii) the

[34] IMF (2018). Press release, 28 February 2018 "Kingdom of the Netherlands: Concluding Statement of the 2018 Article IV Consultation". See: www.imf.org/en/News/Articles/2018/02/28/ms022818-kingdom-of-the-netherlands-concluding-statement-of-the-2018-article-iv-consultation.

[35] Financieel Stabiliteitscomité, press release 13 June 2018, "Stabiele woningmarkt vraagt om beter passend aanbod en handhaving leennormen".

[36] NVM (2018), press release with housing market figures, 12 July 2018.

[37] ABN-Amro (2018), "Housing market monitor", April 2018.

[38] Bernardo et al (2017), "Uncovering Offshore Financial Centers: Conduits and Sinks in the Global Corporate Ownership Network", Scientific Reports, volume 7, Article number: 6246.

[39] VVD, CDA, D66 & ChristenUnie (2017). "Regeerakkoord 2017 - Vertrouwen in de toekomst" (Coalition agreement 2017 - Faith in the future), p. 35.

[40] If dividend is taxed in their home country and a bilateral agreement to avoid double taxation is in place, they can request a credit note from Dutch tax authorities to avoid double taxation by their home country, or request an exemption of Dutch taxation by the amount of dividend income tax paid in their home country.

[41] Ministry of General Affairs (2018). "Kamerbrief over dividendbelasting" (Letter to the House of Representatives on dividend tax). See: https://www.rijksoverheid.nl/documenten/kamerstukken/2018/04/24/kamerbrief-over-dividendbelasting.

[42] PWC (2016). "Stock-taking of administrative capacity, systems, and practices across the EU to ensure the compliance and quality of public procurement involving European Structural and Investment (ESI) funds" p.59.

[43] European Commission (2018). "Country Report The Netherlands 2018"; including an in-depth review on the prevention and correction of macroeconomic imbalances. Commission staff working document.

exclusion of certain sectors from public procurement requirements; and (iv) the potential for the further development of strategic procurement.

Limited access of SMEs to public procurement **-** SMEs represent 99% of all companies in the Netherlands, but the share of contracts awarded to SMEs is much lower.[44] For above-threshold procurement, the Netherlands shows win rates for SMEs below the European average, while also for below-threshold procurement, SME win rates are relatively low. Low win rates for SMEs may be explained by low SME participation levels.[45] There are multiple possible barriers for SMEs to participate in procurement of public contracts: (i) turnover requirements; (ii) clustering of multiple contracts into one big contract; (iii) high initial costs to understand procurement procedures; (iv) the administrative burden of collecting the requested documents; and (v) the shift from a price criterion to a price/quality criterion, which increases the requirements to win tenders.[46] In the procurement Act, most notably its amendment in 2016, several of these concerns were addressed, albeit with mixed results. The most important remaining points of attention are the clustering of procurements (despite it no longer being permitted to unnecessary cluster assignments)[47], and barriers for SME-participation in specific sectors, most notably construction and ICT.[48]

Improving procurement expertise **-** One of the conclusions of the evaluation of the 2012 Procurement Act was that there were no problems with the procurement laws and procedures themselves.[49] Rather, the problems originated from the implementation of the laws and procedures. The evaluation also pointed out frustrations amongst companies and contracting authorities caused by (high) tendering costs and small mistakes made during the tendering procedure. In order to improve tendering by contracting authorities, the Dutch government initiated the "Beter aanbesteden" programme to address these concerns.[50]

Exemption of sectors from public procurement requirements - Besides ministries, provinces or municipalities, public institutions are required to make use of public procurement. There are, however, a few exceptions in the Netherlands. Non-academic hospitals, certain healthcare institutions and housing corporations are not obliged to procure publicly.[51] The

---

44 ICF GHK, Ecorys & PWC (2014). "SMEs' access to public procurement markets and aggregation of demand in the EU".

45 ICF GHK (2014). Section 2.4. Moreover, the success rate of companies does not seem to differ by enterprise size class (same source).

46 MKB Servicedesk (2012). "Europa: aanbestedingsregels moeten mkb-vriendelijker" (Europe: Tender regulation needs to be more SME-friendly). See: https://www.mkbservicedesk.nl/6467/wordt-meedoen-aan-aanbesteding-echt.htm.
Pianoo (n.d.). "MKB-vriendelijk inkopen togelicht" (SME-friendly purchasing explained). See: https://www.pianoo.nl/themas/mkb-vriendelijk-inkopen/mkb-vriendelijk-inkopen-toegelicht.

47 Kwink (2015). "Effects of the 2012 public procurement act – part 1, SME participation in public procurement and a fact study".
Tweede Kamer der Staten-Generaal (2015). Document: 34252, nr. 1 "Evaluatie Aanbestedingswet 2012" (Evaluation 2012 public procurement act).

48 MKB Nederland (2018). "Vergoeding voor hoge tenderkosten bij aanbestedingen" (Compensation for high tender costs). See: https://www.mkb.nl/nieuws/vergoeding-voor-hoge-tenderkosten-bij-aanbestedingen.

49 Tweede Kamer der Staten-Generaal (2015). Document: 34252, nr. 2 "Evaluatie Aanbestedingswet 2012" (Evaluation 2012 public procurement act).

50 Tweede Kamer der Staten-Generaal (2015). Document: 34252, nr. 2 "Evaluatie Aanbestedingswet 2012" (Evaluation 2012 public procurement act).

51 Pianoo (n.d.). "Wanneer moet ik aanbesteden?" (When do I have to issue tenders?). See: https://www.pianoo.nl/nl/metrokaart/wanneer-moet-ik-aanbesteden.
Ministry of Economic Affairs and Climate (2005). "Lijst met voorbeelden van publiekrechtelijke instellingen" (List with examples of public instititutions).
Europa decentraal (2017). "Is een woningcorporatie aanbestedingsplichtig?" (Is a housing corporation required to issue tenders?). See: https://europadecentraal.nl/services/praktijkvragen/is-een-woningcorporatie-aanbestedingsplichtig/.

rules that exclude hospitals, healthcare institutions and housing corporations are difficult to interpret and have led to many discussions and several court cases.[52] The EC has started infringement procedures against the exemption for housing corporations.[53] The Dutch Cabinet disagrees with the EC's analysis.[54] The core of their argument is that the Dutch government has insufficient influence on the decision-making of the corporation to make them eligible for the qualification of the public authority. The sector estimated the costs of obligatory procurement to amount to approximately EUR 30 million annually, while, again according to the sector, no benefits are expected due to corporations already making careful and efficient purchases, including procurement.[55] No other assessment of the impact of the obligation to publically procure for any of the exempted sectors has been identified. No policy initiatives on this topic are expected until a decision on the infringement procedures is reached.

Strategic procurement - In recent years, strategic procurement has increased in importance. However, the space offered by the Act for innovative and sustainable procurement is only partly used, with innovation and sustainability still relatively little-used as award criteria: in 2014, 14% of the tenders included sustainability (up from 12% in 2009), and only 4% included innovation (compared with 3% in 2009).[56] The Dutch government aims to put more emphasis on innovation procurement and aims to increase the use of Small Business Innovation Research (SBIR) programme.[57] The latest 2017 Coalition Agreement underlines the possibilities created by the Procurement Act to include innovative and social consideration in procurement and indicates that central government will support local governments in strategic procurement.

We further reflect on these findings in chapter 5.

Kennedy Van der Laan (2014). Press release, 2 June 2014 "Zijn algemene ziekenhuizen aanbestedende diensten?" (Are regular hospitals tender-issuing institutions?). See: https://kvdl.nl/nieuws/zijn-algemene-ziekenhuizen-aanbestedende-diensten/.
De Kempenaer (2017). "Geen aanbestedingsplicht voor zorginstellingen, maar hoedt u voor de eendentest" (No tender requirement for care institutions, but be aware of the duck test). See: https://www.dekempenaer.nl/kennis/geen-aanbestedingsplicht-zorginstellingen-hoedt-eendentest/#.

52 Hospitals: case P1/St Antonius Ziekenhuis (286872 / HA ZA 10-1147; 5 December 2012); housing corporations: case X/ Stichting Woonbedrijf SWS.HHVL (C/01/288440 / KG ZA 15-6; 27 February 2015).

53 European Commission (2017). "Public procurement: Commission refers 4 Member States to Court of Justice and opens a new case". See: http://europa.eu/rapid/press-release_IP-17-4771_en.htm.

54 Tweede Kamer der Staten-Generaal (2018). "Kamerstukken 29 453, nr. 468" (Parliamentary pieces 29 453, nr. 468). See: https://zoek.officielebekendmakingen.nl/kst-29453-468.html.

55 Aedes, "Europese aanbestedingsplicht corporaties principieel onjuist" (European procurement fundamentally incorrect), position paper, 8 December 2017. See: https://www.aedes.nl/artikelen/woningmarkt/europa/europees-aanbesteden/aedes-europese-aanbestedingsplicht-corporaties-principieel-onjuist.html

56 Kwink (2015). "Effects of the 2012 public procurement act – part 1, SME participation in public procurement and a fact study".

57 European Commission (2018). "Country Report The Netherlands 2018"; including an in-depth review of the prevention and correction of macroeconomic imbalances. Commission staff working document.

2 Innovation and investment in R&D&I and energy transition (theme 1)

2.1 Introduction

This chapter presents the findings for the first selected theme: innovation and investment in Research and Development and Innovation (R&D&I) and energy transition. Section 2.2 contains a description of the broader perspective and recent (policy) trends. Detailed results are presented in a separate factsheet in Annex C. In section 2.3 we present the results for the in-depth analysis, which is focused on main reasons for the low level of private R&D investment.

2.2 Broad perspective and recent trends

Key findings

Various rankings and publications indicate that the Netherlands performs very well in the field of R&D&I and is in many respects a "frontrunner". Nevertheless, it is also clear that private investment in R&D&I lags behind the EU average for many years[58], which may result in a weakening of the Dutch economy in the longer term. Although the Rathenau Institute and CPB have offered various possible explanations, previous studies did not succeed in pinpointing root causes. Policy-wise, the Dutch government mainly focuses on strengthening existing policy instruments (e.g. the Innovation Box and SBIR program) and new initiatives such as the SME+ innovation fund. Most of these policy instruments have either been recently evaluated and revised or will be evaluated in the near future (e.g. the WBSO) so impacts of reforms have generally not yet been seen. With regard to the transition to energy and climate targets, which has only recently been prioritized, it is clear that the Netherlands lags behind other countries. The climate agreement, which is currently negotiated between the Dutch government, private market players and NGOs will determine the pathway towards a low-carbon economy and (related to that) the level of public and private investment. Various reports emphasize that the Netherlands needs to intensify its investments significantly in order to reach the various energy and climate objectives. Current estimates indicate the national costs of the climate and energy transition will be between EUR 2 billion and EUR 4 billion per year (depending on the scenario, based on realisation of the 2030 targets).[59]

The Netherlands is often seen as a frontrunner in terms of innovation. The most recent (2017-18) WEF Global Competitiveness Report indicates that the Netherlands performs well in terms of innovation (ranked 6th). Furthermore, the EU Innovation Scoreboard promoted the Netherlands in 2016 to the status of "innovation leader". The country performs above the EU average for several indicators including: workers with tertiary education, research systems, venture capital expenditures, public-private collaboration, and performs below EU.[60] The Netherlands, which is home to just 0.2% of the global population, publishes 2.1% of all publications worldwide.[61] Despite the fact that the Netherlands is a frontrunner in many areas, the CPB observed that an average score is

[58] European Commission (2018). "European Innovation Scoreboard 2018".
Deuten, J. (2015). *Rathenau Instituut* "R&D goes global: Policy implications for the Netherlands as a knowledge region in a global perspective".

[59] PBL (2018). "Kosten energie- en klimaattransitie in 2030 – update 2018" (Costs of energy- and climate transition in 2030 – update 2018).

[60] European Commission (2018). "European Innovation Scoreboard 2018"

[61] Elsevier (2018). "Quantitative analysis of research and innovation in key technologies in the Netherlands". See: https://www.elsevier.com/research-intelligence/resource-library/quantitative-analysis-of-dutch-research-and-innovation-in-key-technologies.

realised for R&D-expenditure as percentage of GDP and the number of researchers.[62] The Netherlands performs relatively poorly in terms of the level of private investment.

Private R&D&I investments - Private investment in R&D&I is very low, and has been below the EU average for many years. The European Innovation Scoreboard 2018 shows that overall corporate investment in innovation is below the EU Index (a score of 76 compared with 100 for the EU), which is mainly caused by a very low score for non-R&D innovation expenditure.[63] The underlying reason for the low level of private investment level is unclear. The EC suggests it may reflect the characteristics of the Dutch economy: while some large firms invest large amounts in R&D&I, they represent only a small proportion of the total economy. Often their investment activities are located in other countries, while at the same time they rely on innovative ideas obtained from foreign investors and technology giants. A study by the Rathenau Instituut aligns with this view.[64] Based on CBS data, they found that eight of the largest private R&D investors[65] account for more than one-third of the total business expenditure on R&D in the Netherlands. Additionally, the analysis shows that the position of the Netherlands in the global R&D landscape is weakening. Domestic firms are increasing their R&D investment abroad, while this does not match with increased R&D spending from firms based abroad. At the same time, technology-oriented international multinationals that are located in the Netherlands are spending a smaller share of their worldwide R&D budget in the Netherlands. Other indirect clarifications may relate to typical market failures, which relate to investment in R&D&I and the inability of the Dutch government to solve them in an optimal way (e.g. related to inefficiencies in the IPR policy and SME innovation policy). The CPB (2016) discussed various R&D&I-related issues, but it does not pinpoint a root cause.[66]

The Dutch government acknowledged mid-2017 the need to promote and stimulate public and private investment in R&D&I.[67] The new government announced it would invest EUR 200 million per year in fundamental research, and invest an additional EUR 200 million in applied research and public-private cooperation. In addition, the government has indicated in July 2018 that it intends to increase efforts to reach an R&D expenditure of 2.5% of GDP (the current share is 2.03%).[68] Next to the extra funding that will be invested in R&D&I in the coming years, the government has already introduced and/or implemented several reforms in the past years in order to strengthen private investment. A summary of these reforms and their outcomes (where they are available) is presented below:[69]

- Two laws for tax deductions on innovation activities (WBSO and RDA) have been merged into one law in order to reduce any negative side effects and simplify the application procedure for companies. The evaluation of the merged law (called WBSO) will be evaluated in 2018;
- The innovation box, a fiscal instrument to promote investment in R&D, already proven to be effective and efficient, is revised in order to address existing concerns about tax evasions[70];
- The SME+ innovation fund has been introduced, consisting of several instruments to stimulate SME innovation (innovation credit, seed capital, early-phase financing and Dutch Venture Initiative;

62 CPB (2016). "Kansrijk innovatiebeleid" (Promising innovation policy).
63 European Commission (2018). "European Innovation Scoreboard 2018".
64 Deuten, J. (2015). *Rathenau Instituut* "R&D goes global: Policy implications for the Netherlands as a knowledge region in a global perspective".
65 These are: Philips, ASML, Shell, DSM, NXP, Unilever, Océ and AkzoNobel.
66 CPB (2016). "Kansrijk innovatiebeleid" (Promising innovation policy).
67 Ministries of Economic Affairs and Finance (2017). Letter to parliament, 2 June 2017 "European Semester 2017".
68 Ministry of Economic Affairs and Climate (2018). "Towards mission driven innovation policy and impact".
69 More details about the different reforms can be found in the factsheet in Annex C.
70 Dialogic (2015). "Evaluatie innovatiebox 2010-2012" (Evaluation innovation box 2010-2012).

- The Small Business Innovation Research (SBIR) programme, introduced in 2014, aims to let companies develop innovative solutions for societal questions and to valorise knowledge. The 2017 evaluation of the programme[71] concluded that the SBIR has societal added value and is effectively implemented. However, the programme is relatively expensive and does not seem to have an impact on company performance (revenue, employment, R&D expenditures). The programme also does not automatically lead the purchase of innovative solutions. In the 2017 coalition agreement, the government has also indicated that it wants to drive up innovation by relying more on the use of the (improved) SBIR programme;
- The SME innovation stimulation regulation Topsectoren (MIT), that was introduced in 2013 and extended in 2015, was evaluated positively[72] and saw an increase in requests for MIT subsidies over the years. The MIT was further extended by five years until 2023. In addition to the MIT, and more generally speaking, the government aims to improve the performance of the Topsectoren. Recently they announced plans to work towards specific missions and agendas targeted at current challenges in the Topsectoren.[73]

Innovation and investments in the energy transition - In line with the Paris Agreement and the various EU targets against climate change, the Netherlands has started a variety of actions and measures. The 2013 Energy Agreement can be seen as an important milestone, although it is unlikely that the EU 2020 targets will be met.[74] Nevertheless, the Energy Agreement resulted in a significant contribution to and acceleration of the Dutch policy on energy efficiency and renewable energy. With respect to innovation and investment in the energy transition, the evaluation also showed that specific impacts were not possible to measure due to a lack of data (conclusion 5).[75]

Available data on investment in the overall "energy supply system" show a substantial increase over time: investment increased from EUR 10 billion in 2008 to EUR 15.1 billion in 2015. The majority of investment in 2015 was still related to fossil-based energy sources such as refineries or oil and gas exploration (approximately EUR 9 billion), but this is decreasing. The remaining investment in renewable energy is mainly related to offshore wind energy and (especially) energy efficiency.[76]

Recent high-level initiatives include the Energy Agenda[77] (December 2016) and the first outline of the Climate Agreement[78] (July 2018), while plans for new offshore wind parks in 2024-2030 have been announced. The Climate Agreement is expected to be a landmark policy for enabling the energy transition in the Netherlands.

Innovation and investment in R&D&I were long seen as important for the energy transition, but were only made a priority in the 2016 Energy Agenda. The 2018 outline of the Climate Agreement emphasises (again) the need for both the public and private sector to invest in

---

71 Dialogic (2017). "Evaluatie Small Business Innovation Research (SBIR)" (Evaluation Small Business Innovation Research (SBIR)).

72 Technopolis (2017). "Evaluatie MKB Innovatiestimuleringsregeling Topsectoren (MIT), 2013-2016" (Evaluation SME innovation stimulation instrument top sectors (MIT), 2013-2016).

73 Ministry of Economic Affairs and Climate (2018). "Towards mission driven innovation policy and impact".

74 ECN (2017). "Nationale Energieverkenning 2017" (National energy exploration 2017) p. 12.

75 Kwink Groep (2016). "Evaluatie Energieakkoord voor duurzame groei" (Evaluation energy agreement for sustainable growth).

76 ECN (2017). "Nationale Energieverkenning 2017" (National energy exploration 2017) p. 188-189.

77 Ministry of Economic Affairs and Climate (2016). "Energieagenda – Naar een CO2-arme energievoorziening" (Energy agenda – Towards a low-CO2 emitting energy system). See: https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/documenten/rapporten/2016/12/07/ea.

78 Ministry of Economic Affairs and Climate (2018). "Voorstel voor hoofdlijnen van het klimaatakkoord" (Outline of the Climate Agreement). See: https://www.energieakkoordser.nl/nieuws/2018/belangrijke-stap-klimaatakkoord.aspx.

innovation, pilot and demonstration projects and technology-upscaling. It is indicated that the contribution from public funding to cover cost inefficiencies will increase to between EUR 550 million and EUR 1 billion per year by 2030. More detailed calculations by the PBL and CPB of this first outline of the agreement are expected in the second of September 2018. In an earlier publication (April 2018), PBL estimated the national costs of the climate and energy transition to be between EUR 2 billion to EUR 4 billion per year (depending on the scenario, based on realisation of the 2030 targets).[79]

Sectoral data on innovation and (R&D&I) investment in the energy transition is scattered across various sources. Based on this, several observations can be made:

- The current investment level is too low (given the ambitions for the energy transition);[80] The publication indicates that significant investments have to be made both by the public and private sector to meet the targets, especially in the field of Carbon Capture Storage (CCS) and offshore wind parks;
- The recent PBL-study[81] estimates that a large share of the annual national costs of the climate and energy transition will be related to electricity production (up to EUR 1.1 billion), the industry (up to EUR 1.6 billion) and housing (up to EUR 1.4 billion);
- A fiscal instrument to stimulate investments in energy-efficient equipment is the EIA; data indicates that over the period 2012-2016 approximately EUR 4.2 billion is invested in this type of equipment.[82] Besides the energy sector, the largest investments originate from the retail industry and food supply industry (both around EUR 380 million in this period); for 2017, RVO reports a total investment of EUR 1.5 billion;[83]
- Monitoring reports for the two existing covenants (MJA3 and MEE) indicate that various sectors realize energy-efficiency gains beyond their targets (e.g. in the metallurgic industry, chemical industry, etc.). It is unclear precisely how much investment was made to realize these energy-efficiency gains.[84]

2.3 In-depth analysis: low private R&D investments in the Netherlands

2.3.1 Set-up and methodological considerations

With regard to R&D investments in the Netherlands, public investments as a percentage of GDP are among the highest in the EU. However, private R&D investments in the Netherlands are significantly lower than in a number of front-running economies in the EU. More specifically, Dutch R&D investments in energy transition and the circular economy seem to have been below the EU average. This raises questions about the reasons for low Dutch (private) R&D investment and the possible negative impact on GDP.

This chapter focuses on the reasons for low Dutch (private) R&D investments. The following research questions will be examined:

---

79 PBL (2018). "Kosten energie- en klimaattransitie in 2030 – update 2018" (Costs of energy- and climate transition in 2030 – update 2018).

80 Ministry of Economic Affairs and Climate (2018). "Voorstel voor hoofdlijnen van het klimaatakkoord" (Outline of the Climate Agreement). See: https://www.energieakkoordser.nl/nieuws/2018/belangrijke-stap-klimaatakkoord.aspx.

81 PBL (2018). "Kosten energie- en klimaattransitie in 2030 – update 2018" (Costs of energy- and climate transition in 2030 – update 2018).

82 CE Delft (2017), "Beleidsevaluatie Energie-investeringsaftrek 2012-2017" ("Policy evaluation Energy-Investmentscheme).

83 RVO (2018), EIA annual report for 2017.

84 RVO (2017), "MJA3 and MEE - result brochure 2016".

- A1. In which sectors is (private) investment in R&D&I lowest compared with other EU Member States (based on national and regional data to the extent available)?
- A2. Which types of (private) R&D&I investments are lowest per sector in the Netherlands?
- A3. What factors explain the low Dutch (private) investment levels in R&D&I?
- A4. What are the main barriers for Dutch firms to innovate, if any?

In general, an inductive approach is followed to answer the above questions: data are presented and simple models are estimated to identify significant correlations.

Research question A1-A3

The international comparison (question A1) will be based on Eurostat statistics. These statistics do not separately identify energy transition and the circular economy. The exploration of types of private R&D&I investments will be based on two surveys that are held periodically in the Netherlands: the R&D survey and the Community Innovation Survey (CIS). Since R&D and innovation are complementary, both surveys are used to investigate R&D&I and we will exploit different features of the two data sets.

Several dimensions of R&D and innovation are explored, including a differentiation between fundamental and technical R&D (and other fields of research), in-house and outsourced R&D, and the degree of government funding of private R&D. These are explored at the sector level.

Note on Eurostat and Dutch CBS statistics

Eurostat publishes detailed data on R&D for some countries but not for most countries in north-west Europe, including the Netherlands, Belgium, France, Germany, Denmark and the United Kingdom. For the Netherlands, the reason is that the R&D survey is held among companies with 10 or more workers. For smaller firms (and also for firms with 10 or more workers that are not in the survey), the Dutch Bureau of Statistics uses subsidy filings to produce statistics on total R&D expenditure. Apart from the use of subsidy filings for R&D data, the R&D survey and CIS survey are samples stratified by sector and size (both for firms with 10 or more workers), with larger firms more likely to be sampled.

There is also a difference in methodology between Dutch and Eurostat figures on private R&D investment. Further breakdowns of Dutch statistics are only available including outsourced expenditure, while further breakdowns of Eurostat statistics are only available excluding outsourced expenditure.

One potential explanation for low private R&D is explored in further detail using the CIS, namely that R&D refers to formal investments while possibly part of innovation takes place without formal investment, for example by training workers, improving IT-systems or developing new sales concepts. This may be particularly the case for services sectors.

R&D is arguably easier to influence through a national policy in companies that are not multinationals, where investment decisions are often made by international boards and R&D is done through partnerships around the world. Several Dutch multinationals invest heavily in R&D. For example, ASMI invested 15% of net sales in R&D in 2016[85] compared with 8% in the manufacturing of machines and of electrical appliances respectively, and 13% in the manufacturing of computers, electronic and optical products.[86] The analysis will

[85] ASMI (2016). "Statutory Annual Report 2016" p. 51. See: http://www.asm.com/Downloads/2016_Statutory_annual_report.pdf.

[86] Based on CBS microdata. In charts based on Eurostat data, R&D expenditures are related to gross value added which is typically half of turnover.

explore whether R&D levels are distorted by multinationals by leaving out companies turnovers of more than EUR 100 million.

In order to identify factors explaining low (private) Dutch R&D&I, indicators are investigated at the company level. R&D expenditures are known for stratified samples of roughly 4,000 companies per year participating in surveys held in 1995-2015. From 2011 total expenditure is known from registration data on all companies that applied for R&D subsidies. R&D expenditure will be calculated as a percentage of company turnover because a conclusion about how R&D intensity correlates with company size is more meaningful than a conclusion that larger firms spend larger sums. The R&D intensity will be related to a number of variables of interest, while controlling for other characteristics that are likely to influence R&D expenditure. R&D companies are excluded from the analysis since they often report R&D expenditures to be 100% of turnover (and even on aggregate in the case of Austria). Another reason to exclude R&D companies is that, according to the Dutch definition, private R&D expenditure includes outsourced R&D.

Various indicators were identified which may potentially influence the low Dutch (private) R&D investments, which are grouped in four dimensions with possible relevance for policy development.

Dimension 1: Competition indicators - For an economy as open as the Dutch one, it is often assumed that companies are exposed to fierce competition, for example from low-wage countries. A survival strategy could then be to invest in high-quality products, alone or as part of a production chain. To explore how openness and competition influence R&D at the company level, the R&D percentage will be related to the following variables of interest:

- Monopoly characterisation of the sector (Herfindahl index of turnover);
- Company turnover as percentage of sector turnover;
- Export to EU countries as percentage of company turnover;
- Export to non-EU countries as percentage of company turnover;
- Import from EU countries as percentage of company turnover;
- Import from non-EU countries as percentage of company turnover.

Dimension 2: R&D outsourcing - Another strategy could be to reduce R&D expenditure through co-operation with other companies or institutes, tapping into knowledge that would be costly for companies to develop. In that case, a negative effect of the percentage of outsourced R&D can be expected on the R&D percentage. The variables of interest are accordingly (available from 2011 only):

- Dummy of R&D spent on other companies in the Netherlands;
- Dummy of R&D spent on research institutes in the Netherlands;
- Dummy of R&D spent on universities in the Netherlands;
- Dummy of R&D spent on other companies outside the Netherlands;
- Dummy of R&D spent on research institutes outside the Netherlands;
- Dummy of R&D spent on universities outside the Netherlands.

Note that if R&D expenditures would be explained with outsourced R&D expenditures, coefficients are likely to reflect the share of outsourced R&D in total R&D. But for the occurrence of R&D outsourcing, the effect could be negative (in-house R&D is displaced by outsourced R&D) or positive (in-house and outsourced R&D are complementary).

Dimension 3: R&D fiscal policy - A third dimension of interest are fiscal policies to stimulate R&D. The variables of interest are (from 2011):

- Dummy of R&D funding through the WBSO fiscal treatment (wage cost subsidy);

- Dummy of R&D funding through the RDA fiscal treatment (R&D equipment tax deductibility).

The level of the subsidy is proportional to the expenditure, hence the coefficient of the subsidy level should theoretically be close to the inverse of the tax (subsidy) rate. Both subsidies are available to small and large firms alike. The wage-cost subsidy (WBSO) is 32% for the first EUR 350,000 of wage costs, and 14% beyond that. Before the integration of RDA with the WBSO in 2016, 60% of the expenses on R&D equipment were tax deductible (resulting in a 15% subsidy for a typical company for which a 25% corporate tax rate applies). Out of all companies (with 10 or more workers) investing in R&D, 26% do not receive the WBSO subsidy. This high percentage may be due to a number of factors not further analysed: the limitation of the WBSO to product innovation and software development; administrative costs; and the subsidy cap until and including 2015. Due to the latter factor, it is not a foregone conclusion that R&D-intensive companies always received WBSO.

Dimension 4: Labour market - Finally, as noted earlier, a lack of skills could also explain R&D rates. The general education level of the Dutch population is quite high, but the low R&D rates might be caused by a skills mismatch. In addition, the possibility will be investigated that the high proportion of flexible employment contracts in the Netherlands causes a lack of firm-specific knowledge or long-term commitment to generate new ideas or complete the innovation process. The Labour Force Survey includes information on these two themes but the survey does not allow a representative match of workers with companies. Therefore, the following two variables of interest at the level of sectors or sector groupings and possibly a grouping of years will be included:

- Percentage of high educated technical workers in the sector;
- Percentage of flex contracts in the sector.

The control variables will include:

- Business-sector dummies (to account for structural sector differences);
- Company size category (to account for structural company size differences);
- GDP growth (business cycle indicator);
- GDP growth of the preceding year (to account for an investment lag);
- Percentage of highly educated workers in the sector.

The CBS R&D microdata are based on a mix of data from R&D subsidy registration data (covering all businesses that apply for R&D subsidies but containing only the variables R&D expenditure and subsidy levels) and of survey data (covering a stratified sample of firms with more than 10 workers and containing various breakdowns of R&D expenditures and staff). Thus, the data constitute a partly balanced company panel data set, which could be estimated with pooled OLS or with fixed effect models.

Research question A4

The fourth research question is similar to the third one discussed above, but now focusing on innovation instead of R&D, based on data from the Community Innovation Survey (CIS) instead of the R&D survey. The CIS covers a broad range of topics, mostly in the form of yes/no indicators. Of the various dimensions of innovation, product innovation of goods is the most interesting in the light of the strategy to distinguish with high-quality products rather than low prices (since the Netherlands is not a low-wage country). The variables to be explained are then:

- In the past three years, did the company engage in product innovation new for the company?
- In the past three years, did the company engage in product innovation new for the market?

As explanatory variables, the competition indicators and the lack of (technical) skills indicator will be included as for the third research question discussed above. Other variables of interest in the CIS that could explain innovation are (all categorical indicators):

- R&D outsourcing: Fully in-company, jointly with other companies or institutes, fully outsourced or adaption of products or services of others (yes/no, mutually exclusive in 2008 and multiple choice in later waves);
- Government support (all yes/no indicators):
  - From local or regional governments;
  - From national government (including national agencies);
  - EU (including EU Framework Programmes and the Horizon 2020 Programme).
- Most valuable co-operation partner if any (concern companies, suppliers, customers, competitors, consultants or research institutes/universities);
- percentage of employees with a higher-education degree.

These variables are available in the CBS microdata of the CIS at the company level. Variables in the CIS that could explain lack of innovation are available for the 2015 wave only and include:

- Importance of seven barriers to innovate;
- Importance of four reasons not to innovate.

The (sector-level) control variables will be the same as for the third research question.

Given that the variables to be explained are yes/no variables, the analysis will be done using logit models.

2.3.2 Results - international comparison

Key findings

The first question (A1) asks in which sectors the (private) investment in R&D&I is the lowest compared with other EU Member States (based on national and regional data to the extent available)? The data show that while public expenditure on R&D are at the EU benchmark, private R&D is below the EU average. Companies with a turnover of more than EUR 100 million spend three times less on R&D as a proportion of their turnover than smaller firms. A relatively large number of multinationals are established in the Netherlands, which could help explain the low R&D levels. The "giant" companies might do R&D more efficiently, however no R&D data by company size are available for international comparison.

Dutch R&D in professional services (one of the largest sectors, accounting for 8.0% of GDP) is strikingly low: slightly above other Dutch services but well below the EU average. Other sectors are EU frontrunners, but agriculture contributes relatively little to GDP and the transport sector invests little in R&D. Zooming in on manufacturing industries, Dutch R&D investments lag behind the EU average in pharmaceuticals, "hardware" (computers and electronic and optic instruments) and cars, mostly due to lower non-labour current expenses. These sectors are characterised by high product-safety demands and high

Key findings

R&D levels due to experimental R&D, of which most is outsourced (abroad). Since the EU exports more of these than it imports, product safety demands do not hurt its competitive edge. The presence of multinationals could explain the relatively low but possibly efficient Dutch R&D in these sectors.

Marginally lagging R&D intensity in the Netherlands caused by lagging private R&D

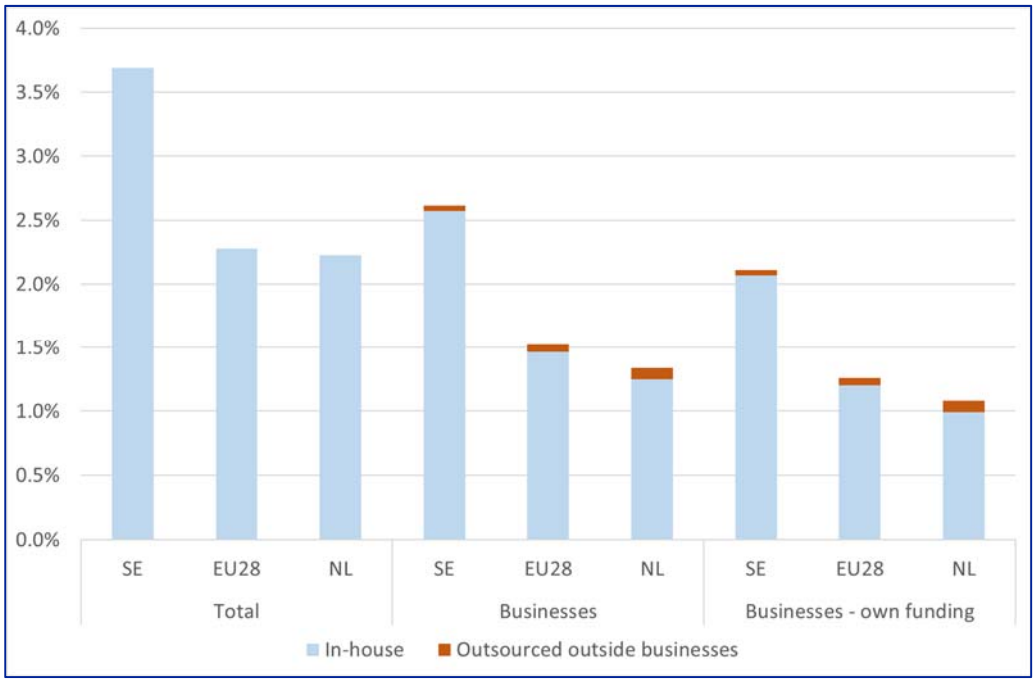
In the Netherlands, 2.2% of GDP was spent on (intramural) R&D in 2015, compared with an average of 2.3% across the EU and 3.7% in Sweden (the frontrunner).[87] R&D expenditure in the Netherlands was incurred mostly by businesses (56%) and higher education institutes (32%), whereas across the EU the average in 2015 was 64% by businesses and 23% by higher education institutes). As a consequence, Dutch business expenditure on R&D was lower than the EU average: 1.2% of GDP compared with 1.5%. Dutch businesses funded 82% of their R&D expenditure themselves and 14% was funded by the public sector. Overall, businesses spent 1.0% of GDP on R&D out of their own resources, compared with 1.2% at the EU level. For each of the above indicators (total R&D, business expenditures and business expenditure out of own resources as a percentage of GDP), Dutch expenditure was slightly below EU average and the Netherlands was ranked 8th based on Eurostat data.

Differences in co-operation with public institutes too small to explain lagging private R&D

The differences become slightly less if expenditure on research outsourced by businesses to universities and public research institutes is included, which accounts for only 0.04% of GDP in EU-frontrunner Sweden, 0.06% at the EU average and 0.09% in the Netherlands. These outsourcing percentages exclude outsourcing to for-profit specialized R&D companies and to non-EU businesses or institutes. However, differences in co-operation with public institutes are too small to explain the lagging private R&D intensity in the Netherlands.

[87] Analysis based on Eurostat GERD data.

Figure 2.1 Expenditure on R&D as % of GDP, EU frontrunner (Sweden), EU average and the Netherlands, 2015

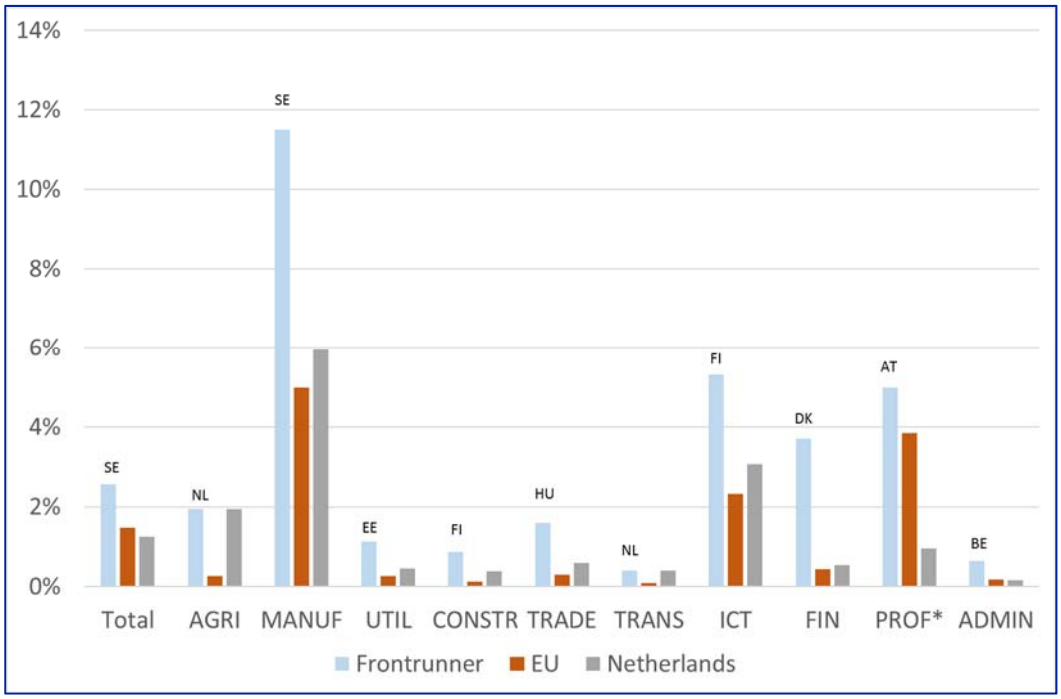


Source: Eurostat, GERD data.

Rationale to compare R&D intensities (as % of value added) rather than sector shares

The observation that the Netherlands spends a smaller proportion of its GDP on R&D than the EU average and seven "neighbour" countries (Denmark, Sweden, Finland, Germany, Austria, Belgium, France as well as Switzerland and Iceland) raises a question of which business sector lags behind other EU countries. To analyse this, expenditure of sectors should be compared to the gross value added per sector. For example, the Dutch manufacturing sector contributes 12% to GDP compared with the EU average of 16%. It would be misleading to merely conclude that the Dutch manufacturing sector spends a smaller share of national business R&D expenditures than the EU average (57% compared with 65%). However, as a percentage of gross value added, the Dutch manufacturing sector spends 5.9% on R&D against an EU average of 5.6%.

Figure 2.2 Business expenditure on R&D as % of GVA by sector, EU frontrunner, EU average and the Netherlands, 2015



* Excluding R&D companies.
Sources: Eurostat, BERD and National Accounts; GVA = Gross Value Added

R&D intensities lowest in various services sectors and utilities

The general picture is that manufacturing and ICT (including media) are the most business R&D intensive sectors. R&D is virtually absent in accommodation and food services and real estate (not shown in Figure 2.2) across the EU and at very low levels in utilities and various services sectors.

Differences in firm size composition within sectors do not obviously explain R&D intensity

From Figure 2.2, differences in firm size composition within services sectors compared to manufacturing sectors do not jump to the eye as a potential explanatory variable. For example, retail trade and transport companies consist of many small companies and R&D intensity is low in those sectors. However, agriculture is also a fragmented sector but has an above-average R&D intensity in the Netherlands. On the other hand, utilities are dominated by large companies in the Netherlands but have a below-average R&D intensity. Another difference between manufacturing and services is that services are typically more difficult to export than products due to language and culture barriers and family reasons of the workers providing the services. However, the transport and wholesale trade sectors include a large international segment and still overall R&D intensity is low in trade and transport.

Service providers less often and less heavily involved in (product innovation) R&D

The nature of services compared with products is more likely to explain low R&D intensities in various services sectors. It should be noted that services sectors do use new, innovative products, from modular housing in the construction industry to sophisticated scanners in retail and GPS tracking equipment in transport and logistics. From the CIS analysis (Section 2.3.5), companies in services sectors are half as likely to be involved in product innovation

than in manufacturing (roughly 20% compared with 40%, see Figure 2.21 below) but this cannot explain the huge discrepancy in the expenditure levels shown in Figure 2.2. Hence, if service providers are involved in R&D for product innovation, this is less heavy than in manufacturing. It may be that research to develop new services is less costly than to develop new products, but R&D expenditure from the R&D survey and (total) innovation expenditures from the CIS survey are not straightforward to compare because they originate from different sources.[88] It might even be the case that research to make services more innovative and efficient is not perceived as R&D; for example it is illustrative that R&D subsidies are only available for product innovation and software development and not for the development of new services.

EU frontrunners invest well above average

In almost all sectors, the EU frontrunners spend a much greater proportion of gross value added on R&D compared with the EU average.[89] Only in professional services businesses the EU frontrunner (Austria) does not spend much more than the EU average on R&D: 5.0% compared with 3.8%.

Dutch agriculture and transport are EU frontrunners but contribute little to overall R&D

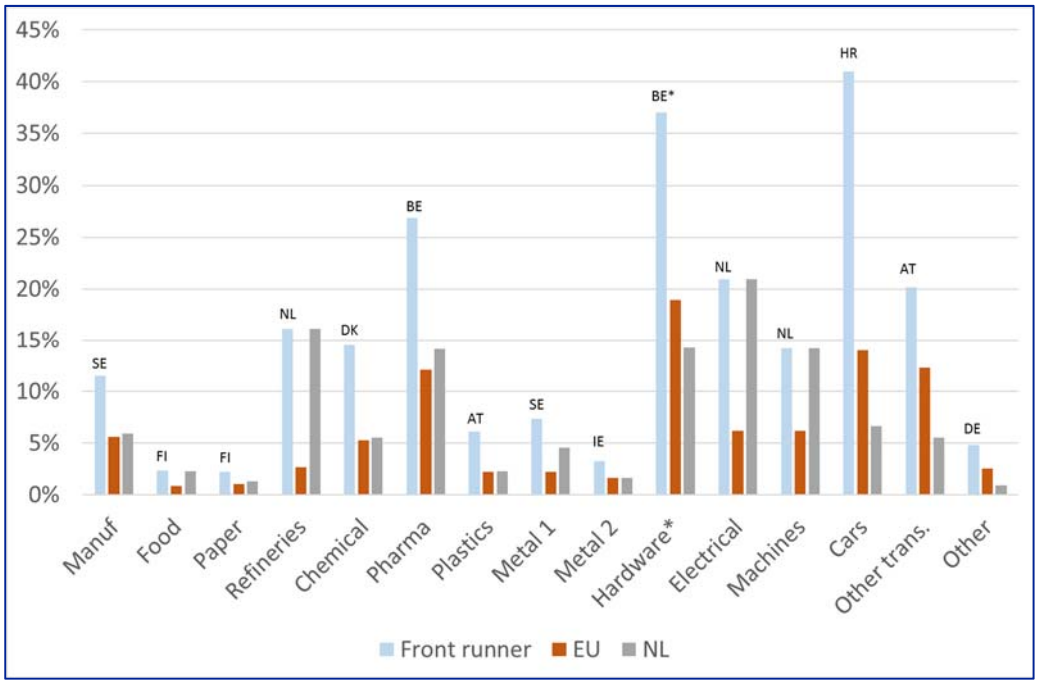
Two Dutch sectors are EU frontrunners for business R&D expenditure: namely agriculture and transport. Both sectors are among the nine "top sectors" in Dutch R&D policies (agrifood, horticulture and logistics), the other six being the chemical industry, the creative industry, energy, a broadly defined high-tech sector, health and water). In agriculture, Dutch R&D expenditure is quite high at 1.9% of sector gross value added, although in 2015 agriculture contributed just 1.8% of Dutch GDP according to Eurostat data. The transport sector contributed 5.2% to Dutch GDP.

When looking at the manufacturing sector in greater detail, the Netherlands are R&D frontrunners in three industrial sectors: oil refineries, electrical equipment and machinery, but the country lags behind other EU countries in sectors such as "hardware" and the production of cars and other transport equipment (trains, ships and aircraft). It should be noted that the Dutch car industry is relatively small, contributing 3% to manufacturing gross value added (GVA) compared with an EU average of 11%. The food industry (19% of manufacturing GVA versus 11% at the EU level) and the chemical industry (13% against 6%) are much more important in the Netherlands, but the food industry does not spend much on R&D.

[88] For professional services, R&D expenditures from the R&D survey even exceeds total innovation expenditures from the CIS survey, which makes no sense.

[89] For finance, the high value of Denmark is an outlier, high expenditures in Greece and Portugal may reflect catch-up demand, and gross value added in the financial sector not only reflects productivity but also return on investment.

Figure 2.3 Business R&D expenditures as % of GVA by manufacturing sector, frontrunner, EU and the Netherlands, 2015

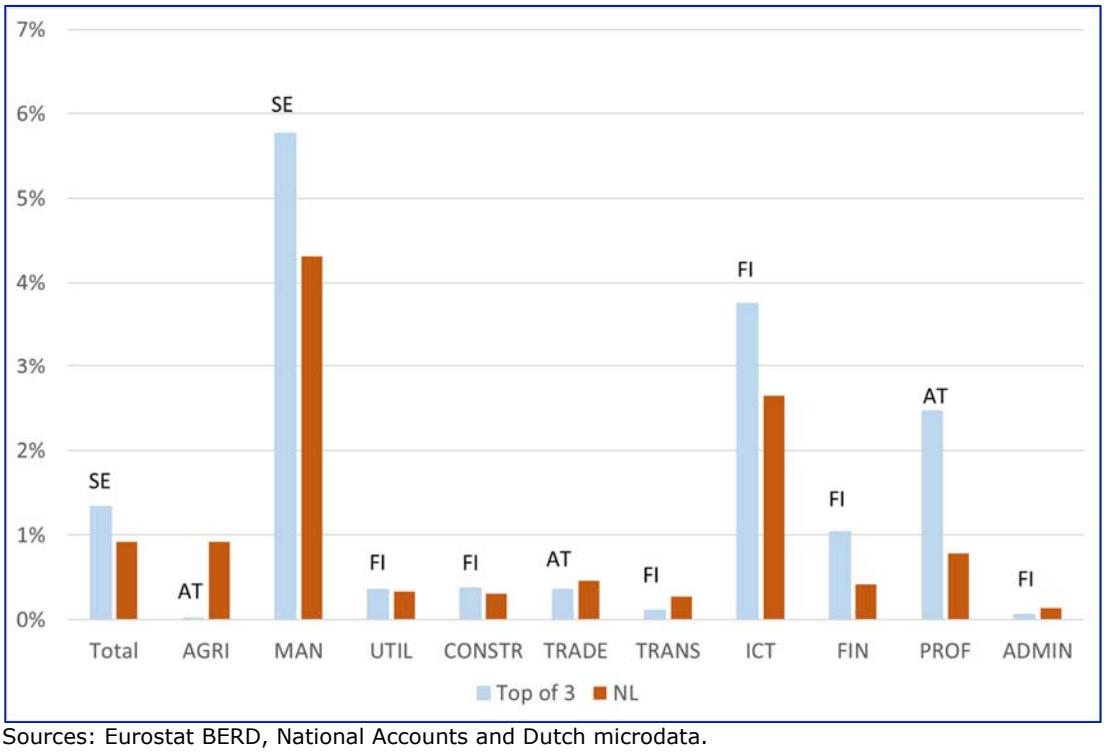


Sources: Eurostat BERD and National Accounts.
* For the hardware sector 37% of runner-up BE instead of 71% of frontrunner SE is shown.

Especially non-labour current R&D expenditures lag behind EU average

A further international comparison of R&D expenditures on labour, capital and other current expenditure is only possible for three countries comprising the benchmark of north-west Europe (Austria, Finland and Sweden) and bearing in mind that results from the Dutch microdata only apply to companies with 10 or more workers. For labour, it shows that expenditure is not that far below the top-three, with professional services the main exception (Figure 2.4).

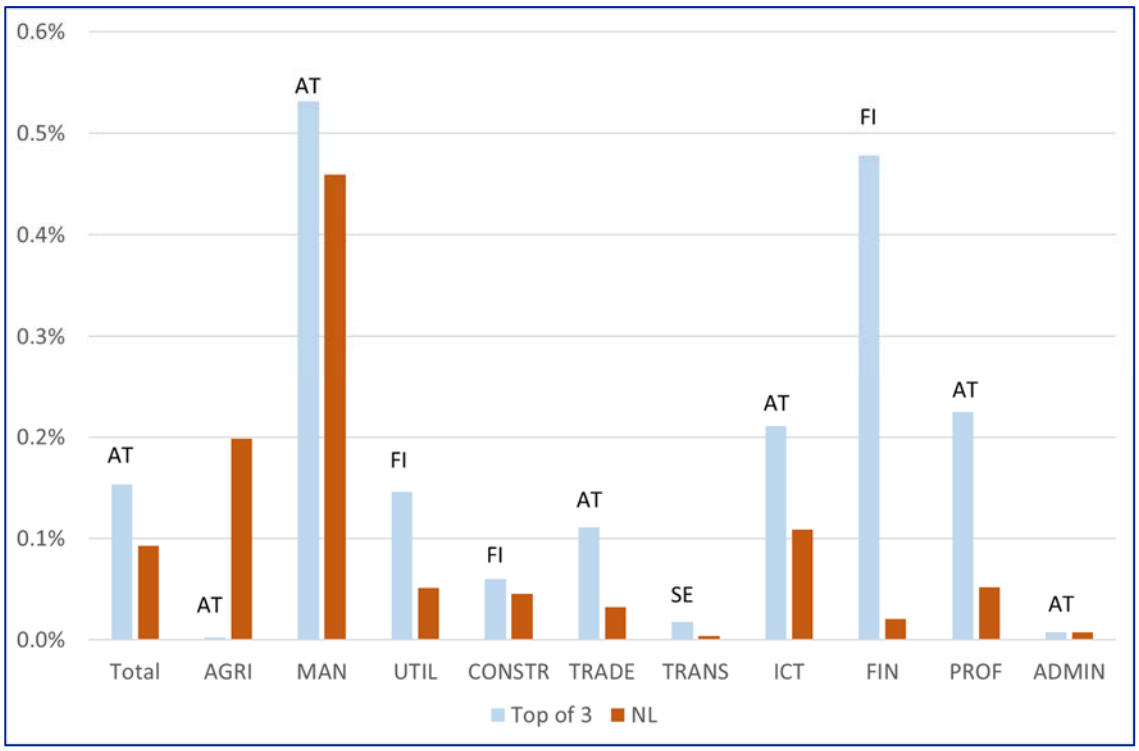
Figure 2.4 Business R&D expenditure on labour as % of GVA by main sector, the Netherlands and top-three (Austria, Finland, Sweden), 2015



Sources: Eurostat BERD, National Accounts and Dutch microdata.

R&D expenditure on capital (e.g. buildings) is not far below the benchmark in most sectors, with the notable exceptions of finance and professional services (Figure 2.11). Here, it should be kept in mind that R&D expenditure on capital is only a fraction of those on labour.

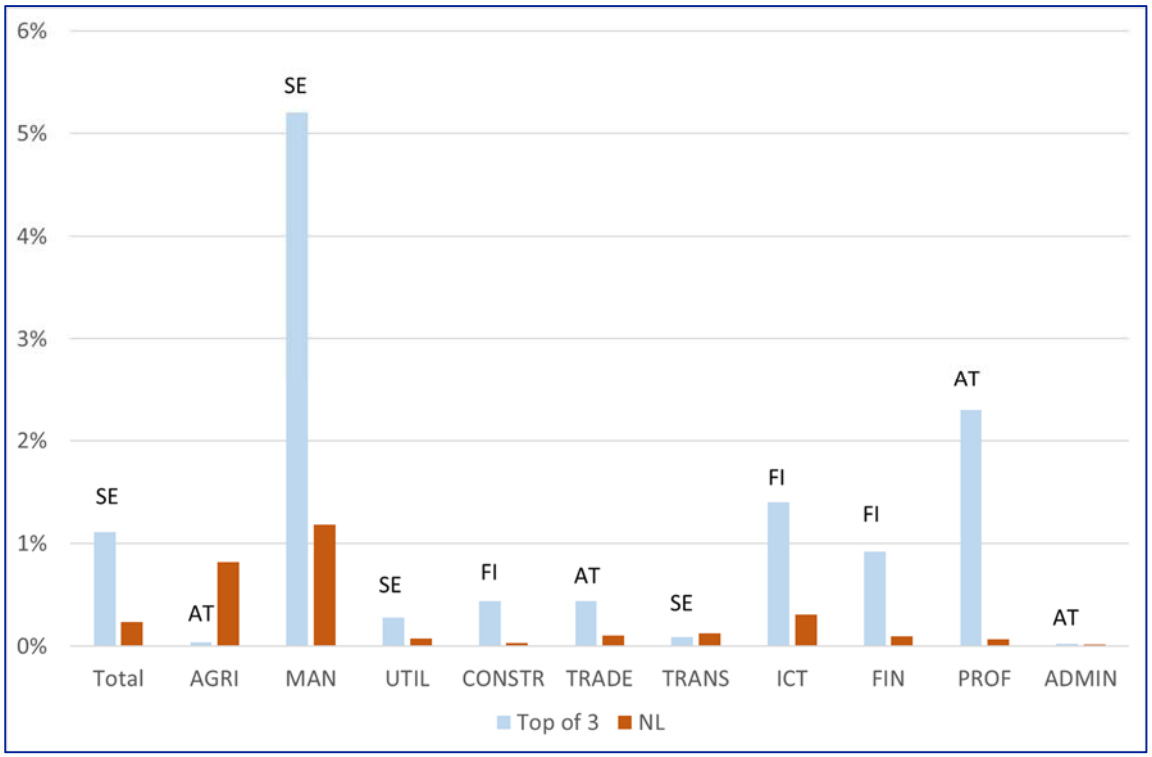
Figure 2.5 Business R&D expenditures on capital as % of GVA by main sector, the Netherlands and top-three (Austria, Finland, Sweden), 2015



Sources: Eurostat BERD, National Accounts and Dutch microdata.

The largest differences between the Dutch business R&D expenditure and the top-three countries exist for non-labour current expenses, where Dutch expenditure is low in almost all sectors with the exceptions of agriculture and transport.

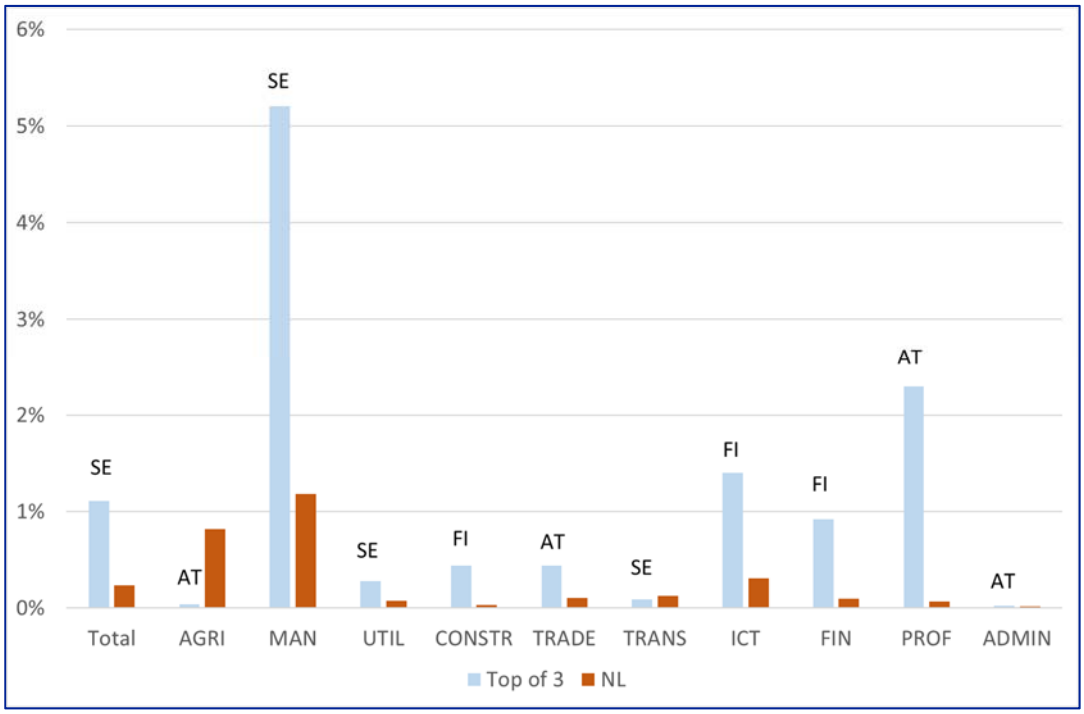
Figure 2.6 Business R&D non-labour current expenditures as % of GVA by main sector, the Netherlands and top of three (Austria, Finland, Sweden), 2015



Sources: Eurostat BERD, National Accounts and Dutch microdata.

Zooming in on manufacturing sectors, R&D expenditures on labour are highest in the electrical sector and also higher than the top of the three northwest European countries for which data is available. R&D expenses on labour are second-highest in the "hardware" sector, but still far below the top country Sweden (Figure 2.7).

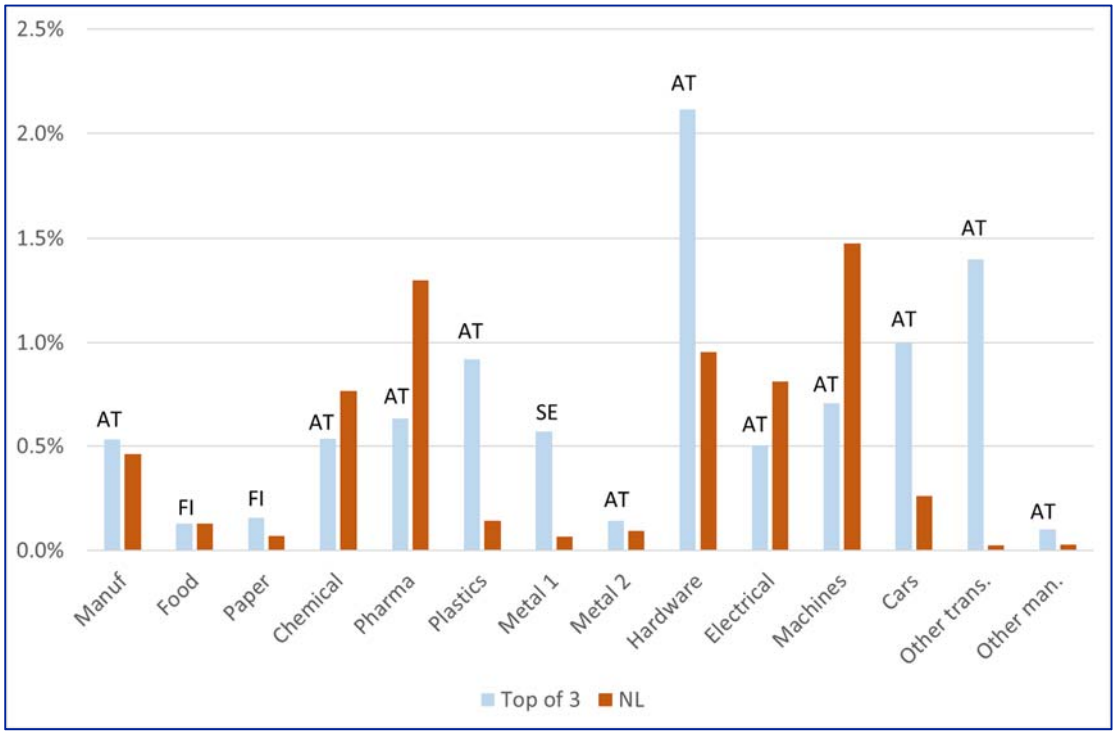
Figure 2.7 Eurostat Business R&D expenditures on labour as % of GVA by manufacturing sector, the Netherlands and top of three (Austria, Finland, Sweden), 2015



Sources: Eurostat BERD, National Accounts and Dutch microdata.

For R&D expenditures on capital in manufacturing sectors, the picture is mixed, with below-benchmark expenditures in the production of plastics, basic metal, hardware, cars and other transport equipment but above-benchmark expenditures in the production of chemicals, pharma, electrical equipment and machines (Figure 2.8).

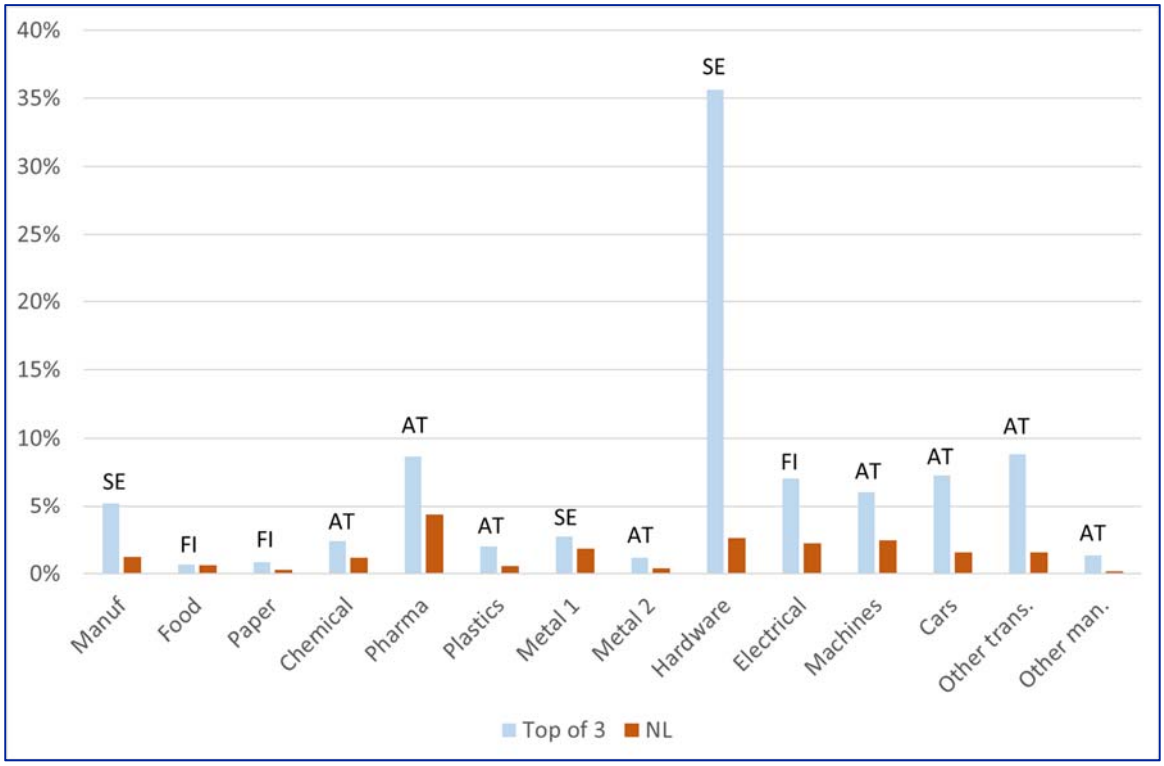
Figure 2.8 Business R&D expenditures on capital as % of GVA by manufacturing sector, the Netherlands and top-three (Austria, Finland, Sweden), 2015



Sources: Eurostat BERD, National Accounts and Dutch microdata.

The R&D non-labour current expenditure is below the benchmark in all manufacturing sectors, particularly in the "hardware" sector (Figure 2.9).

Figure 2.9 Business R&D non-labour current expenditures as % of GVA by manufacturing sector, the Netherlands and top-three (Austria, Finland, Sweden), 2015



Sources: Eurostat BERD, National Accounts and Dutch microdata.

2.3.3 Results – types of R&D investment that are low

Key findings

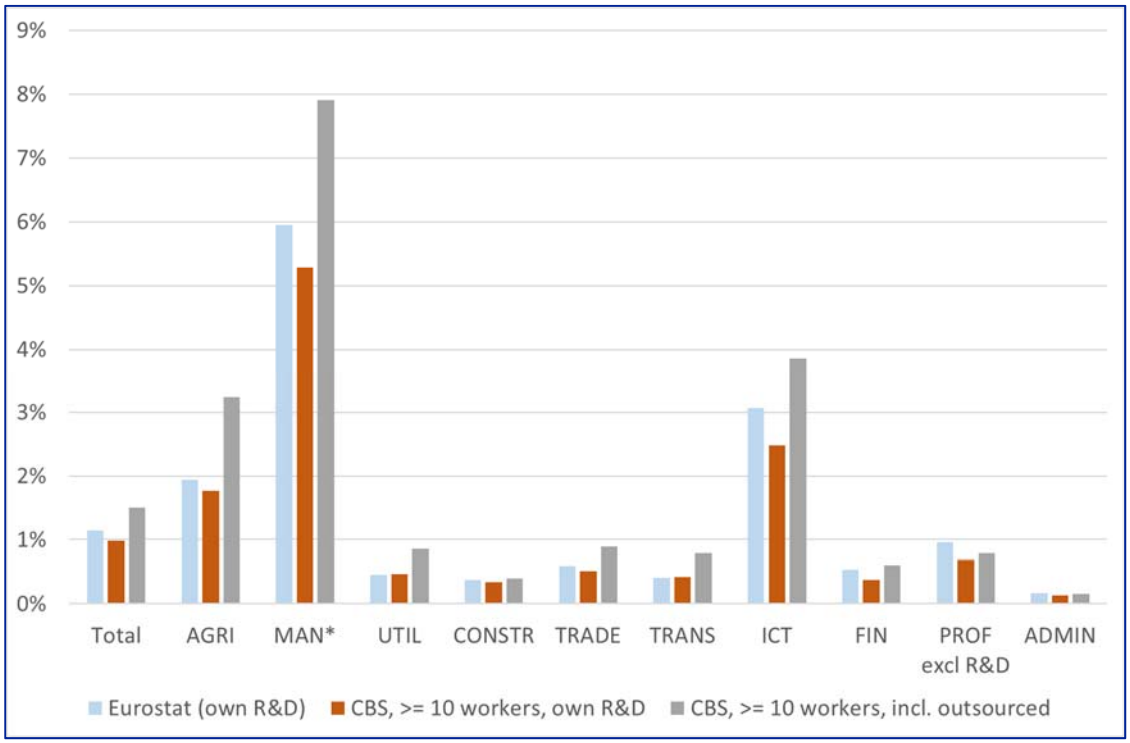
The second question (A2) asks which types of (private) R&D&I investments are lowest per sector in the Netherlands. Dutch microdata allow investigation of this for outsourcing, the educational profile of R&D staff and the type of research (applied, experimental or fundamental), but only for companies with 10 or more workers. The data show that the largest part of R&D is spent on in-house research, with 1/6 outsourced to other organisations in the Netherlands and abroad each. Outsourcing abroad is particularly low in sectors where total R&D expenditures are low. In the manufacturing sector, outsourcing does not depend on company size. The increase of engineers and scientists in high-tech manufacturing sectors between 2008 and 2017 suggests the great degree of outsourcing abroad in these sectors did not hurt their employment. This suggests complementarity of in-house and outsourced R&D, where mainly in sectors with high R&D intensities and high product quality demands (pharmaceuticals, electronics, cars) the product testing is outsourced abroad as demonstrated in the previous section. Employees without a technical or scientific degree tend not to be involved in R&D except in agriculture, food and pharmaceuticals. Businesses also spend little on fundamental research, except in agriculture.

An international comparison of detailed R&D statistics suffers from the fact that Eurostat data on private R&D expenditure are only available for the total expenditure in most countries in north-west Europe (Austria, Finland and Sweden being the exceptions), as explained in the note in Section 2.3.1. In this section, more detailed Dutch R&D statistics are presented, with the caveat that these more detailed statistics only apply to companies with 10 or more workers.

Micro enterprises account for 10% of Dutch R&D

In Figure 2.10 one can infer that the (in-house) R&D expenditure of micro-enterprises is typically around 10 per cent of national R&D expenditure, with the notable exception of ICT companies. Interestingly, only two thirds of total Dutch private R&D expenditure is on own (in-house) R&D. This does not imply that private R&D is 50% higher than private in-house R&D because 80% of outsourced R&D expenditures is on other businesses (both within the Netherlands and abroad), on which more later. However, it does illustrate that a focus on in-house R&D ignores the dynamics of R&D partnerships. As shown above, Dutch businesses spend a larger proportion of GDP on partnerships with national non-business institutes. Eurostat statistics on business-to-business R&D partnerships are not available, so the dynamics of these partnerships cannot be compared with other EU countries. Thus, the detailed statistics presented in this section (namely for companies with 10 or more workers) cover roughly 90 per cent of Dutch R&D.

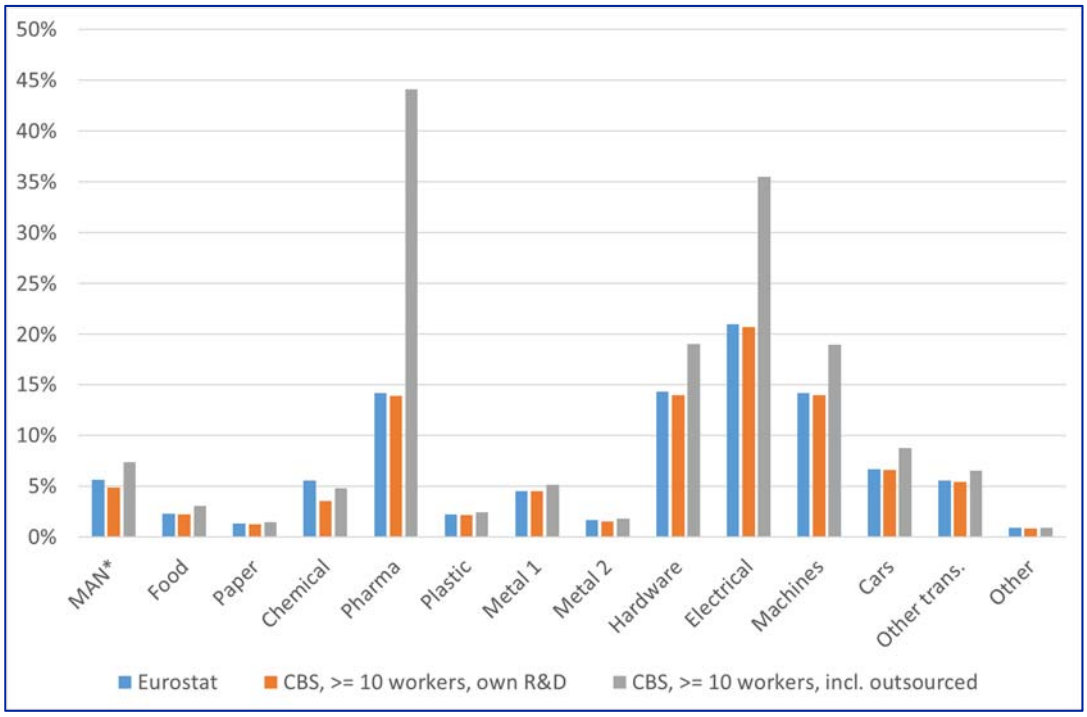
Figure 2.10 Dutch business expenditures by main sector, (1) all businesses, (2) excl. micro-enterprises and (3) including outsourced R&D, 2015



* Dutch CBS statistics: excluding refineries due to small-sample publication restrictions.
Sources: Calculations based Eurostat data and CBS microdata.

The chemical sector is the only Dutch manufacturing sector with a noticeable share of micro-enterprises (Figure 2.11). Pharmaceutical (69%) and electrical (42%) manufacturers outsource the greatest shares of R&D, with food, chemical, hardware, machines and cars each outsourcing 24% to 27% of R&D.

Figure 2.11 Dutch business expenditures by main sector, (1) all businesses, (2) excl. micro-enterprises and (3) including outsourced R&D, 2015



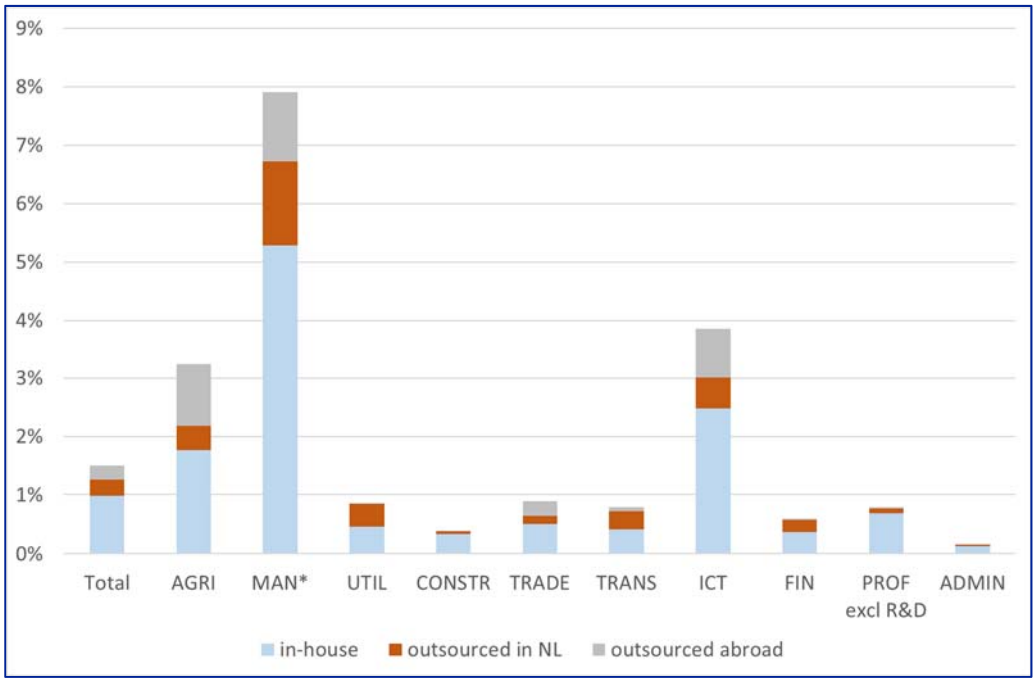
* Dutch CBS statistics: excluding refineries due to small-sample publication restrictions.
Sources: Calculations based Eurostat data and CBS microdata.

Roughly one-third of R&D is outsourced, of which roughly half is abroad

Roughly two-thirds of R&D is spent on in-house research and development, one sixth is outsourced to other organisations (businesses and otherwise) in the Netherlands and one sixth is outsourced abroad

Figure 2.12). R&D outsourced to other organisations in the Netherlands is double-counted at the level of the whole Dutch economy, but not necessarily per sector. For example, it is conceivable that Dutch banks outsource part of their R&D to ICT companies and that Dutch utilities outsource part of their R&D to machine manufacturers (no data are available on this). Therefore, at the sector level the part of expenditure outsourced to other businesses remains relevant as an indicator of sector investments in R&D. The sectors that invest least in R&D, outsource less even compared with their low R&D levels: administrative services and construction.

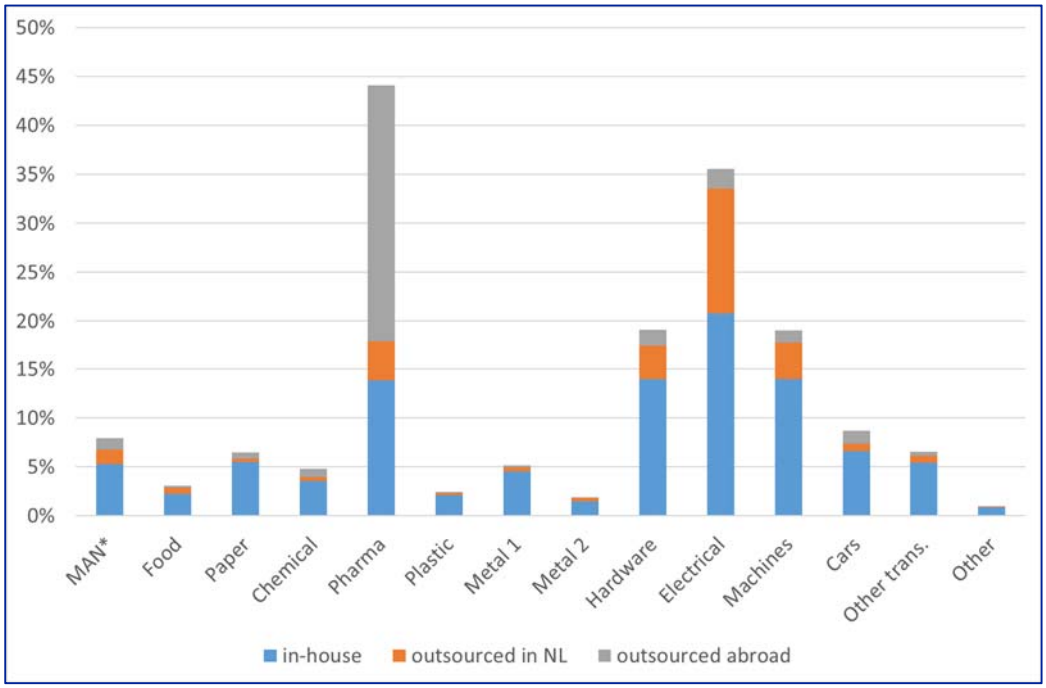
Figure 2.12 Dutch R&D expenditures in main sectors, in-house, outsourced in the Netherlands and abroad, 2015 (excl. micro-enterprises)



Source: calculations based on CBS microdata.

Zooming in on manufacturing sectors, those that outsource a greater part of R&D do so both within the Netherlands and abroad. Most manufacturers contract outsourcing for the greater part within the Netherlands. The pharmaceutical industry is the exception, outsourcing the greater part of even all R&D abroad (Figure 2.13).

Figure 2.13 Dutch R&D expenditures in manufacturing sectors, in-house, outsourced in the Netherlands and abroad, 2015 (excl. micro-enterprises)

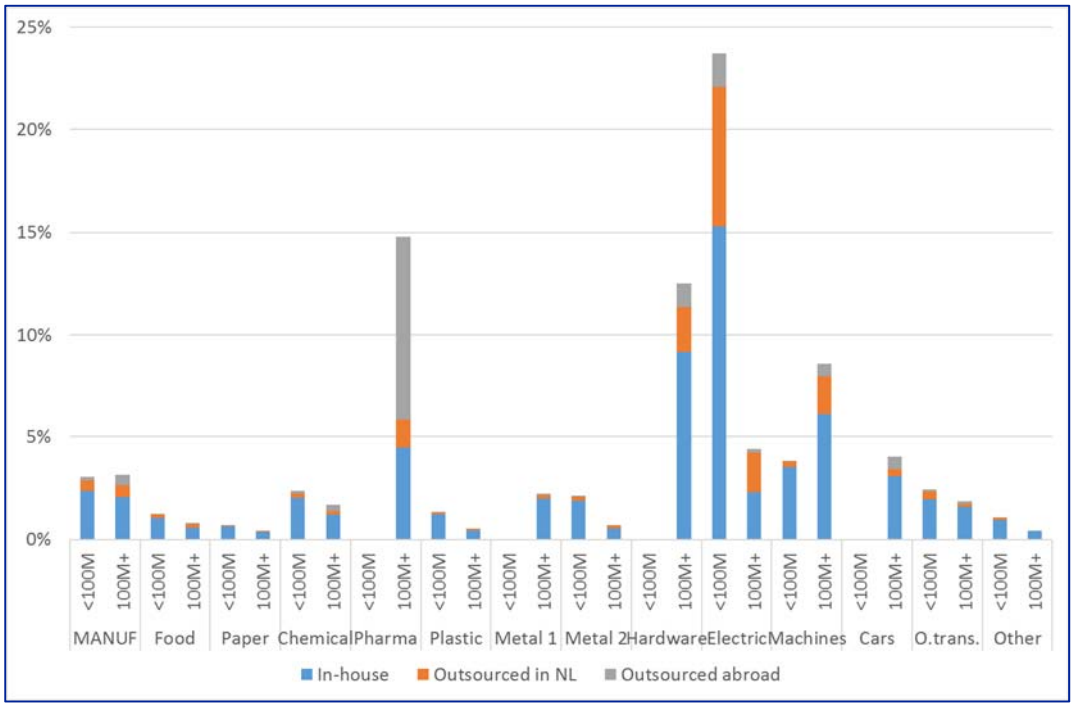


Source: calculations based on CBS microdata.

Similar degrees of outsourcing between very large and smaller manufacturers

As an explanation for the great degree of outsourcing in these sectors, the presence of Dutch multinationals was considered.[90] Examples are Unilever and Heineken (food), DSM (pharmaceuticals), Philips, NXL semiconductors and Océ copy machines ("hardware"), Aalberts (electrical) and ASML (machines). The impact of outsourcing on innovation might be positive if extra research is done through partnerships abroad, or negative outsourcing of R&D follows outsourcing of manufacturing and Dutch R&D personnel is displaced. The virtual absence of small companies in some of these sectors dominated by multinationals, particularly in pharmaceuticals and "hardware", but also in the basic metal and car industries, hampers comparison. However, in manufacturing as a whole there is no striking difference in outsourcing to other organisations in the home country and abroad between manufacturers with more and with a turnover of less than EUR 100 million, nor in individual subsectors of manufacturing (Figure 2.14).

Figure 2.14 Dutch R&D expenditures in manufacturing sectors, in-house, outsourced in NL and abroad, 2015, firms with ≥ and with < EUR 100 mil turnover (excl. micro-enterprises)



Source: calculations based on CBS microdata.

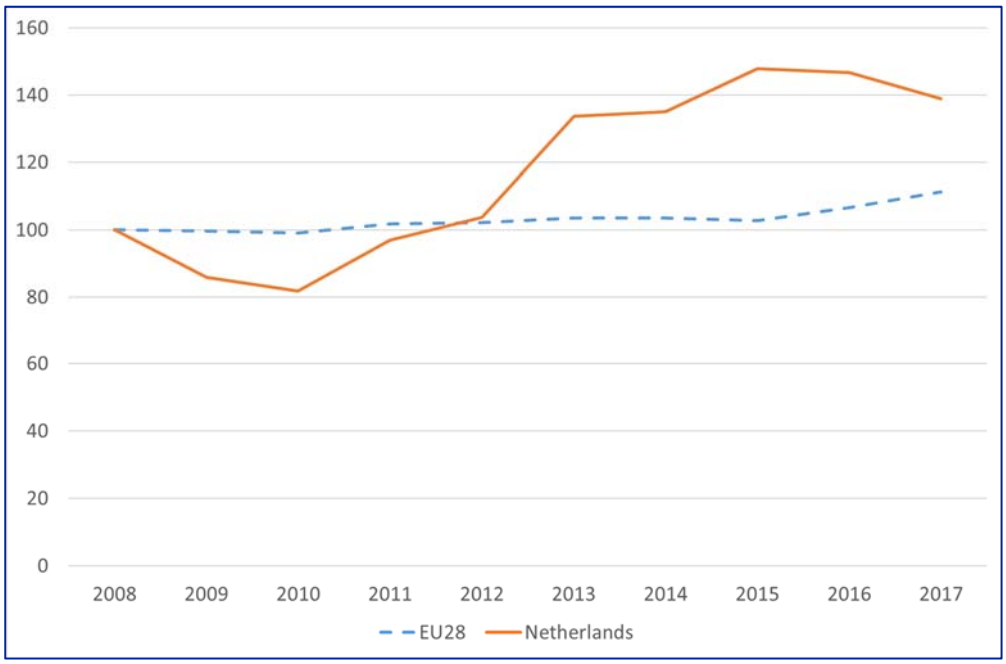
Outsourcing and in-house R&D seem complementary

Looking at the development of the number of engineers and scientists in medium and high-technology manufacturing indicates that this number declined during the crisis and immediate aftermath in 2009 and 2010 and then recovered in both the Netherlands and the EU (Figure 2.15). The developments in the Netherlands were more pronounced than in the EU. The Dutch share in EU high-technology staff was 3.0% at the peak in 2015, compared with 3.6% in overall employment. Thus, there is no evidence that outsourcing

[90] According to the Dutch Bureau of Statistics, multinationals account for 40% of jobs in the Dutch private sector and for two thirds of total private sector turnover, www.cbs.nl/en-gb/news/2015/30/multinational-companies-play-prominent-part-in-dutch-economy.

displaced Dutch employment in R&D but rather that outsourcing and in-house R&D are complementary.

Figure 2.15 Number of engineers and scientists in medium- and high-technology manufacturing, EU and the Netherlands, 2008-2017 (index, 2008 = 100)

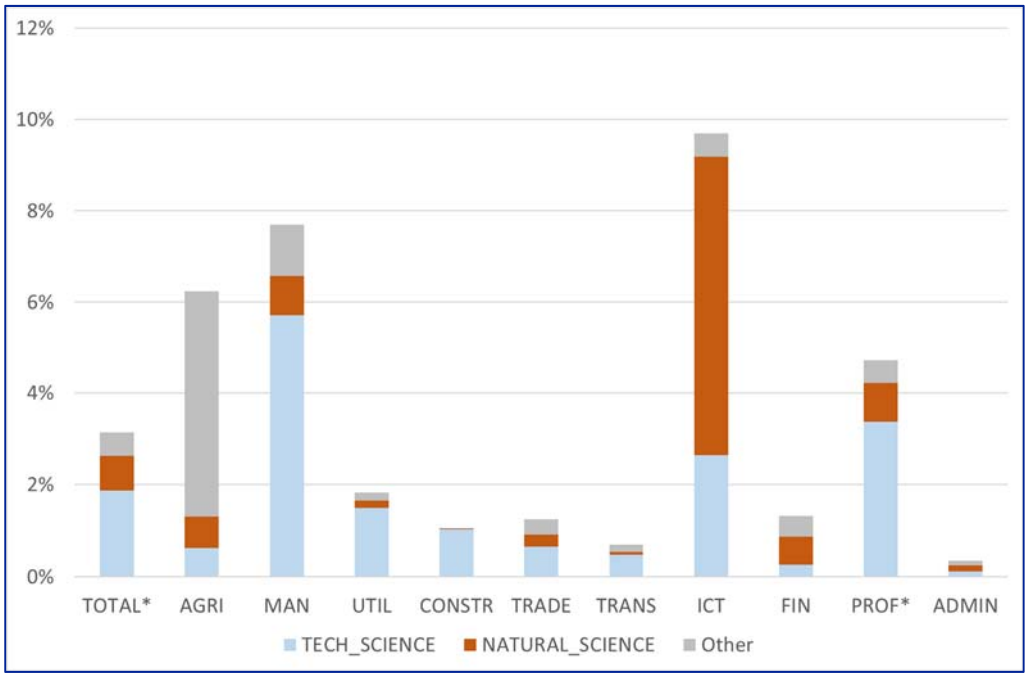


Source: Eurostat [hrst_st_nsec2].

R&D staff predominantly have a technical background

In the Netherlands (and likely other countries in north-west Europe although detailed Eurostat figures are unavailable), most R&D staff have a technical background in most sectors except agriculture and ICT where most R&D staff are specialized in agricultural sciences and ICT respectively, and financial services where R&D staff are mixed (Figure 2.16). This underlines the importance of a technical background for R&D.

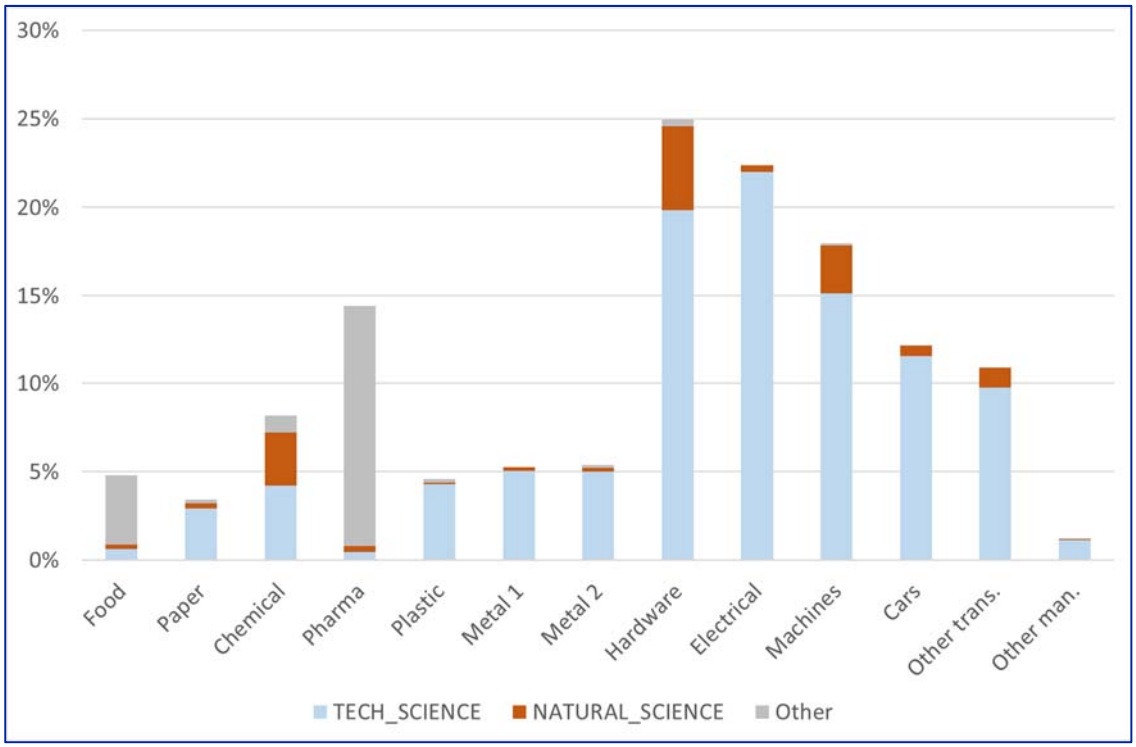
Figure 2.16 Technical and science R&D staff in the Netherlands as % of total employment, 2015 (excl. micro-enterprises)



Manufacturing: excluding refineries, professional services: excluding R&D companies.
Source: CBS microdata.

A technical background is also the predominant requirement in most manufacturing sectors, with the exceptions of food (agricultural sciences) and pharmaceuticals (medical sciences), see Figure 2.17. People with a background in natural sciences are to a lesser extent employed in R&D in the chemical, hardware and machines industries, although surprisingly not in electrical manufacturing.

Figure 2.17 Technical and science R&D staff in Dutch manufacturing as % of total employment, 2015 (excl. micro-enterprises)



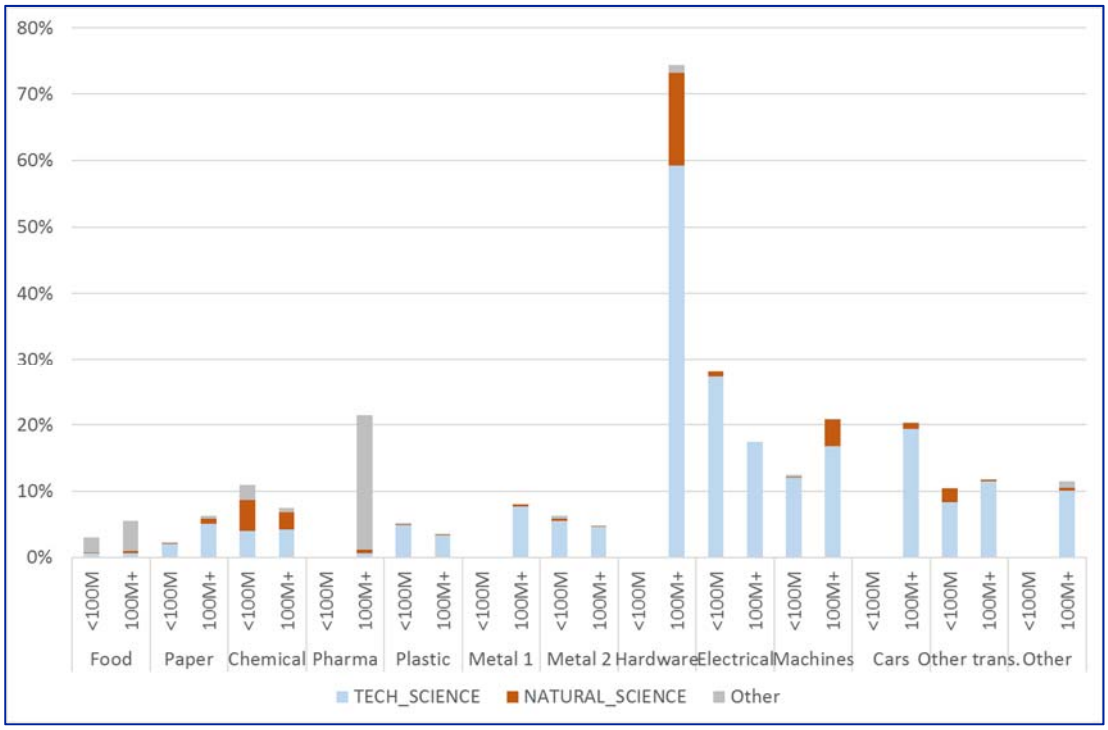
Source: CBS microdata.

Technical staff predominant in both very large and smaller companies

In both the Dutch economy as a whole and in the Dutch manufacturing sector, companies with turnover of more than EUR 100 million employ about 60% of both all workers and R&D personnel. The field composition of R&D staff does not differ noticeably between manufacturers with turnover of more or with less than EUR 100 million (Figure 2.18).[91]

[91] All figures excluding textile, pharma, metal1, hardware, cars, other manufacturing and finance, where fewer than 10 companies in the Dutch R&D survey had turnover of less than EUR 100 million turnover in 2015, and all excluding micro-enterprises.

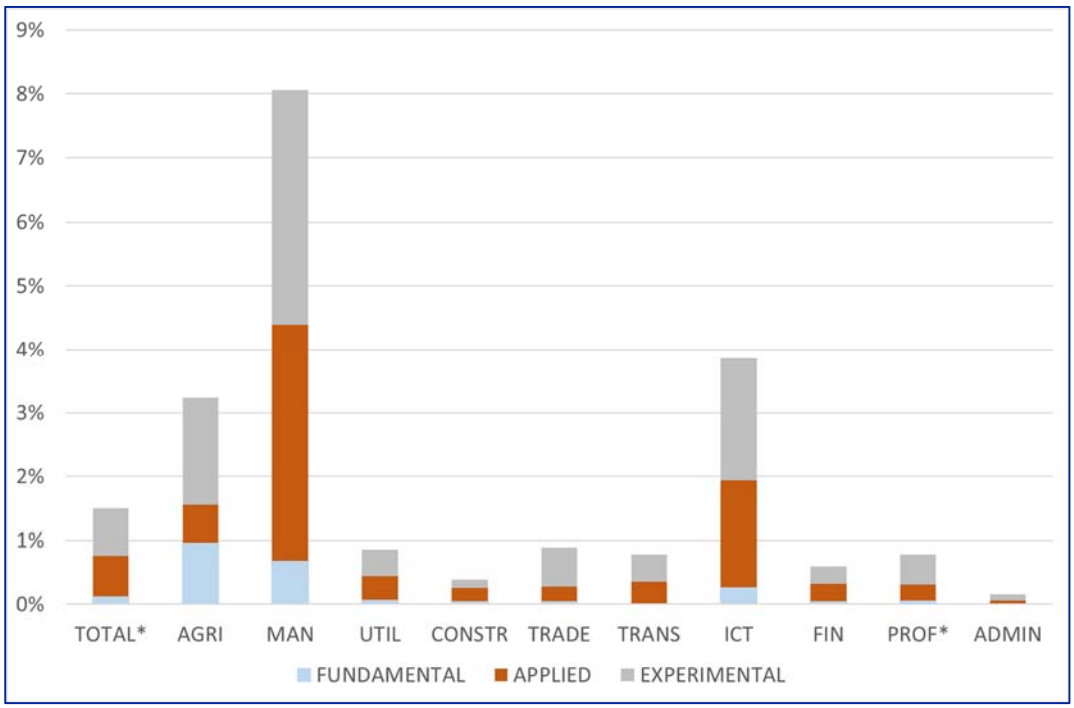
Figure 2.18 Technical and science R&D staff in Dutch manufacturing as % of total employment, firms with turnover ≥ and with < EUR 100m, 2015 (excl. micro-enterprises)



Source: CBS microdata.

Perhaps not surprisingly, businesses spend little R&D on fundamental research, and in roughly equal parts to applied and experimental research, with agriculture being the notable exception (Figure 2.19).

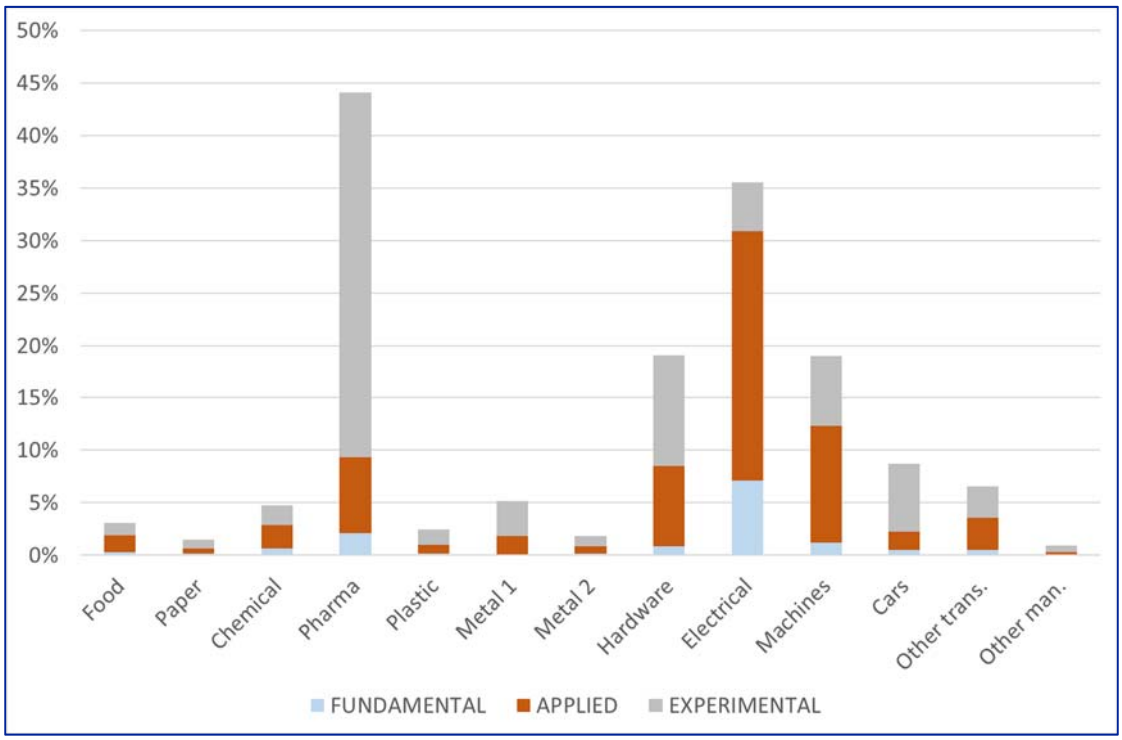
Figure 2.19 Expenditure by type of R&D as % of GVA, 2015, excl. micro-enterprises



Manufacturing: excluding refineries, professional services: excluding R&D companies.
Source: CBS microdata.

In manufacturing, sectors where product safety and reliability are paramount spend the greatest share of turnover on experimental research: pharmaceuticals, "hardware" (computers, electronic and optical appliances) and the car industry. This is likely not specific to Dutch manufacturers in these sectors. Given that the EU exports more medicinal/pharmaceutical products and cars than it imports[92], experimental research to meet product safety demands (whether regulatory or not) appears more likely to enhance than to detriment the competitive edge of EU manufacturers.

Figure 2.20 Expenditure by type of R&D in manufacturing as % of GVA, 2015, excl. Micro-enterprises



Source: CBS microdata.

2.3.4 Results – explanation of low R&D investment

Key findings

Question A3 asks, based on the dataset, which factors explain the low Dutch (private) investment levels in R&D&I. The data shows that three factors contribute positively to R&D intensity (expenditures as % of turnover): (i) high educated technical staff, (ii) the occurrence of outsourcing except for co-operation with (Dutch) R&D institutes and (iii) a wage cost subsidy (called WBSO). R&D intensity (as a percentage of turnover) is decreasing in both sector dominance and log turnover; pointing to both scale efficiencies and monopoly underinvestment as reasons for lower R&D intensity in (very) large companies. Sector growth and flexwork initially also had a significantly positive effect on R&D intensity but both effects became insignificant after controlling for the significantly positive percentage of young workers (aged 15-29), and an initially positive effect of an R&D equipment tax deductibility for companies with turnover of less than EUR 100 million disappeared after controlling for the occurrence of outsourcing.

[92] Eurostat (2018). "EU-28 exports, imports and trade balance in medicinal and pharmaceutical products, 2002-2017". See: http://ec.europa.eu/eurostat/statistics-explained/index.php/International_trade_in_medicinal_and_pharmaceutical_products. Eurostat (2018). "EU-28 exports, imports and trade balance in cars, 2002-2017". See: http://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_trade_in_cars.

To explain which factors contribute to low R&D investment, a panel data model was estimated, making optimal use of the fact that most participating companies did so multiple times. Out of the 17,443 observations across all waves in 2011-2015, only 1,747 observations (companies) got dropped when estimating a panel data model with fixed effects, resulting in 15,696 observations. This is considered sufficiently representative for the whole sample. Contrary to the previous section where statistics were presented, observations are not weighted in the regressions.

R&D expenses are expressed as a percentage of company turnover, taken from the VAT filings. For those companies where VAT filings were missing (no match could be found with the R&D sample), turnover was imputed with the average of non-missing values per sector and category of number of workers.

Insights from initial estimates caused one major change of approach: instead of numerical values of R&D outsourcing and fiscal policy, yes/no indicators of these were used. The reason is that the coefficients of R&D outsourcing approximate their share in total R&D, and that the coefficients of R&D tax deductions approximate the inverse of the corporate tax rate. For more meaningful interpretations, the effects of the occurrence of R&D outsourcing and tax deductions on the level of R&D expenses were investigated instead.

All potential factors mentioned in Section 2.3.1 were initially included in the model, but two were excluded at an early stage:

- GDP growth: not much variation in 2011-2015 and very insignificant;
- Percentage of high educated workers in a sector, because highly correlated with the more significant percentage of high technical educated workers.

Three variables were added to the model after initial estimates:

- Percentage of young workers in a sector. The reason is that flexwork had an unexpected significantly positive coefficient on R&D expenses in initial estimates. Since young workers in particular have flexible employment contracts, the effect of flexwork might actually reflects that of young workers and the percentage of young workers should be controlled for;
- An indicator of whether the sector is covered by the topsector policy. The topsector policy was initiated in 2010 and the coverage of sectors by this policy has not changed since then, so basically it is an aggregate of several sector dummies;
- An indicator of whether the sector is covered by sector training funds (O&O funds). The reason is that in initial estimates the Herfindahl index had a significantly negative coefficient on R&D expenses and also on company training, discussed in the next chapter. This might be interpreted as within-sector competition inducing more R&D and company training. However, in the Netherlands sectors with many small firms may also be covered by sector collective agreements, which the Ministry of Employment and Social Affairs may then declare compulsory for all companies in the sector. This compulsory sector collective agreement may mitigate some effects of competition between many small firms. The presence of sector training funds in sectors with a low Herfindahl index might particularly explain company training, but this dummy was added to models for R&D as well. The sectors covered by collective agreements (and sector training funds) do not necessarily coincide with NACE sectors. Hence the occurrence of sector training funds was weighted with 0.25 or 0.5 to reflect

partial coverage. Some sector training funds ceased to exist from 2015, so there is some variation of this indicator.

The model was estimated for the whole sample and for both subsamples of companies with annual turnover (in current prices) less than EUR 100 million and those with annual turnover of EUR 100 million or more (Table 2.1). Imports or exports in or outside the EU and the size category in terms of number of workers were included in the model but are not presented because all four coefficients were insignificant, nor are sector and year dummies because less meaningful for interpretations. The full estimation results including standard errors are presented in Annex C.

Table 2.1 Estimation results for R&D expenditure as a percentage point of company turnover, by value of company turnover

Variable	< EUR 100 million	≥ EUR 100 million	All companies
Herfindahl index	-0.060	-0.045	-0.032
Company to sector turnover ratio	-4.722**	-0.372***	-0.422***
WBSO dummy (R&D staff wage subsidy)	6.717***	0.026	4.581***
RDA dummy (equipment tax deduction)	0.509	0.126	0.421
EXP sister companies Abroad dummy	0.593	0.644**	0.313
EXP third companies Abroad dummy	2.702**	-0.138	1.996**
EXP R&D institutes Abroad dummy	1.049	0.341	0.241
EXP universities Abroad dummy	-1.977	0.367	-1.641
EXP sister companies NL dummy	0.576	0.043	0.182
EXP third companies NL dummy	1.689**	1.269	1.537***
EXP R&D institutes NL dummy	-3.335*	0.621	-2.129
EXP universities NL dummy	1.279	-1.79	0.391
% high tech educated workers in sector	0.034	-0.032	0.007
% flexworkers in sector	0.002	0.027	0.014
% workers aged 15-29 in sector	0.080***	0.119	0.087***
Topsector dummy	1.037	3.235	2.308**
O&O (sector training fund) dummy	0.558	-0.427	0.519
Nr. of companies (some in multiple waves)	5,962	1,375	6,951
Nr. of observations	12,349	3,347	15,696
R-squared	0.167	0.071	0.112

* = significant at 10%, ** = at 5% and *** = at 1%. Standard errors were clustered per company.
Source: Ecorys estimates with Dutch microdata.

The variance of R&D expenditures explained by the model ranges from 7% to 17% depending on the subsample. The low explanatory power does not invalidate the estimates, but does imply that R&D remains hard to predict.

The company's turnover as a percentage of sector turnover correlates negatively with the share of turnover spent on R&D (R&D intensity for short).

The occurrence of a R&D staff wage subsidy correlates positively with R&D intensity for companies with turnover of less than EUR 100 million, but not for larger companies.

The occurrence of outsourcing R&D to companies abroad (third companies abroad if turnover is less than EUR 100 million and sister companies abroad if turnover is higher) correlates positively with R&D intensity. For Dutch companies with turnover of less than EUR 100 million turnover, this also holds for outsourcing to third companies in the Netherlands. Equally interestingly, the occurrence of outsourcing R&D to R&D institutes or universities does not correlate significantly (at the 5% level) with R&D intensity. For companies with turnover of less than EUR 100 million, the coefficient of co-operation with Dutch universities is even weakly significantly negative. This indicates that while outsourcing is generally complementary, co-operation with Dutch universities seems to be a substitute for private R&D.

Coverage of the sector-by-sector training funds does not correlate significantly with R&D intensity. The top sector indicator correlates significantly with R&D intensity at the 5% level but not at the 1% level, nor even at 10% level for the separate subsamples of companies with less turnover of less than or with greater than EUR 100 million respectively.

Flexwork had a significantly positive effect on R&D intensity in the initial model estimates. Because this was unexpected, the percentage of young workers (aged 15-29) was added after which the effect of flexwork became insignificant.

It is also interesting to note that the percentage of workers with a high technical educational background in the sector does not correlate significantly with R&D intensity. However, dropping the R&D outsourcing indicators leads to a significantly positive coefficient of high technical educated staff and also of the R&D equipment tax deductibility (RDA) for companies with turnover of less than EUR 100 million. Lastly, dropping the R&D outsourcing indicators causes both the percentages of flexworkers and of young workers in the sector to become insignificant (Table 2.2).[93] Indeed, outsourcing, the availability of high-educated technical staff, flexwork, sector value added and the employment of young workers are all positively correlated. It suggests a complementarity of outsourcing and the employment of high-educated technical staff, and apparently the employment of young workers matches the (cyclical) variation of R&D better than flexwork or sector value added.

Table 2.2 Estimation results for R&D expenditure as a percentage point of company turnover, by value of company turnover, without outsourcing dummies

Variable	< EUR 100 million	≥ EUR 100 million	All companies
Herfindahl index	-0.175*	-0.142**	-0.161**
Company to sector turnover ratio	-2.874***	-0.274***	-0.454***
WBSO dummy (R&D staff wage subsidy)	7.824***	0.692***	5.530***
RDA dummy (equipment tax deduction)	2.059***	0.301	1.581***
% high tech educated workers in sector	0.137***	-0.016	0.096***
% flexworkers in sector	0.037	0.025	0.020
% workers aged 15-29 in sector	0.002	0.038	0.057
Number of participating companies	7,345	1,740	8,508
Number of observations	16,759	4,965	21,724

[93] The number of observations increases after dropping the R&D outsourcing dummies because R&D expenditures and subsidies are taken from registration data and the R&D outsourcing data from an R&D survey.

Variable	< EUR 100 million	≥ EUR 100 million	All companies
R-squared	0.097	0.038	0.069

* = significant at 10%, ** = at 5% and *** = at 1%. Standard errors were clustered per company.
Source: Ecorys estimates with Dutch microdata.

The above results are not conclusive about the interpretation of the company to sector turnover ratio. It was meant as an indicator of monopoly power, but its negative coefficient could also be interpreted as an efficiency of scale effect. For this reason, log turnover was added to the equation. Log turnover is significant in both the regressions for all companies and for companies with turnover of less than EUR 100 million, but the impact is partly mitigated by the employee size dummies which initially were insignificant but now become significant above 200 workers (Table 2.3). The company to sector turnover ratio is only significant in the regression for all companies. In addition, neither the Herfindahl index nor its square when added, are significant.

In the segment of companies with turnover of more than EUR 100 million, both the company to sector turnover ratio and log turnover are insignificant. The negative impact of company size in this segment is now captured by the employee-size dummies.

After including log turnover, some of the other coefficients change too although the overall picture does not change much. From the finding that company training is most often insignificant but has a significantly negative effect in one regression in Table 2.3 it seems safe to conclude that company training does not boost R&D. In the regression for all companies, the percentage of high tech educated workers reclaims its significantly positive effect.

More interesting is that the effect of expenditures on Dutch R&D research institutes on overall R&D intensity now becomes significantly negative in Table 2.3 instead of weakly negative in Table 2.1. This is evidence that at least for companies with turnover of less than EUR 100 million, outsourcing to Dutch R&D research institutes is a substitute for in-house R&D.

Table 2.3 Estimation results for R&D expenditure as a percentage point of company turnover, by value of company turnover, without outsourcing dummies

Variable	< EUR 100 million	≥ EUR 100 million	All companies
Herfindahl index	-0.114	0.381	-0.013
Herfindahl squared	0.003	-0.028	-0.003
Company to sector turnover ratio	-3.352	-0.175	-0.323***
Ln(turnover)	-0.208**	-1.031	-0.285***
WBSO dummy (R&D staff wage subsidy)	3.216***	-0.053	2.237***
RDA dummy (equipment tax deduction)	0.56	0.252	0.353
EXP sister companies Abroad dummy	1.387	0.611*	0.883
EXP third companies Abroad dummy	0.091	-0.114	0.405
EXP R&D institutes Abroad dummy	-0.176	0.308	-0.364
EXP universities Abroad dummy	1.668	0.654	0.834
EXP sister companies NL dummy	0.917	0.123	0.607
EXP third companies NL dummy	1.111**	1.195	1.108***
EXP R&D institutes NL dummy	-2.683**	0.375	-1.790**
EXP universities NL dummy	1.816	-1.804	0.553

Variable	< EUR 100 million	≥ EUR 100 million	All companies
% high tech educated workers in sector	0.059	0.228	0.083**
% receiving company training in sector	-0.091**	0.277	-0.038
% flexworkers in sector	-0.003	-0.017	-0.003
% workers aged 15-29 in sector	0.063**	0.158*	0.081***
Topsectors	0.867	3.182*	0.058
50 - 199 workers dummy	0.581	-0.813**	0.504*
200 or more workers dummy	1.428**	-0.703*	1.098**
Number of participating companies	5,982	1,375	6,971
Number of observations	12,394	3,347	15,741
R-squared	0.142	0.121	0.098

* = significant at 10%, ** = at 5% and *** = at 1%. Standard errors were clustered per company.
Source: Ecorys estimations with Dutch microdata.

In a meta-review, Becker (2015)[94] finds the following relevant factors (apart from industry characteristics):

- Internal finance and sales;
- Product market competition;
- R&D tax credits and subsidies;
- human capital embodied in knowledge workers and related indicators;
- co-operation with public R&D
- spillovers from foreign R&D.

Our data do not include internal finance. Most other effects are confirmed by our estimates, except for co-operation with public R&D where the above models indicate an insignificant effect of co-operation with universities (and a negative effect of R&D institutes but these are not necessarily public). Gu (2016)[95] finds that competition increases the number of R&D projects, the percentage of R&D failures but also a higher expected return of R&D. The positive effect of R&D tax credits is further confirmed by Rao (2016).[96] Rodríguez and Nieto (2016) find that "offshore insourcing" and "offshore outsourcing" both increase sales through higher R&D.[97]

2.3.5 Results – explanation of low product innovation of goods

Key findings

Question A4 asks what are the main barriers for Dutch firms to innovate (if any). An international comparison of the Community Innovation Survey (CIS) shows that the occurrence of product innovation is above EU-average and not that far below the EU frontrunner – contrary to expenditure levels (observed for total innovation including

[94] Becker, B. (2015), "The Determinants of R&D Investment: A Survey of the Empirical Research", Journal of Economic Surveys 29 (5), 917-942.
[95] Gu, L. (2016), Product market competition, R&D investment, and stock returns, Journal of Financial Economics, Vol. 119, Issue 2, February 2016, 441-455.
[96] Rao, N. (2016), Do tax credits stimulate R&D spending? The effect of the R&D tax credit in its first decade, Journal of Public Economics, Vol. 140, August 2016, 1-12.
[97] A. Rodríguez, A. and M. J. Nieto (2016), Does R&D offshoring lead to SME growth? Different governance modes and the mediating role of innovation, Strategic Management Journal, Vol. 37, Issue8, August 2016, 1734-1753.

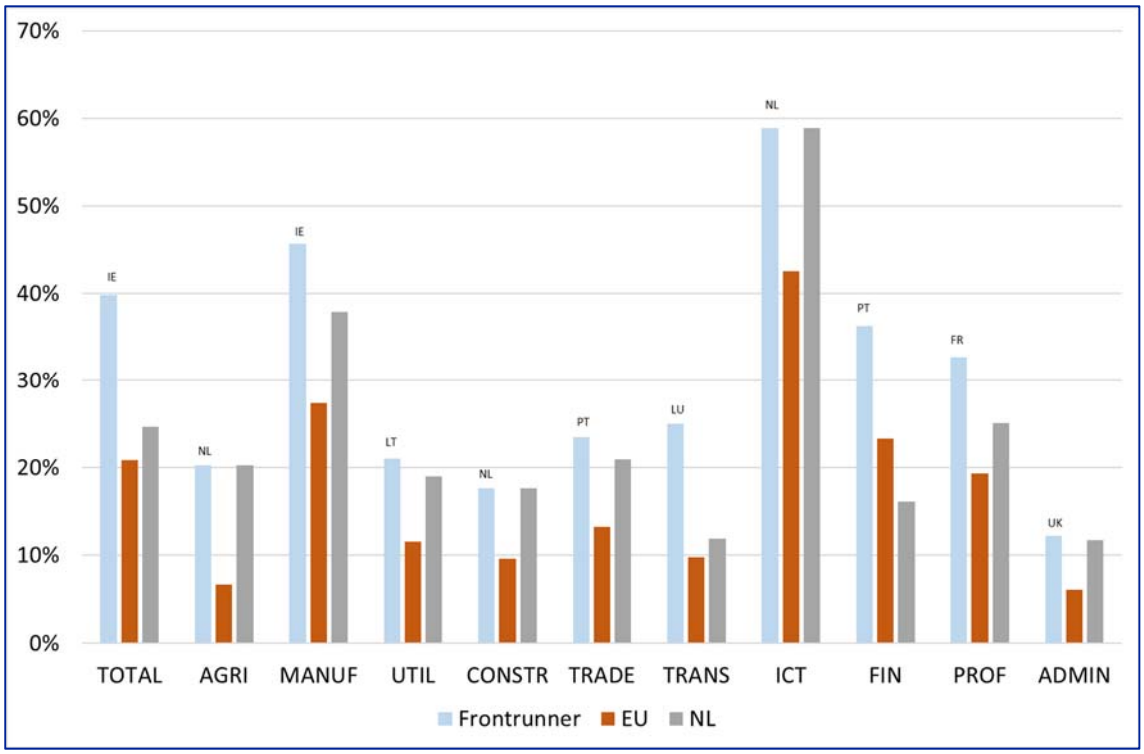
Key findings

process, services and marketing innovation only, however). The main barrier for innovation of products that are new to the market is lack of skilled personnel (observed for the 2014 wave only) and the main positive external factor is the availability of technical professionals and of craftworkers (all waves). Flexwork and company training were not found to have significant effects on this "new" innovation.

Slightly above EU-average Dutch involvement in product innovation …

Statistics on product innovation are based on the Community Innovation Survey, of which the most recently available data (CIS 2014) relate to 2012-14. The percentage of Dutch enterprises engaging in product innovation is at 25%, above the EU average of 21%. The Netherlands is even an EU frontrunner in three sectors: agriculture, construction and ICT (Figure 2.21).

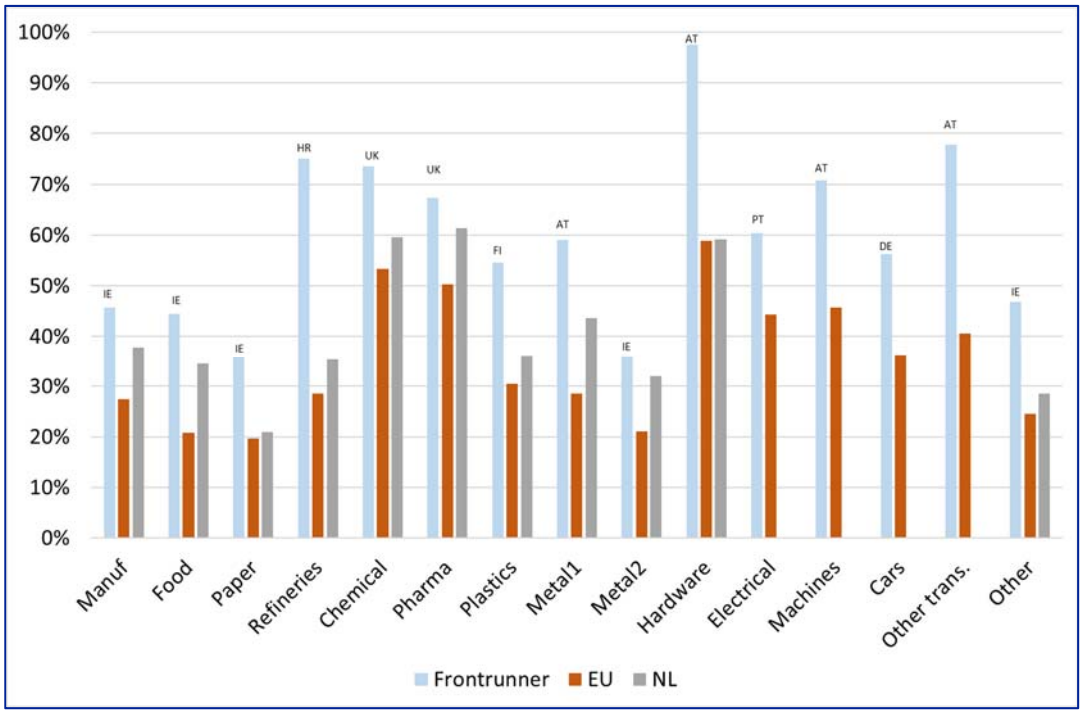
Figure 2.21 Percentage of companies with product innovation, EU frontrunner, EU average and the Netherlands, per sector (CIS 2014)



Source: Eurostat, Community Innovation Survey.

The differences are more pronounced in the manufacturing sector, where at the EU level 27% of the companies engaged in product innovation, compared with 38% of Dutch manufacturers, with Ireland being the EU frontrunner Ireland (at 46%). For all manufacturing sectors for which data are available, Dutch manufacturing is above the EU average but below the EU frontrunner (most often Ireland, UK and Austria, Figure 2.22).

Figure 2.22 Percentage of manufacturers with product innovation, EU frontrunner, EU average and the Netherlands, per sector (CIS 2014)



Source: Eurostat, Community Innovation Survey.

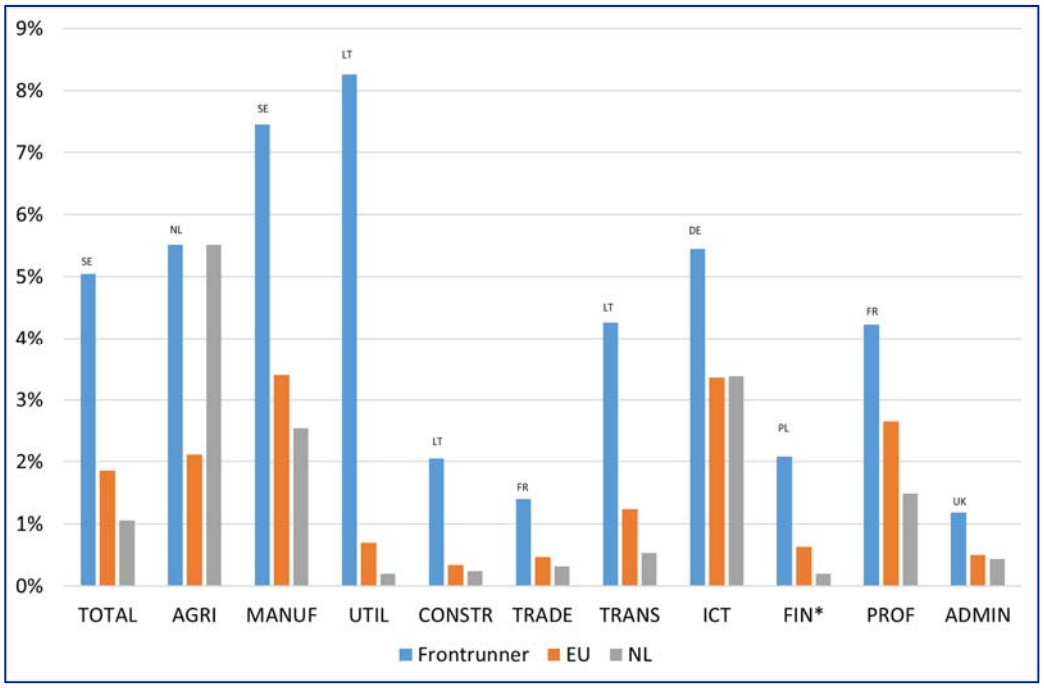
… but quite below EU-average overall expenditures on innovation

However, the percentage of turnover that companies invest in total in innovation[98] confirms the findings for R&D intensity, with even more pronounced differences. As a percentage of turnover, Dutch companies invest 1.1% in innovation compared with 1.8% at the EU level and 5.0% in EU frontrunner Sweden (Figure 2.24).[99]

[98] This includes process innovation and innovation in services, as well as innovation that is new to the company but not new to the market. Specific figures on expenditures on product innovation would be more relevant for this study but are not available in the Eurostat public database.

[99] As a percentage of gross value added, these percentages would typically be twice as high.

Figure 2.23 Percentage of turnover spent on innovation, EU frontrunner, average and the Netherlands, per sector (CIS 2014)

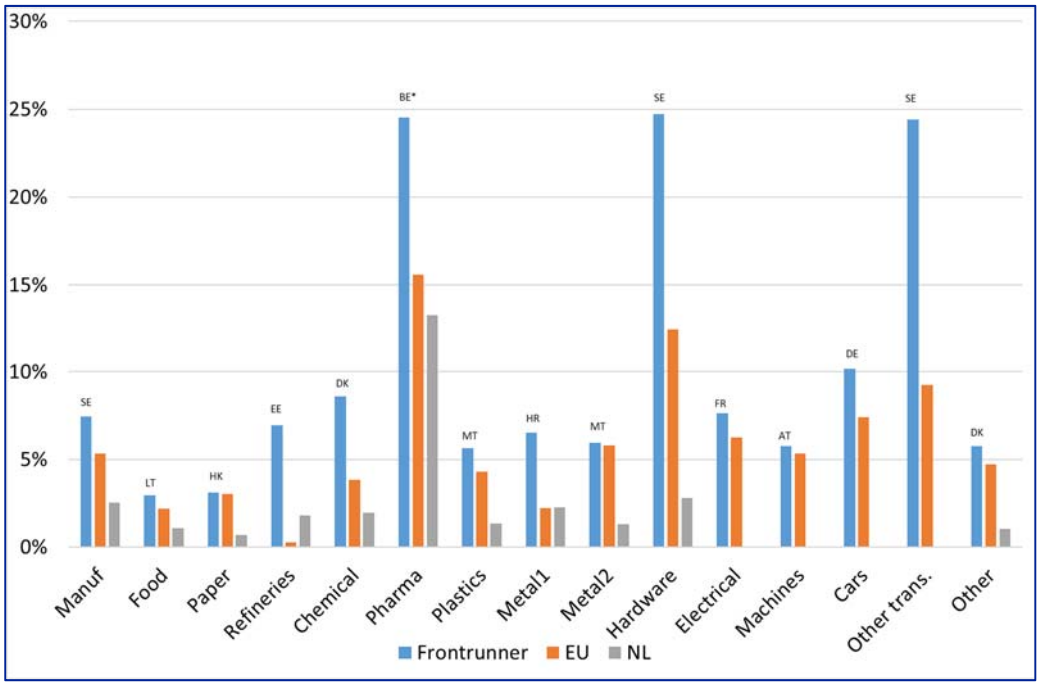


* Finance: excluding frontrunner Denmark (14%).
Source: Eurostat Community Innovation Survey.

Sweden thanks its leading position in innovation expenses to the manufacturing industry, in particular pharmaceuticals, hardware and other transport equipment than cars (Figure 2.24). The Netherlands lag behind the EU average in all manufacturing industries, with the exceptions of refineries (e.g. Shell Pernis) and base metal product (e.g. Hoogovens).

Since total innovation is too broadly confined for the purposes of this study, the conclusion from the international comparison of innovation is limited to a confirmation of R&D figures: expenditure is below the EU average, and this is likely related to low percentages of turnover spent by large companies (since the number of product innovative companies is above the EU average).

Figure 2.24 Percentage of turnover spent on innovation, EU frontrunner, EU average and the Netherlands, per manufacturing sector (CIS 2014)



Pharma: excluding EU frontrunner Sweden (61%).
Source: Eurostat Community Innovation Survey.

To investigate whether low R&D coincides with low innovation, the Dutch Community Innovation Survey microdata (CIS for short) of 2008, 2010, 2012 and 2014 were analysed. In particular, a company could gain access to new technologies by taking a license on them, or by developing products that already exist in the market but that are new to the company.

The CIS includes only one variable for expenditures on innovation, namely for total innovation. This variable may refer not only to product innovation, but also to services, process or marketing innovation. It would be difficult to interpret factors that contribute to this overall expenditure value. Hence, the analysis is limited to the occurrence of product innovation and more specifically, to innovation of products that are new to the market ("new innovation" for short).

Thus, diffusion of technologies by purchasing access to them is not covered by the CIS, but further insights in differences in innovation (and presumably R&D) of products that are new to the company only or also the market can be gained.

A number of core variables are available for all waves. In addition, the 2014 data on barriers for innovation were used. To avoid the exclusion of 2008, 2010 and 2012 data, the values of missing barriers for earlier years were set to zero. To again exploit the panel structure of the data, a fixed effect model was estimated initially. However, most companies participated only once in the survey. Estimating a fixed effects model, about 95% of the companies and 85% of the observations were dropped. Hence, a random effect was estimated instead.

The Herfindahl index and the company-to-sector turnover ratio were calculated using the VAT register due to the change of the NACE sector classification in 2008, and inclusion of the 2008 and 2010 waves was judged more valuable than the inclusion of the VAT-register data for the 2012 and 2014 waves only.

Most of the questions in the CIS are yes/no questions. For example, innovation can be jointly with partners, fully outsourced or fully in-house. They are included as control variables but are not helpful to explain the occurrence of product innovation. Also, it should be noted that a company can develop products that are new to the market and other products that are only new to the company at the same time. Hence, product adaption can still be positively correlated with innovation of products that are new to the market (Table 2.4). The most valued partner (MVP) is also an indicator that is likely to be filled in at least once, and these variables are also included mainly as controls. Controls for sector and year were included as well but are not presented.

Government funding is positively correlated with innovation of products that are new to the market ("new innovation"). National government funding is also positively correlated with product innovation in general and the coefficient is even greater than for new innovation. However, local and EU funding are not significantly correlated with product innovation in general.

For the innovation of products that are new to the market, the percentages of flexworkers, young workers and workers with company training in a sector are not significant. However, the percentage of professionals in technical field correlates strongly with the occurrence of new innovation and that of craftworkers as well (although not at the 1% level). The percentages of high and medium educated workers and of high and medium technical educated workers were initially included as well but dropped later in favour of the profession indicators which strongly correlate with the education indicators and turned out more significant.

With regard to barriers to innovation, it should be noted that questions about these were only asked in the 2014 survey and only if the company experienced difficulties to innovate, to which only a minority of companies respond. Thus the estimated effects are based on relatively few responses and most of the barriers got omitted from the equation. Any barriers were expected to have a negative impact on innovation, but surprisingly a lack of internal finance and uncertain demand are positively correlated with new innovation. Only lack of skilled staff has the expected negative correlation with new innovation.

The skills indicators and barriers were all insignificant in the equation for product innovation in general. This implies that the significant coefficients in the equation for new innovation may be interpreted as specific for innovation of products that are new to the market.

Table 2.4 Estimation results for the occurrence of product innovation and specifically of innovation of products that are new to the market

	Product innovation	Innovation of products that are new to the market ("new innovation")
joint innovation	5.794***	1.993***
product adaption		0.878***
fully outsourced	6.759***	2.378***
local govt funding	0.295*	0.375***
national govt funding	2.741***	1.846***
EU funding	0.043	0.271**
MVP: sister company	1.951***	1.676***
MVP: supplier	1.156***	1.333***
MVP: customer	1.372***	1.783***
MVP: competitor	0.310	1.451***
MVP: consultant	0.787***	1.015***
MVP: universities	0.812***	1.028***

	Product innovation	Innovation of products that are new to the market ("new innovation")
MVP: govt or institute	0.312	1.163***
% flexworkers in sector	7.795***	2.781
% young workers in sector	1.444	-1.383
% workers with company training in sector	2.465	-0.649
% tech professionals in sector	-0.205	4.331***
% tech technicians in sector	-0.104	-0.489
% craftworkers in sector	1.789	4.153**
lack of internal finance	0.164	0.513**
difficulty to get subsidy	-	-
lack of partners	0.023	0.073
lack of skilled staff	-0.144	-0.535**
lack of external finance	-	-
uncertain demand	0.06	0.155**
too much competition	-	-
low demand	-	-
prior innovation suffices	-	-
absence of competition	-	-
lack of ideas	-	-
Number of companies	21,496	21,776
Number of observations	30,465	31,296

* = significant at 10%, ** = at 5% and *** = at 1%, - = omitted. Standard errors were clustered per company.
Source: Ecorys estimations with Dutch microdata.

2.3.6 Interpretation of the results by Ecorys

The lagging R&D intensity in the Netherlands is caused by lagging private R&D, which is far below-average in professional services (excluding private R&D companies) and in companies with turnover of more than EUR 100 million. Within Dutch professional services, 63% of gross value added is generated by legal & accounting services compared with 50% at the EU average; and 6% is generated by private R&D companies compared with 12% at the EU average according to Eurostat national account data. However, also excluding private R&D companies, R&D intensity is far below the EU average in professional services, so the structure of professional services is not a likely explanatory factor. A tentative explanation is that public institutes such as TNO, TU Delft and TU Eindhoven offer professional services. In this light, it is interesting that expenditures on Dutch R&D institutes negatively affects overall R&D intensity, at least for companies with turnover of less than EUR 100 million.

In order to separate effects of monopoly power and company size itself, a model was estimated including both log turnover and the company-to-sector turnover ratio. From the separate significance of company size, it can be concluded that company size affects R&D intensity apart from sector dominance. This is an argument for efficiency of scales (relatively less start-up costs). However, the finding that the coefficient of the company-to-sector turnover ratio remains significant in the regression for all companies, suggests that monopoly underinvestment occurs in the largest companies compared to smaller companies. All in all, both efficiency of scale and monopoly underinvestment explain part of the lower R&D intensity in the largest firms.

A recurrent factor that explains R&D is the employment of highly educated technical staff in the sector, both based on R&D data and on CIS data. In addition, the only significant

barrier to innovate (asked in the CIS 2014 wave only) is lack of high-skilled technical staff. As noted in Annex C (Factsheet Employment), the top-three of occupations with high demand/supply ratios are all three high-tech occupations.

Given the tightness of high-tech occupations, one might suppose that Dutch employers recruit more workers with these skills. For temporary work visas, which in the Netherlands employers must apply for, the trend is downward until recently, from a total 19,000 in 2008 to 5,800 in 2016 and 6,600 in 2017 (no further breakdowns are available). In 2008, the share of foreign "knowledge workers" was merely at the OECD average and the growth of high-educated workers from other countries was also less than in comparable countries (although 14% of the knowledge workers from abroad works in a high-tech occupation compared with 10% of Dutch knowledge workers).[100] Not all foreign workers stay employed in the Netherlands; more than half of the foreign knowledge workers leave the country within eight years, and 7% is unemployed; another challenge is that foreign highly technically educated staff more often have completed a general technical education without a specialization while the latter are in most demand (all according to the PBL study cited above).

As a by-product of the analysis in this chapter, sectors with the highest R&D intensities and their characteristics were identified: pharmaceuticals, "hardware" and the car industry, characterised by high (abroad) outsourcing and experimental research, suggesting that product testing rather than product development is outsourced. This suggests that R&D and outsourcing abroad is complementary, an interpretation that is further confirmed by the fact that employment of engineers and scientists in medium- and high-tech manufacturing increased steadily after the crisis of 2009, suggesting there was no displacement of Dutch R&D staff.

[100] PBL (2014), Buitenlandse kenniswerkers in Nederland, www.pbl.nl/sites/default/files/cms/publicaties/PBL_2014_Buitenlandse%20kenniswerkers%20in%20Nederland_684.pdf.

3 Employment and productivity (theme 2)

3.1 Introduction

This chapter describes in more detail the results for the study's second theme: "employment and productivity". A brief description of the broader perspective and recent (policy) trends is given in section 3.2, while detailed results are presented in the separate factsheet in Annex C. Section 3.3 presents the results for the in-depth analysis, which aims to better understand the implications of the rise of flexible employment on innovation pathways (e.g. via company training) and indirectly on the overall level of competitiveness and productivity of the Netherlands.

3.2 Broad perspective and recent trends

Key findings

In the field of employment, available publications highlight three main challenges for structural reform in the Netherlands, i.e. (i) job flexibility, (ii) shortage of skilled (technical) personnel and (iii) labour-force participation. Of these three, the (too) high level of **job flexibility** and related negative social effects are seen as the most urgent structural problem. This is emphasised in a recent OECD publication,[101] which (amongst others) recommends to reduce the excessive incentives to self-employment. The current coalition is preparing new legislation to restore a sustainable market balance (WAB, Act Labour Market in Balance), but this is still being prepared. On **labour-force participation**, a major reform with regard to the employment of disabled people was implemented in 2015 (Participatiewet); the first effects seem positive, but additional measures were announced in 2017. Pertaining to the (increased) employment of women, no major reforms have been implemented or are planned. The shortage of **skilled (technical) personnel** is expected to increase in the coming years, despite various initiatives.

As indicated in chapter 1, the need of fundamental labour-market reforms is underlined both by international competitive indicators and by various (inter-) national institutions organisations. The main challenges relate to: (i) job flexibility, (ii) shortage of technical personnel; and (iii) labour force participation. These challenges are briefly described here, more details are provided in the factsheet in Annex C.

Permanent/flex job duality - The main challenge is the duality of the labour market into semi-rigid permanent jobs and insecure "flex" jobs. Between 2003 and 2017 the share of flex workers (including self-employed without personnel and employees with a temporary contract) increased from 22% to 35% of all workers in the Netherlands.[102] This development towards a more flexible work force has various implications, which are not always positive for Dutch society as a whole. In its 2016 policy brief the CPB outlines various implications, including: (i) lower contributions to the Dutch social security system, (ii) a shift in risk bearing (e.g. health risks) from employers towards self-employed without personnel and (iii) a larger share of flexibility in categories with a relative higher level of vulnerability (often less well-educated people).[103] In other publications the CPB warns of

[101] OECD (2018). "Economic Survey 2018".
[102] CBS (2018). "Weer meer vast werk, maar flexwerk groeit harder" (Steady work increases again, but flexiwork grows faster). See: www.cbs.nl/nl-nl/nieuws/2018/08/weer-meer-vast-werk-maar-flexwerk-groeit-harder.
[103] CPB (2016). "Policy brief 2016/14".

uncertainty and a lack of perspective for employees.[104] Other flagged negative side-effects include less favourable payment conditions,[105] less job security and social insurance[106] and less training (also in the law).[107] In a recent publication on self-employment, the OECD concluded that "non-standard forms of work" (i.e. temporary contracts and self-employment) have risen, which creates on the one hand business opportunities, and on the other hand challenges for job quality.[108] The OECD emphasised the need to reduce what they called an excessive incentive for self-employment.

Technology/skills gaps - Another recurrent theme in the Dutch labour market is a shortage of technical personnel, the so-called skills gap. Traditionally, unemployment and vacancies are compared in order to assess shortages in the labour market. According to the Dutch Public Employment Services, employers in construction and industry found respectively 60% and 43% of the vacancies difficult to fill in 2017, compared with 34% of Dutch employers on average.[109] All in all, there is evidence that after seven "meagre" years, shortages of technical personnel are rapidly becoming an issue again. The three occupations with the highest demand/supply ratio in the first quarter of 2018 were all in the high-tech sector.

Labour-force participation - A third theme is the labour-force participation, and the participation of disabled workers in particular. At the start of 2018 around 7.3% of the potential work force of 11 million people were receiving a disability benefit, which is considered higher than necessary by the government. The Participation Act was reformed in January 2015 to increase labour participation in this group of disabled (see below).

Reform outcomes - Within these thematic fields, various reform initiatives are in preparation or have been implemented. A summary of these reforms and their outcomes (if already available) is presented below; more details are provided in the factsheet in Annex C:

- Permanent/flex job duality - One of the ambitions stated in the Coalition Agreement of 2012 was to address the segmentation in the labour market between flexible[110] and permanent contracts without reducing the benefits of a flexible labour market. This resulted in the Act Work and Security (Wwz), which became effective in 2016. The evaluation of the effects of Wwz will take place in 2020 and only intermediary reports with some glossary information about the progress of the Wwz have been carried out.[111] These glossary data show a stronger increase in flexible working compared with permanent jobs in 2013-17. The Act Labour Market in Balance (WAB) is a proposal of the new government to implement certain ambitions stated in the Coalition Agreement of 2017 and to correct some of the flaws in the Wwz (e.g. dismissal law and the segmentation in the labour market). The WAB is still in preparation and has not yet been sent to parliament;

[104] CPB (2016). "De flexibele schil van de Nederlandse arbeidsmarkt: een analyse op basis van microdata" (The flexible peel of the Dutch labour market: an analysis based on microdata).
[105] AWVN (2014). "Toekomst van werk" (The future of work). See: www.nautilus-educatief.nl/files/Download/AWVN2014ToekomstVanWerk.pdf. See also: DNB (2017). "Jaarverslag 2016" (Annual report 2016).
[106] See also: CPB (2016). "Flexibiliteit op de arbeidsmarkt" (Flexibility on the labour market).
[107] See also: Borghans, L., Fouarge, D., Grip, A. d., & Thor, J. v. (2014). "Werken en leren in Nederland" (Working and learning in the Netherlands); Emre Akgündüz, Y., & Huizen, T. v. (2015). "De invloed van de baanmatch op trainingskansen flexwerkers" (The effect of the job match on the trainging chances of flexiworkers).
[108] OECD (2018). "Economic Survey 2018".
[109] UWV (2018). "Technische beroepen – factsheet arbeidsmarkt" (Technical employments – factsheet labour market). See: www.werk.nl/xpsimage/wdo222551.
[110] These are: employees with flexible contracts and self-employed without employees.
[111] Tweede kamer der Staten Generaal. (2017, 2016, 2015 & 2014). "Evaluatie Wet werk en zekerheid" (Evaluation work and security Act).

- Technology/skills gaps - Various initiatives are being taken to address the risk of skills gaps in an increasing technological work environment: (i) Life-long-learning; (ii) Techniekpact 2020 and (iii) Sector plans (cooperation between cabinet and social partners to develop a strategy and initiatives per region or sector). Jointly, the initiatives aim to achieve sustainable employability of the people, address the shortage in supply of educated labour in the field of tech, and strengthen the labour market in the Netherlands. While the labour-market position of participants has been made stronger and collaboration has increased,[112] the shortage in supply of skilled tech workers is expected to grow in the coming years;[113]
- Labour-force participation – With regard to the employment of women, no major reforms have been implemented and/or planned. With regard to the employment of disabled people, the main reform is the 2015 Participation Act. According to the 2017 evaluation, the Participation Act resulted in an increased awareness for working with people with work limitation under employers, increased use of wage subsidies and job coaching and more use of job support. In terms of job creation, the 2013 objective to create 20,500 jobs for people with work limitations was met.[114] The 2017 Coalition Agreement proposed again some major reforms, e.g. a more stringent policy to accept a job and replacement of the wage-cost subsidy with an earnings dispensation. These plans are still in the preparation phase. In 2013, the retirement age was raised (i.e. gradually to 67 years and 3 months in 2022); negotiations about a new pension scheme are still ongoing.

3.3 In-depth analysis: the labour market, R&D and productivity

3.3.1 Set-up and methodological considerations

The previous chapter analysed causes of low private R&D at the company level, including skills and flexible contracts at the sector level (because workers from the Labour Force Survey cannot be matched representatively with companies). This section aims to better understand the implications of the rise of flexible employment on innovation pathways (e.g. via company training) and indirectly on the overall level of competitiveness and productivity of the Netherlands.

Besides low private R&D, one striking feature of the Dutch economy is the high degree of flexible contracts, in particular of employees with temporary contracts. The hypothesis tested in the previous chapter was that flexible contracts cause workers to have too little firm-specific knowledge or commitment (of highly educated tech workers) to generate ideas or to foster innovation. But the flexible labour market may also affect productivity through another channel, namely the lack of training of workers. The underlying hypothesis is that employers are less likely to train workers who are expected to leave the company shortly. For simplicity, it is assumed that training does not directly affect R&D, which is done by professionals who are likely keep learning through the research they do.

Investments are long-term processes with long-term benefits. Ideally, investments are observed for a number of years per company and the impact on productivity in a subsequent number of years is analysed. In reality, R&D data derive from a survey among random companies, so investments are observed for only one year per company. To the extent that investments of individual companies come with peaks and troughs, there is a high risk that any relation between investments of one year and subsequent productivity

[112] SEO (2017). "Tussenevaluatie sectorplannen 2017" (Interime evaluation sector plans 2017).
[113] UWV (2017). "Tekort aan vakmensen houdt nog jaren aan" (Shortage of professionals will continue for years). See: www.uwv.nl/overuwv/pers/persberichten/2017/tekort-aan-vakmensen-houdt-nog-jaren-aan.aspx.
[114] Tweede kamer der Staten Generaal (2017). "Uitvoering en evaluatie Participatiewet" (Implementation and evaluation Participation Act). Kamerstuk 34352 nr. 60.

merely reflect the impact of peaks or troughs. Therefore, the relation between R&D and productivity is analysed at the sector level.

The above observations lead to a set of three equations:

- R&D% = F(…, % flex contracts);
- % workers in training = F(…, % flex contracts);
- Productivity = F(…, R&D% in preceding years, % workers in training, % flex contracts).

The first equation is similar to the one estimated in the previous chapter, but now at sector level instead of company level. The second equation relates training to the percentage of flexible employment contracts, with similar control variables as in the previous chapter.

The third equation relates productivity to R&D and training. The third equation specifies a correlation between productivity on the one hand and R&D and training on the other hand. Even though productivity is related to the percentage of R&D in preceding years, this does not imply a causal relationship between R&D and productivity. The converse, that high-productivity companies can afford to invest more in R&D and training, may hold equally true.

However, the variable of particular interest is the effect of labour-market flexibility on productivity. If labour-market flexibility affects productivity only through R&D and training, the effect of the percentage of flexible employment contracts should affect productivity negatively if R&D and training are excluded from the productivity equation, and zero if R&D and training are included.

In reality, the percentage of flexible contracts is likely affect productivity directly, mainly because workers are only hired if the company has sufficient work for them: labour- market flexibility reduces the overcapacity of employees and thus increases labour productivity. But even in this case, it will be interesting to explore to what extent the effect of labour-market flexibility affects productivity through R&D and training.

It should be noted that the percentage of highly educated tech workers is one of the variables in the R&D equation. In principle, the education breakdown could also be included in the productivity equation. However, there is a risk that this breakdown captures sector effects rather than measuring the effect of skills through education level. In addition, older workers with medium or even lower educational level may have gained high-level skills through work. An analysis of skills composition and the impact on productivity is best conducted cross-country, and beyond the scope of this study.

The set of three equations will be estimated with 3SLS (in Stata) to correct at least partially for the endogeneity of R&D and training in the productivity equation.

3.3.2 Results – joint model of R&D, company training and productivity

Key findings

This section is aimed to better understand the implications of the rise of flexible employment on innovation pathways (e.g. via company training) and indirectly on the overall level of competitiveness and productivity of the Netherlands. No evidence is found for a causal relationship between flexwork and productivity, either in the short or long term, neither directly nor via pathways of company training or R&D. This finding contradicts the argument that flexible work enhances productivity through enabling

Key findings

companies to hire workers only when sufficient work is available and suggests that if such short-term positive effects exist, they may be offset by negative effects in the long term. Another key finding is the reconfirmation of the previous chapter's finding that there is a positive correlation between highly educated technical staff and expenditure on R&D.

The model specified in the previous section is estimated at the sector level. Compared with the previous chapter, the analysis of R&D expenditures is repeated at the sector level instead of the company level. Two additional equations are estimated to explain company training and productivity or production growth (change in gross value added) respectively.

For R&D expenditures, the number of observations is limited by the change of NACE classification in 2008, resulting in consistent sector definitions for data since 2011. A cross-country sector analysis would require R&D data with further breakdowns per sector than Eurostat publishes for countries in north-west Europe, and also Labour-Force Survey statistics per sector, which Eurostat does not publish.

In addition, R&D expenditures (as a percentage of value added) and the percentage of workers receiving company training are serially auto-correlated at the five-percent level (for productivity absence of auto-correlation may be assumed). The need to estimate and models for changes rather than levels, further reduces the number of years available from five to four. Sector indicators were included in the model but their coefficients are not shown in Table 3.3 1.

With a system equation including productivity in hours, the importance of highly educated technical personnel for R&D (expenditures as a percentage of value added) is confirmed. The percentage point[115] of workers with a flexible contract is significantly positive. Later in this section, the percentage of young workers (aged 15-29 years) will be added to estimations of an error correction model, since flexible contracts are concentrated in this age group.

For company training, the Herfindahl index indicates training of more workers in sectors with less monopoly power of the largest firms. Apart from this, only sector growth was identified as a factor correlating with company training.

For productivity in hours, the percentage of highly educated technical workers is negatively correlated with productivity per hour. An increase in R&D expenditure in the recent past is not correlated with productivity: a one percentage-point increase of R&D between 2016 and 2017 would, if anything, reduce productivity by 12 cents per hour, but with a very large margin of error. Unfortunately, the short time series does not allow us to estimate the effects of cumulative R&D from a greater number of prior years.

Another interesting finding is that the percentage of workers on a flexible contract is not significantly correlated with productivity, whether per hour or per worker (regression results for the latter are not shown).

[115] In the remainder of this chapter, a percentage refers to a percentage point, being a number between 0 and 100.

Table 3.1 3SLS Model estimations for R&D expenditures, workers receiving company training and productivity per hour

VARIABLES	Δ expenditures	Δ company_training	prod_hrs
Herfindahl index		-0.523**	0.164
% flexworker			-0.009
% edu_high			0.220
% edu_medium			-0.005
% edu_tech_high	0.246***		-0.339***
% edu_tech_medium	-0.099*		0.011
% tech_prof			-0.269
% tech_technician			0.199
% company_training			0.422**
Δ expenditures[-1]			-0.122
Δ flexworker	0.210***	0.178	
Δ edu_high		0.149	
Δ edu_tech_high		-0.098	
sect_grow	-0.009	0.238***	
Δ company_training			
Constant	-0.371	-1.498	38.726***
Observations	71	71	71
R-squared	0.741	0.210	0.998

* = significant at 10%, ** = at 5% and *** = at 1%.
Source: Ecorys estimations, using Dutch microdata.

When a variant of the previous model is estimated for growth of sector added value instead of productivity in the third equation, the results for the R&D expenditure and company training do not change much. The most notable difference is that correlation between sector growth and R&D expenditure turns from insignificant to significantly positive, confirming the results of the previous chapter (Table 3.2).

Not many factors could be identified that significantly affect sector growth. Negative correlations with R&D expenditure in the recent past and the percentage of workers with a flexible contract are the main exceptions. R&D expenditure in the recent past have a weakly significant negative impact on sector growth of value added (significant with 95% confidence but not 99% confidence).

Table 3.2 3SLS Model estimations for R&D expenditures, workers receiving company training and sector growth of value added

VARIABLES	Δ expenditures	Δ company_training	Sect_grow
Herfindahl index		-0.444*	-0.473
% flexworker			
% edu_high			0.159
% edu_medium			0.244
% edu_tech_high	0.277***		-0.008
% edu_tech_medium	0.096		-0.671
% tech_prof			-0.366
% tech_technician			-0.864
% company_training			

VARIABLES	Δ expenditures	Δ company_training	Sect_grow
Δ expenditures[-1]			-0.632**
Δ flexworker	0.582***	0.272	-1.038***
Δ edu_high		0.161	
Δ edu_tech_high		-0.120	
sect_grow	0.422***	0.346	
Δ company_training			-0.793
Constant	-2.344**	-1.869	-2.707
Observations	71	71	71
R-squared	0.247	0.173	0.242

* = significant at 10%, ** = at 5% and *** = at 1%.
Source: Ecorys estimations, using Dutch microdata.

The above analysis suffers from the fact that only short-run effects are estimated. In fact, R&D and training may have long-term impacts on productivity. To differentiate between short-term and long-term effects, an error correction model was estimated. The error correction model has the following specification:

$$\Delta \ln(y_t) = a0 + a1 * \Delta \ln(x_t) + a2 * \ln(y_{t-1}) + a3 * \ln(x_{t-1})$$

Keeping the levels constant, a1 is the short-term elasticity (dy/y) / (dx/x). In a long-term equilibrium no changes occur and $\Delta \ln(y_t) = \Delta \ln(x_t) = 0$. From this it follow that the long-term elasticity (dy/y) / (dx/x) is –a3/a2.

Estimating the systems equations for R&D expenditures, company training and productivity with a short time series of 2011-15 for R&D expenditures creates a host of econometric problems, including insufficient observations for the number of variables, multicollinearity, autocorrelation and negative R-squared. After taking logarithms, autocorrelation became an issue even for productivity where previously autocorrelation was not rejected with 95% confidence. To solve autocorrelation, a lagged differential was added, at the expense of a further reduction of the number of observations. For company training, the addition of a lagged level introduced autocorrelation that not even the addition of a lagged differential could solve. Hence, for company training, a simple model of differentials instead of an error correction model was estimated.

To address the other problems, the number of variables had to be reduced. One step was to combine sector dummies to indicators of sectors with high and with medium levels of R&D (utilities and all services being the reference category with low R&D levels). Insignificant control variables were dropped as well. Model performance would be even better if insignificant key variables were dropped as well, but they were kept to facilitate their discussion.

The dependent variable R&D expenses is still divided by sector gross value added, and the number of workers receiving company training is still divided by the total number of workers according to the Labour Force Survey. Without this scaling, the problems discussed above become more acute.

The estimates for R&D expenditures reconfirm the significance of highly skilled technical professionals, with an implied short-term elasticity of 0.18 and a long-term elasticity of 0.54. R&D expenditures are significantly higher in the sectors covered by the topsector policy, but it should be noted that topsector policy is targeted at sectors that already score high in the areas of innovation, productivity and/or export. With the inclusion of the percentage of young workers in the sector (significant at the 10% level only) the significance of flexwork in the R&D expenditures equation disappears (Table 3.3).

R&D expenditures induce company training and reduce productivity significantly at the 5% level though not at the 1% level. No other factors were identified that help explain company training or productivity. For company training, the very low R-squared of 0.02 means that company training basically remains unpredictable. For productivity, the coefficient of the lagged level is totally insignificant which means that any calculation of long-term elasticities is unreliable (and besides the coefficient is even positive instead of negative as is assumed under the error correction model). R&D expenditures have a negative effect on productivity in the short run.

Table 3.3 3SLS Error Correction Model estimations for R&D expenditures, workers receiving company training and productivity per hour

Variables	Δ ln(expenditures)	Δ ln(company_training)	Δ ln(prod_hrs)
Δln_expenditures		0.472**	-0.127**
Δln_comp_training	0.235		0.067
Δln_prod_hrs[-1]			0.019
Δln_expenditures[-1]			-0.009
Δln_flexworker		-0.061	-0.030
Δln_tech_prof	0.176**	-0.153	-0.017
Δln_tech_technician			-0.002
Δln_edu_high		0.155	
Δln_young_worker	0.289*	0.268	
topsector	0.355***	0.034	0.017
high_rd_sectors	0.757***		0.040
med_rd_sectors	0.380***		0.014
sector_training_fund		-0.029	
lag_lnexpenditures	-0.364***		-0.010
lag_lnprod_hrs			0.001
lag_lntech_prof	0.197***		
Observations	72	72	72
R-squared	0.395	0.020	0.140
Wooldridge F-stat	3.12	2.05	0.55
Wooldridge p-val	0.09	0.17	0.47

* = significant at 10%, ** = at 5% and *** = at 1%. Wooldridge stats based on stand-alone equations.
Source: Ecorys estimations, using Dutch microdata.

Predicting changes in gross value added rather than productivity, autocorrelation becomes more of an issue. The lagged level of gross value added had to be dropped. Autocorrelation is not rejected at the 10% level though it is at the 5% level for both expenditures and gross value added. The importance of professionals in technical fields for R&D is re-confirmed, with an implied long-term elasticity of 0.45, which is close to the 0.54 for productivity calculated above. Again, R&D expenditures induce company training in the short run and no other factors were identified that help predict company training. For gross value added, the only significant effect at the 5% level is a short-term negative effect of flex workers.

Table 3.4 3SLS Error Correction Model estimations for R&D expenditures, workers receiving company training and gross value added

Variables	Δ ln(expenditures)	Δ ln(company_training)	Δ ln(gva)
Δln_expenditures		0.328**	
Δln_comp_training			0.013
Δln_flexworker		0.065	-0.078**
Δln_tech_prof	0.070	-0.074	-0.019
Δln_tech_technician			-0.009
Δln_edu_high		0.232	
Δln_young_worker		0.255	
Herfindahl index			0.005*
topsector	0.199**	0.006	0.026*
high_rd_sectors	0.545***		-0.035
med_rd_sectors	0.216***		-0.016
sector_training_fund		-0.025	
lag_lnexpenditures	-0.209***		
lag_lntech_prof	0.095**		
Observations	96	96	96
R-squared	0.121	0.005	0.294
Wooldridge F-stat	3.75	2.05	3.69
Wooldridge p-val	0.07	0.17	0.07

* = significant at 10%, ** = at 5% and *** = at 1%. Wooldridge stats based on stand-alone equations.
Source: Ecorys estimations, using Dutch microdata.

Evidence from previous literature on the effect of flexible employment on productivity is mixed. At the company level, Hirsch and Mueller (2012) and Nielen (2016) find a hump-shaped relation between the use of temporary agency workers and a company's productivity.[116] Boeri and Garibaldi (2007) find that employment quickly increases to a higher level, but particularly in low-productivity sectors causing overall productivity (and its variance) to decline.[117] Garicano et al. (2016) estimate that labour regulations binding firms with 50 or more employees in France leads to 3.4 per cent less GDP, mainly due to job losses. Workers earn less on average because work shifts from large firms with higher wages to smaller firms with lower wages.[118]

Specifically, the findings in this chapter contradict the findings of Kleinknecht et al. (2014)[119] who find a negative correlation between R&D occurrence and the percentage of temporary workers. However, it should be noted that Kleinknecht et al. did not control for the percentage of high-tech staff or the business cycle. The Pearson correlation between sector R&D intensity and the percentage of flexworkers is -0.16: it is only after controlling for high-tech staff that the negative correlation becomes positive (and disappears if in

[116] Hirsch, B. and S. Mueller (2012), The Productivity Effect of Temporary Agency Work: Evidence from German Panel Data, The Economic Journal, Vol. 122, Issue562, August 2012, F216-F235. Nielen S. (2016) Temporary Agency Work and Firm Competitiveness: Evidence from German Manufacturing Firms. In: Trade Credit and Temporary Employment. Contributions to Management Science. Springer, Cham.

[117] Boeri, T. and P. Garibaldi (2007), Two Tier Reforms of Employment Protection: a Honeymoon Effect? The Economic Journal, Vol. 117, Issue 521, June 2007, F357-F385.

[118] Garicano, L., C. Lelarge, and J. Van Reenen (2016). "Firm Size Distortions and the Productivity Distribution: Evidence from France." American Economic Review, 106 (11): 3439-79.

[119] Kleinknecht, A., F.N. van Schaik and H. Zhou (2014), Is flexible labour good for innovation? Evidence from firm-level data, Cambridge Journal of Economics 2014, 38, 1207-1219.

addition the percentage of young workers are added). An explanation is that high-tech staff works in sectors with less flexwork. The correlation between the percentage of young workers and R&D intensity may be explained by the percentage of young workers capturing (cyclical) variation of R&D better than sector gross value added: if economic prospects deteriorate, companies immediately start to hire fewer (typically young) workers even if they initially retain their current staff.[120] Likewise, the Pearson correlation between flexwork and productivity is negative (-0.13), but not significant in regressions (although the coefficient of flexwork is significantly negative in a model without error corrections for sector gross value added, but this might also reflect the increasing use of flexworkers in the long period of stagnant growth after the crisis of 2009).

3.3.3 Interpretation of the results by Ecorys

All models estimated jointly for R&D expenditures, company training and productivity or sector value added growth imply the importance of highly educated professionals with a technical background for R&D. This effect is already visible in the short term and even larger and more significant in the longer term.

Without controlling for the percentage of young workers in a sector, flexwork and sometimes sector growth have a significant positive effect on R&D expenses. Both effects become insignificant after controlling for young workers, all of which are positively correlated with each other.

A topsector dummy has a positive coefficient in the R&D equation. However, the topsector policy aims to support R&D in sectors with already high R&D, productivity or export and the causal relation is impossible to determine without data before 2010 (when the topsector policy was introduced). It is even possible that ignoring other sectors hurts overall R&D.

Company training is hard to predict. In early models, the Herfindahl index had a significantly positive effect. This means that company training is more prevalent in sectors with fewer dominant companies. These sectors are more likely to have sector training funds, but a yes/no indicator of sector training funds proved insignificant. In later models, only R&D expenditures had a significant (and positive) effect on company training. The absence of other significant effects suggests that no large groups of workers are significantly left out of company training, including workers past age 30 or flexworkers.

On productivity or value added, R&D has a significant negative short-term effect in the last two models. In the first model, the number of high-educated technical workers had a significant negative short-term effect. This suggests that in the short-term R&D uses up resources that might otherwise have been used to increase production. A CPB study of 2003 (p.18) found no relation between R&D and productivity growth in the period 1985-1999, nor with capital intensity or changes in sector composition.[121] The CPB study concludes that the unpredictability of productivity growth implies a missing factor is dominant and nominates product innovation as the most likely missing factor.

The percentage of flexworkers was insignificant in both models for productivity. This suggests that flexworkers are not less productive or work in low-productivity sectors. It is interesting because flexwork allows employers to hire workers only for those moments

[120] Ecorys (2010), Labour hoarding door bedrijven, www.arbeidsdeskundigen.nl/dossiers/participatie/onderzoeksrapporten/document/akc/741.

[121] CPB (2003), Arbeidsproductiviteitsontwikkeling in de Nederlandse industrie, CPB Memorandum 73, www.cpb.nl/sites/default/files/publicaties/download/memo73.pdf.

when work is available which especially in times of economic decline and overcapacity should imply a positive effect. The absence of this positive effect may imply that firms hoard labour (at least initially as in 2009[122]), or that short-term positive effects are offset by long-term negative effects. An Italian study found that within industries, productivity growth was lower in companies with more flexible labour, higher job turnover and lower wages.[123]

Flexwork did have a significant negative effect on value added. Given the absence of an effect on productivity, this suggests that businesses tend to hire more workers on a flexible contract when sales decrease.

[122] Ecorys (2010), Labour hoarding door bedrijven, ibid.
[123] F. Lucidi et al. (2010), "Little innovation, many jobs: An econometric analysis of the Italian labour productivity crisis", in Cambridge Journal of Economics, Vol. 34, No. 3, pp. 525–546.

4 Access to finance and financial services competition (theme 4)

4.1 Introduction

In this chapter we delve deeper into theme 4, access to finance and competition in financial services. We have analysed current trends and developments under this theme as well recent structural reforms implemented by the Dutch government. A summary of these findings is presented in Section 4.2. In Section 4.3 we discuss three case studies each focussing on alternative ways financing, where the first two have a specific focus on SMEs. We summarise and conclude in Section 4.4.

4.2 Broad perspective and recent trends

Key findings

The analysis is focused on two key problems for the Netherlands, i.e. (i) the sub-optimal functioning of the Dutch market for credit facilitation and (ii) the access to finance for SMEs. Various publications indicate a sub-optimal market situation, including a strong level of concentration. Although the access to capital in the Netherlands improved over time, the situation is still not optimal; the financing of SMEs is a case in point (small size loans and relatively high risks for traditional banks). Various initiatives to strengthen competition in the SME financing market were undertaken, both by the government and by private organisation (sometimes with government support). This includes the introduction of a microcredit scheme and two initiatives for an SME stock exchange. While these initiatives show some positive development in the creation of alternative sources of finance for SME, the nature of the instruments or the conditions to access them make them only an indirect substitute for banking credit. Various suggestions for further reform of the market have been made (e.g. a suggestion to create a "light" banking licence, as well as a suggestion by the CPB for a more market-oriented financial system), but no specific initiatives have been initiated.

Access to finance is an important pre-condition for the functioning and growth of small and medium sized enterprises (SMEs). In the aftermath of the 2008 financial crisis, access to finance for SMEs was seen as a serious issue in the Netherlands.[124] As a result, it has since been targeted by various government programmes. Despite the strong performance of the Dutch economy in recent years, the situation is (still) not seen as optimal. The WEF Global Competitiveness Index 2017-2018[125] indicates that respondents (still) perceive hurdles for businesses when they attempt obtain bank loans. We identified two key problems for the Netherlands: (i) the sub-optimal functioning of the Dutch market for credit facilitation and (ii) the access to finance for SMEs.

Ad (i) sub-optimal functioning of the Dutch financial market (SME credit facilitation)

The functioning on the Dutch market for SME credit facilitation has been criticized for a long time.[126,127] In 2013, the government signalled problems in the banking sector. In its "Kabinetsvisie Nederlandse Bankensector",[128] the former cabinet discusses the future and

[124] Stuurgroep Kredietverlening (2012). "Kredietverlening aan het MKB" (Credit facilities to SMEs).
[125] World Economic Forum (2017). "The Global Competitiveness Report 2017-2018". See: http://reports.weforum.org/global-competitiveness-index-2017-2018/.
[126] NMa (2009). "Rekening-courantkredietverlening aan het MKB" (Credit facilitation to SMEs").
[127] Ministry of Finance (2013). "Kabinetsvisie Nederlandse bankensector" (Cabinet vision on the Dutch banking sector). See: https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/kamerstukken/2013/08/23/kabinetsvisie-nederlandse-bankensector/kabinetsvisie-nederlandse-bankensector.pdf.
[128] Ministry of Finance (2013). "Kabinetsvisie Nederlandse bankensector" (Cabinet vision on the Dutch banking sector).

desirable characteristics of the Dutch banking sector. It notes, *inter alia*, that the banking sector is dominated by the four major banks,[129] and that on the market for SME finance, the market is strongly concentrated. In 2015, the sector was still seen as suboptimal by the Dutch Competition Authority (ACM)[130] and they stressed the need for more competition. The 2015 ACM-report observed five main problems: (i) high access barriers for new entrants, (ii) increased credit requirements for banks, (iii) limited switching behaviour by SMEs, (iv) the risk of silent coordination by banks and (v) limited competition pressure by alternative forms of finance. In 2016 the ACM indicated that the situation improved (e.g. improved information provision about product conditions and penalties, as well as the end of the credit period), but that the market is still suboptimal.[131] The ACM stressed the need for more competition in the banking sector and market for SME financing.[132]

In order to strengthen the competition in SME financing, several reforms have been implemented or announced by the government or were suggested by other parties. A summary of these reforms and their outcomes (if already available) is presented below:[133]

- The Dutch government presented in 2014 the Action plan on SME financing,[134] followed by a more elaborated plan in 2016.[135] Proposed measures mainly related to improved information provision, training/coaching, etc. The measures are currently implemented, but evaluation results are not available yet;
- The 2017 coalition agreement announced aims to simplify the entry of innovative companies by introducing a "light" bank license. This measure links to the initiative of the DNB and AFM to create a less burdensome supervision for small and innovative companies ("regulatory sandbox");[136]
- The CPB[137] suggested a more market-oriented financial system; in this system companies can switch from bank to market financing more easily when banks get into trouble. The CPB report facilitated the discussion about the alternative forms of finance, but structural changes were not taken over by the government.

Ad (ii) Access to finance

With regard to the actual access to finance for SMEs, the situation has improved since 2014. The Panteia Financing Monitor shows that the demand for credit is increasing and that the success rate for obtaining a credit is also improving (around 80% succeeds fully or partially).[138] Nevertheless, EU research shows that the Netherlands (still) ranks very low

[129] Kabinetsvisie Nederlandse Bankensector: "*Het Nederlandse bankenlandschap wordt gedomineerd door vier grootbanken (ABN AMRO, ING, Rabobank en SNS Bank)*" (p.3), and "*De markt voor kredietverlening aan het Midden- en Kleinbedrijf (MKB) is sterk nationaal georiënteerd. Ook hier geldt dat sprake is van een sterk geconcentreerde markt …*" (p.5).

[130] ACM (2015). "Concurrentie op de markt voor MKB financiering" (Competition on the market for SME financing).

[131] ACM (2016): www.acm.nl/nl/publicaties/publicatie/14430/Concurrentie-op-de-markt-voor-MKB-financiering.

[132] ACM (2015). "Concurrentie op de markt voor MKB financiering" (Competition on the market for SME financing).

[133] More details about the different reforms can be found in the factsheets in Annex C.

[134] Ministry of Economic Affairs (2014). "Aanvullend actieplan MKB-financiering" (Supplementary Action plan SME financing).

[135] Ministry of Economic Affairs (2016). "Uitwerking aanvullend Actieplan MKB-financiering" (Implementation supplementary Action plan SME financing).

[136] DNB & AFM (2016). "Meer ruimte voor innovatie in de financiële sector" (More room for innovation in the financial sector).

[137] CPB (2015). "Een wereld zonder banken? Marktfinanciering en bankfinanciering in perspectief" (A world without banks? Market financing and bank financing in perspective).

[138] Ministry of Economic Affairs (2017). Letter to parliament, "Recente ontwikkelingen in de mkb-financieringsmarkt" (Recent developments in the SME financing market).

in the EU context.[139] The main problem continues to be loan financing, especially for small enterprises. The ministry of Economic Affairs noted that there is sufficient capital in the country, but that the problem lies in directing it to the right projects. Because of their small size and the relatively high risk, micro loans are often too expensive. A positive note is that national data shows that the overall rejection rates of loans and credit has declined: from around 35%-40% in 2014 to 10% in the first half of 2017. One should keep in mind that these rates show the share of requests that have been actually been processed and afterwards rejected. A large share of requests, however, are not processed at all. A more detailed assessment of the data shows significant differences among sectors. Rejection rates are higher for sectors such as construction and agriculture, as well as for micro and small-sized enterprises (compared with large enterprises).[140]

In order to facilitate access to finance for SMEs several reforms have been implemented or announced by the government or were suggested by other parties. A summary of these reforms and their outcomes (if already available) is presented below: [141]

- The Dutch government presented in 2014 the Action plan on SME financing[142], followed by a more elaborated plan in 2016.[143] In the plan, specific actions were planned for (a) risk capital, and (b) broading of SME credit supply. With regard to the 2016 government action plan, there is not yet a dedicated evaluation on the results, but some high-level observations can be made (i) additional public funding has been made available to SMEs, (ii) access to finance is improved compared to several years ago, (iii) more alternative suppliers of financing enter the market;
- The Financial Market Authority (AFM) published in 2017 the first findings of the adjustments of regulations that came into effect on 1 April 2016 on crowdfunding.[144] The AFM identified two key challenges for the near future: (i) the regulation and supervision of alternative forms of financing does not need to be more stringent than strictly necessary, and (ii) the one-sided advantage for banks, for example through government guarantees, can impede the growth of alternative forms.

4.3 In-depth analysis: alternative financing forms

Key findings

With respect to loan capital, some initiatives have been initiated in the past, with private credit institution Qredits slowly gaining traction over the past decade. The set-up of Qredits is focused to address typical market failure of provision of credit to small companies. For SME credit, an explicit condition is that the SMEs are not able to obtain financing at the regular banks. As Qredits works on a sustainable basis – currently proceeds exceed costs – the initiative can be considered successful in providing loans to the correct kind of companies with a positive financial outlook.

An alternative form of loan capital is the emission of bonds via stock exchanges. While the Alternext initiative failed, NPEX managed to be successful and new plans for a SME stock exchange hosted by Euronext are in the making. These initiatives offer an alternative to the main banking loan channels, but are accompanied with significant

139 European Commission (2016). "SBA Fact Sheet — Netherlands".
140 Panteia (2017). "Finance monitor".
141 More details about the different reforms can be found in in Annex C.
142 Ministry of Economic Affairs (2014). "Aanvullend actieplan MKB-financiering" (Supplementary Action plan SME financing).
143 Ministry of Economic Affairs (2016). "Uitwerking aanvullend Actieplan MKB-financiering" (Implementation supplementary Action plan SME financing).
144 AFM (2017). "Evaluatie crowdfundingvoorschriften" (Evaluation crowdfunding regulation).

Key findings

higher transaction costs associated with the provision of information to future investors. Hence, banking loans will retain a competitive advantage in comparison to these alternative channels. Nonetheless, the slow growth achieved by NPEX and the possible launch on a new Euronext initiative offer some promises of alternative channels for loan capital for firms.

In addition to loan capital, companies may obtain equity. For this the same stock exchange channels are open as for the emission of bonds, with NPEX focused on a segment with smaller emission amounts that the Euronext initiative is exploring. Additionally, venture capital is increasing in the Netherlands, including for SMEs, but due to its nature, this option may not be suitable for all SMEs seeking additional capital.

4.3.1 Set-up and methodological considerations

The three case studies discussed below are of a qualitative nature. For the first two case studies, a literature review has been conducted including information from the institutions' website, news articles and evaluations. The literature review was complemented with interviews with the institutions and additional documentation that was shared. The third case study presents data on venture capital and is based on the data publicly available on the website of the Dutch organisation for venture capital (the Nederlandse Vereniging van Participatiemaatschappijen, NVP).[145]

4.3.2 Results of the in-depth analysis

Case 1: financing of start-ups and SMEs via Qredits

A first alternative SMEs can turn to when looking for capital is Qredits. Qredits is a Dutch private credit institution providing credit to start-ups and SMEs. Companies can directly approach Qredits for microcredit, whereas for SME credit the requirement is that firms have been denied a bank loan. The institution was established in 2009 by the Council of Microfinancing, ministry of Economic Affairs, ministry of Social Affairs, and several large banks. Qredits has the status of a public benefit organisation, i.e. it does not have a profit-making objective. To fund their credit to companies, Qredits received about EUR 128 million in the form of business agreements and loans from the Ministry of Economic Affairs, the Ministry of Social Affairs, several Dutch banks, several Dutch assurance companies and about EUR 100 million from the European Investment Bank.[146,147]

Qredits has grown significantly over the past 10 years. When they started in 2009, just four persons were employed; now there are 75 employees. After two years, the maximum credit was increased from EUR 35,000 to EUR 50,000. In 2013 and 2015 they increased it again - to EUR 150,000 and EUR 250,000 respectively. Also, the number of credits provided increases every year. A short timeline is presented in the figure below. As of August 2018,

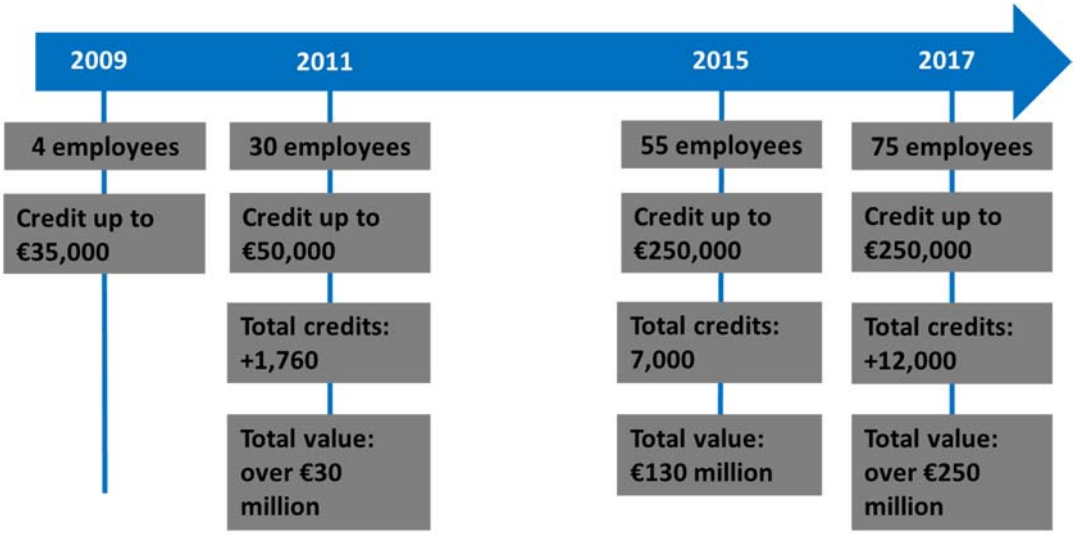
[145] A replication of the analysis into venture capital participations as conducted in the study on structural reform in Germany (WIFO and ZEW, study on structural reforms in Germany 2013-2018, not public yet) was explored, but data limitation prevented the actual replication.

[146] SEO (2016). "Evaluatie microfinanciering" (Evaluation micro financing).

[147] NU.nl (2016). News article, 7 January 2016, "Qredits krijgt toegezegde lening van Europese Investeringsbank" (Qredits granted loan from European Investment Bank). See: https://www.nu.nl/ondernemen/4193603/qredits-krijgt-toegezegde-lening-van-europese-investeringsbank.html.

Qredits has provided 12.425 loans for a value of EUR 275 million since its foundation.[148] [149] The average value of these loans amounts to EUR 22,133.

Figure 4.1 Timeline of Qredits



Sources: Qredits (website), NOS, NU.nl.

At the moment, Qredits offers four types of credits: 1) microcredit, credit up to EUR 50.000, 2) SME credit, credit between EUR 50.000 and EUR 250.000, 3) mortgage credit, credit between EUR 50.000 and EUR 250.000 for the sole purpose of financing real estate, and 4) flexible credit, credit between EUR 5.000 and EUR 25.000 for the sole purpose of providing working capital.[150] The microcredits have a minimal duration of one year and a maximum duration of 10 years. The duration of the other credit forms varies, but can cover a period of 20 years for a mortgage credit.[151] Next to these forms of credit, Qredits offers also coaching, e-learning, and the Qredits Academy. These coaching programmes focus on topics such as the business plan, finance and administration and marketing etc.[152] [153]

Table 4.1 Overview of credits requested and granted per credit type

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Micro credit – # applications	3.521	5.051	5.544	6.311	7.435	6.449	5.671	6.016	6.481
Micro credit – # granted	372	615	602	897	1.143	1.191	1.295	1.602	1.763
SME credit - # applications	n.a.	n.a.	n.a.	n.a.	461	1.708	1.412	2.219	2.263
SME credit - # granted	n.a.	n.a.	n.a.	n.a.	8	147	194	119	159
Flexible credit - # applications	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.897	3.888
Flexible credit - # granted	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	172	407

Source: Qredits, 2017 social annual report.

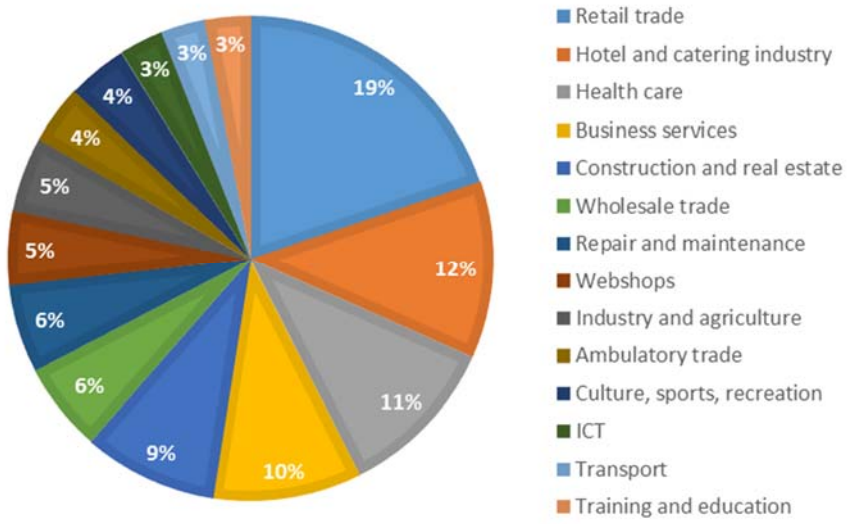
Qredits currently receives about 50 loan applications per day. Since their start, they have received almost 75,000 applications, of which three-quarters concern micro credit (also in monetary terms). The number of applications per year and per credit type is presented in

[148] Information from Qredits, see: https://qredits.nl/.
[149] During the course of this case study, the number of loans provided has increased with 455 and the value with EUR 11 million.
[150] Information from Qredits, see: https://qredits.nl/krediet/.
[151] Information from Qredits, see: https://qredits.nl/veel-gestelde-vragen/wat-is-de-maximale-looptijd-van-een-lening.html.
[152] Information from Qredits, see: https://qredits.nl/coaching/.
[153] Information from Qredits, see: https://qredits.nl/academy/.

Table 4.1 above. On average, 17% of the applicants are granted a loan. This figure differs by credit type and is higher for micro credit (19.2%) and much lower for SME credit (6.3%).[154] [155] Companies are most often rejected because they do not have a solid organisation and/or because they don't bring in any private money. About 65% of the companies are start-ups. While the companies all have different backgrounds and stem from a different sector, the majority of the companies have the following characteristics: they are active in the hotel and catering, retail trade, and business services sectors, the entrepreneur is a male, has received secondary vocational education (MBO), and does not receive social benefit.[156] [157]

In terms of sectoral spreading, more than half of the loans go to the retail trade, hotel and catering, health care and business services sectors (see Figure 4.2 and Figure 4.3). Although the share of SME credit is larger than micro credit for the retail trade and the hotel and catering sector, the total value the SME credit is about 60% of that of the micro credit. Although the value of the loan is higher for micro credit, the culture, sports and recreation sector and the transport sector take up a higher ranking for SME credit.

Figure 4.2 Sectoral spread of micro credit



Source: non-public data received from Qredits.

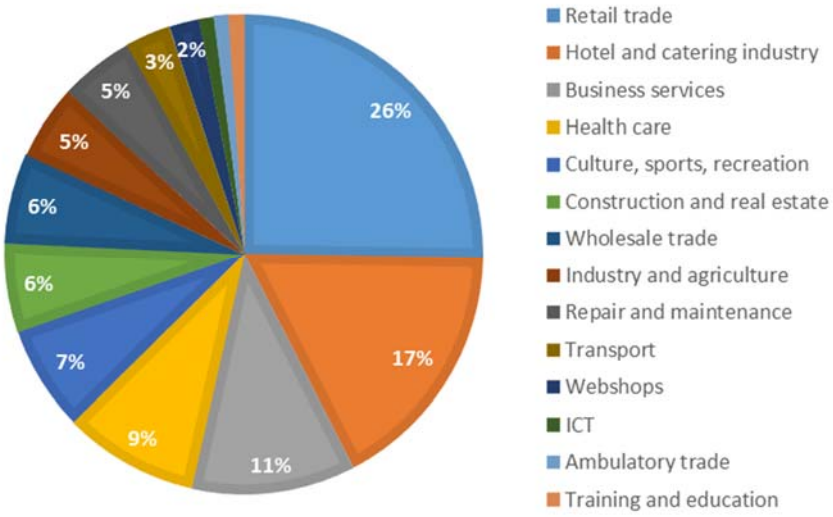
[154] Tables with non-public data received from Qredits.

[155] Contrary to the rejection rates of banks presented in Section 4.2, the rejection rates of Qredits include both requests that are not processed and requests that are processed but rejected. The 17% of loans granted presented above is also a share of all requests. When only looking at the requests that are processed, the share of loans granted lies around 30%.

[156] Accountant Week (2018). News article, 3 April 2018, "Zakelijke dienstverlening in top 3 branches verstrekt kredit Qredits" (Financial services in top 3 sectors provided Qredit's credit). See: https://accountantweek.nl/artikel/zakelijke-dienstverlening-in-top-3-branches-verstrekt-krediet-qredits. Qredits (2017). "Sociaal Jaarverslag 2017" (Social annual report 2017). See: https://cdn.qredits.nl/shared/files/documents/pdf/sociaal-jaarverslag-def.pdf.

[157] The exact shares for man vs. women, the different levels of education, and whether or not the entrepreneur receives social benefit can be found in the 2017 social annual report of Qredits.

Figure 4.3 Sectoral spread of SME credit



Source: non-public data received from Qredits.

With respect to the geographical spreading, the majority of the activities are located in the areas around the larger cities: Rotterdam-The Hague, Amsterdam, Utrecht-Amersfoort, Breda, Maastricht, Nijmegen, and Enschede-Hengelo. Qredits is not only active in the Netherlands. Up to date 784 applications have been received from Aruba, Bonaire, Curacao and St Maarten, of which 292 have been granted. In both Bonaire and St Maarten over 100 credits have been issued, with an average value between US$23.000 and US$27.000.[158]

Despite the many daily applications and the almost constant increase in applications per year (see Table 4.1 above) Qredits only reaches a small share of the market. In their evaluation, SEO had estimated the size of the target group of Qredits, consisting of companies with a yearly revenue up to EUR 1 million, with maximum 5.0 FTE, with a financial need of maximum EUR 50.000, and who were not able to obtain any financing via the market. They estimated that Qredits only reaches between 11% and 26% of this group.[159] According to their analysis, only 20% of the target group was aware of Qredits. These figures stem from 2015, so we do not know what the current status is. Nevertheless, these figures show room for improvement.

Three years after receiving a loan, 86% of the companies are still in business. After five years this number equals 68%. Of all firms that received loans, 93% were able to repay them. The gross default rate has constantly decreased over time while the outstanding value of loans increased. In 2012, the gross default rate for micro credit stood at almost 12%, but has dropped to only 0.21% in 2017, leaving the average gross default rate at 6.04%. For SME credit it dropped from 4.67% in 2014 to 0.54% in 2016, leaving the average gross default rate at 2.07%. Qredits indicated that in the first year(s) they were very eager to start and help SMEs and start-ups and provided loans more easily, which led to more defaults at the beginning. Their credit terms were subsequently tightened.

While the companies have grown after the loan from Qredits,[160] the majority of them remained sole proprietors. Companies with personnel often work with volunteers or people

[158] Non-public data received from Qredits.
[159] SEO (2016). "Evaluatie microfinanciering" (Evaluation micro financing).
[160] 75% of the entrepreneurs obtained income through their business, and 60% of the entrepreneurs could cover their business and private costs with the income from their business.

with disabilities or other constraints. In 2016 SEO has evaluated the performance of Qredits and compared the performance of companies that received a loan to companies that did not request a loan either at Qredits or at another institute. They found that: "*Starters are in a worse starting position (in terms of profit, revenue and employment) than the control group, but catch up in a few years' time. While these companies are more risky at the start, in the end they appear to be as successful as other firms*". In comparison to existing firms, they performed similar in terms of revenue and employment but lower in terms of profit at the start. Nevertheless, their growth rates are equal to or larger than firms in the control group.[161] Because of the successes of these firms, the Dutch government has, according to Qredits, saved EUR 40 million on social benefits.

With regard to the future, Qredits aims to increase its offer with two more credit types (related to financial leasing, which is already in the piloting phase, and disbursing invoices). Herewith, they aim to offer a more complete package for SMEs and most of all assist in financial needs banks would not want to be involved in. As Qredits itself keeps growing and showing green figures, they are considering expanding in Europe. The reason why Qredits continues to exist and grow in a market that banks cannot serve is twofold. Firstly, unlike banks Qredits does not have to make a profit or pay shareholders. As profits on micro credits are often limited or even non-existing, shareholders do not like to see banks offering micro credit. Secondly, regulation and requirements for banks and from banks towards companies have become stricter, making it harder for the company to comply with it and for the banks to issue loans. These tough requirements (e.g. high solvability rates) are (often) not applicable when obtaining a loan via Qredits. In addition, Qredits offers a more personal approach and additional products such as training or coaching for free.

Case 2: SME financing via the public issue of bonds/shares

Besides obtaining a loan from one entity - a bank or any other institution - SMEs can also choose to bring their company to the stock exchange. Here, they can chose to either issue bonds or to issue shares. In both cases, the capital is obtained via multiple companies, individuals and institutions.

In 2006, Alternext Amsterdam was founded by Euronext (a European stock exchange covering Belgium, France, Ireland, the Netherlands, Portugal and the UK). Alternext Amsterdam was based on the principles of Alternext Paris, which opened one year earlier. The aim of Alternext is to help SMEs enter the stock exchange and remain visible there. The stock exchange was targeted at SMEs with a market capitalisation between EUR 50 million and EUR 500 million. After several years there were only two stocks and two listings, and in 2014 the authorities decided to close Alternext Amsterdam.[162] At that point Paris was performing very well and had around 150 listings. According to the head of listings of Euronext Amsterdam there were multiple reasons why Alternext did not work out in the Netherlands: [163]

- Wrong timing. The Netherlands was already slowly entering the crisis, and consequently banks were reluctant to assist with the development of Alternext Amsterdam and investors became more risk-averse;
- Regulatory burdens. Regulation regarding documentation, transparency and openness became stricter. It became more difficult and costly for SMEs to comply;

[161] SEO (2016). "Evaluatie microfinanciering" (Evaluation micro financing).

[162] Euronext (2014). News article, 9 April 2014, "Euronext bouwt Alternext Amsterdam af" (Euronext reduces Alternext Amsterdam). See: www.euronext.com/nl/nieuws/euronext-bouwt-alternext-amsterdam-af. Witteman, J. (2014). News article, 10 April 2014, *de Volkskrant*, "Euronext Amsterdam sluit 'babybeurs' Alternext" (Euronext Amsterdam closes Alternext exchange). See: www.volkskrant.nl/nieuws-achtergrond/euronext-amsterdam-sluit-babybeurs-alternext~b0e02d04/.

[163] Interview with the head if listings of Euronext Amsterdam.

- Limited interest. Banks have changed their investment portfolio in the last couple of years and are increasingly seeking larger companies in which foreign investors also invest. This is more profitable for the bank;
- Different local circumstances. Alternext Amsterdam was based on Alternext Paris, but was not tailored to the Dutch market and culture. The Dutch capital market is very open - about 95% of all capital stems from abroad. Foreign investors, however, invest more often in large companies and are also more strict and demanding regarding documentation, openness and liquidity. In France, on the other hand, investments stem much more from domestic investors. In addition, domestic institutions are/feel (morally) obliged to invest in local companies. Overall, the capital market is better regulated in France than in the Netherlands, resulting in companies turning more easily to the stock exchange when they are in need of capital than to other options.

Alternext Lisbon also has very few listings (three), but it is still running. The reason for these limited listings is likely to be found in a lack of interest from stakeholders, investors and listed sponsors. In addition, not all SMEs might be prepared or willing to make the (cultural) change to the stock exchange for their financing. According to Alternext Lisbon, they are still active because they still believe it makes sense to have this market available for SMEs. As the market is already up and running they did not see any reason to close it. Moreover, they said that Alternext Lisbon is part of the larger Alternext market of Euronext Group. It should be seen as a fully pan-European market with over 200 companies of which only three are Portuguese.[164]

Euronext Amsterdam is currently looking into an alternative for Alternext. Discussions over the exact form (they want to stay away from an Alternext 2.0) are ongoing, with many interested parties, including banks, investors, regulators, government bodies, law firms, and private equity and venture capital firms.

In order to assess the potential for a new SME stock exchange, Euronext has contracted Deloitte to conduct a market analysis. The study identified 285 potential companies to enter the stock exchange after 3 to 5 years of establishment and that would have a market capitalisation of at least EUR 50 million. These include both companies that would be willing to enter the stock exchange and companies that could enter the stock exchange in terms of documentation, solvability, liquidity, etc. The main sectors in which these companies are located are industrials (41.4%), consumer goods (discretionary 15.4% and staples 9.5%), technology (10.5%) and financials (9.1%).

The other stock exchange for SMEs, NPEX, was established in 2009 and is still active. It is an online platform with no interference from banks. NPEX originally started as a stock exchange for real estate but changed its business model in 2013 to SME financing and targets companies that look for capital between EUR 1 million and EUR 10 million. In order to issue bonds or shares at NPEX, a company should have a solid organisation and have existed for at least three years, of which one year must have been profitable.[165] After the application, NPEX will visit the company, its financials and organisation will be checked and a light due diligence report will be drafted. If everything is approved, a prospectus will be set up and the company will be placed on the NPEX website.[166]

The first bond was issued in 2013, and a few more were issued in 2014 and 2015. In 2016 seven more followed and in 2017 there were 15. By then a total of EUR 54.5 million had been raised; this was also the first year in which NPEX had been profitable. By the end of

[164] Input received from Alternext Lisbon.
[165] Information from NPEX, see: https://www.npex.nl/npex-voor-financiering.
[166] Interview with NPEX, see: https://www.npex.nl/npex-voor-financiering.

2017, however, NPEX had to close down this market for several months, as the granted license did not met the growth in activities.[167] At the start of their operations they had received a tailored license from the financial authority (AFM). After they started growing and with the arrival of Mifid II they had to change it to the standard licence, which took some time.

As of today, NPEX has financed 29 companies (of which two more than once) and raised around EUR 66.4 million. The average amount raised or requested by companies was EUR 2.5 million. This is mainly a consequence of regulation, as until recently it was not needed to have a formal approved prospectus by the AFM under EUR 2.5 million, which would save the company money.[168] The companies listed cover a wide range of areas, including photonics, car wash, restaurant, industrial gas supplier, industrial manufacture supplier, clothing shop, consultancy firm etc. NPEX aims to select firms that have social or environmental added value. According to NPEX, all companies apart from one are performing very well and have grown significantly since they received capital via the stock exchange. NPEX, however, believes that more companies could be listed and receive capital if the financial guarantee given by the EU to banks would also be given to private investment organisations, which is currently not the case. If the guarantee would be given, this would be a stimulant for investors.[169]

Case 3: financing via venture capital

Another alternative way through which firms can finance their investments or operations is via venture capital (VC). With venture capital another firm, bank or institution invests in your firm and receives an equity share in return. The majority of the financing is carried out by venture capital specialists (called VC firms) but investments made by other firms also occur. The firms that receive venture capital are often start-ups or small firms.

The Nederlandse Vereniging van Participatiemaatschappijen (NVP) presents data from European Data Cooperative on venture capital in the Netherlands for several indicators on their website.[170] This data, however, does not make a distinction between start-ups/small firms and large firms. In 2017 the total value of VC investments in the Netherlands was EUR 320 million. Except for a drop in 2015, the value of VC investments has slowly been increasing since the financial crisis. Also, the number of companies involved in VC investments has steadily increased since the financial crisis.

[167] See news article De Volkskrant, 18 November 2018: https://www.volkskrant.nl/economie/afm-legt-handel-op-kleine-bedrijvenbeurs-npex-stil-om-vergunningsperikelen~b2d4e047/.
[168] It has now been increased to EUR 5 million.
[169] Interview with NPEX.
[170] Information from the NVP, see: http://www.nvp.nl/pagina/investeringen/?lang=en#!lang=en.

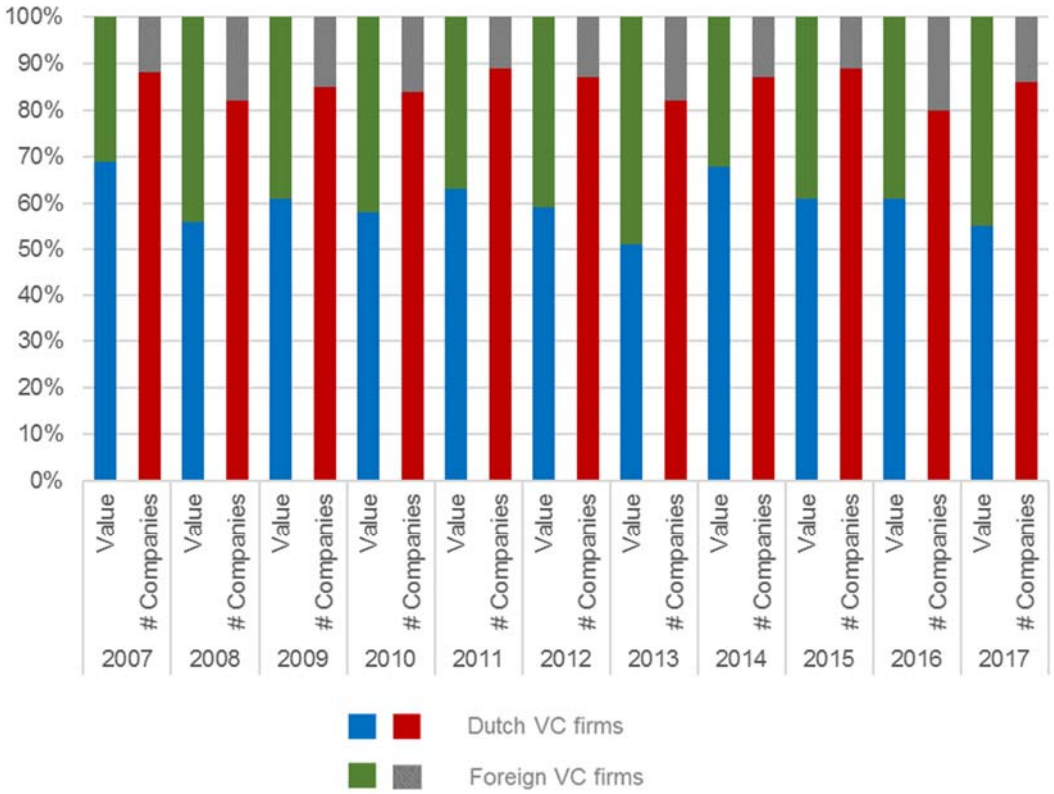
Figure 4.4 VC investment in the Netherlands

Sources: NVP fact and figures, investment data. Author's calculations.

About three-quarters of the VC investments have a value of EUR 0 - EUR 1 million, one-fifth has a value of between EUR 1 million and EUR 5 million. In the past ten years only one VC investment has been valued between EUR 25 million and EUR 50 million. Less than 10% of these investments concern seed capital. On average 60% is start-up capital and 37% is later-stage venture capital.

The data on the NVP website make a distinction in the origin of the investment, i.e. whether it comes from Dutch VC firms or from foreign VC firms. The share of the Dutch and foreign firms in total VC investment, in terms of value and number of companies that have invested, in the Netherlands is presented in Figure 4.5. When focusing on the value of the VC investment, we see that for most years it has been dominated by Dutch firms. For the number of companies that have invested in the Netherlands, this is even more the case. As the share of foreign companies investing in the Netherlands is much lower than their share in the total value of VC investments, this would indicate that on average foreign firms invest a larger amount than Dutch firms.

Figure 4.5 VC investment value and number of companies split out for location of origin



Sources: NVP fact and figures, investment data. Author's calculations.

With regard to the destination, VC investments are centred around four provinces. The largest values are invested in Noord-Holland, Zuid-Holland, Utrecht, and Noord-Brabant, they make up 83% of the value of all VC investments in the Netherlands in 2007-2017. When focussing on the number of companies that invest in the Dutch provinces, Utrecht is replaced by Gelderland.

The VC investments mainly take place in five sectors: biotech and healthcare, ICT, business products and services, consumer goods and services, and energy and environment.[171] While the shares differ significantly per year (ranging from 23% to 63%) the largest share of VC investments has always taken place in the biotech and healthcare sector. The ICT sector follows with a share ranging from 15% to 39%. While the shares of the consumer goods and services sector and the energy and environment have been declining, the share of the business products and services been increasing in the last few years.

According to the NVP, one can assume that VC investments of up to EUR 10 million are investments in SMEs. This would mean that 80% or more of all VC investments are in SMEs. However, as the data are not split out for large and small firms, we cannot tell for sure. CBS has made a distinction between VC investments in SMEs and large firms,[172] however, since the values are unknown for firms with 50-100 employees, with 100-250 employees and with 250 or more employees, and for half of the total investment value the

[171] For the sectors financial and insurance activities, chemicals and materials, agriculture, transportation, construction, real estate and others, the share in total VC investment in the Netherlands ranges from 0-9% but is for more years equal to 0% than that there is a positive value.

[172] CBS (2018). "Private equity and venture capital 2007-2016". See: https://www.cbs.nl/nl-nl/maatwerk/2018/16/private-equity-en-venture-capital-2007-2016.

size of the receiving company is unknown we cannot say much about the data that are available for firms with 0-5 employees, with 5-20 employees and with 20-50 employees.

In order to put the above figures in perspective, we assessed the EC Innovation Scoreboard, which provides scores for each country on many indicators related to innovation performance and allows for comparison with other countries. With regard to VC investments, the Netherlands scores better than the EU average; in 2010 the Netherlands' performance relative to the EU's was 112.8% and it increased to 129.2% in 2017. Although the Netherlands performs very well compared with the EU, the EU is considered to be lagging behind other trade blocks, like the US. *"EU companies spend less on innovation than their competitors. Venture capital remains underdeveloped in Europe, resulting in companies moving to ecosystems where they have better chances to grow fast"*.[173] This positive view about the Netherlands' performance is thus likely to be overestimated.

[173] European Commission (2018). Press release, 22 June 2018 "European Innovation Scoreboard 2018: Europe must deepen its innovation edge". See: http://europa.eu/rapid/press-release_IP-18-4223_en.htm.

5 Summary and further reflection on the findings

5.1 Introduction

Identification and assessment of relevant structural reforms

The European Semester is one of the main coordination instruments the European Commission and the Member States developed in order to further strengthen the EU economic and monetary union.[174] This instrument supports the long-term ambitions of the EU for economic growth, creation of jobs, innovation, etc., and pays (amongst other things) specific attention to structural reforms in the individual Member States. In order to support the Commission in their work this study aimed "*to identify past, present, and pending structural reforms in the Netherlands for the period 2013-2018 and to analyse and report on their origins and the intended and actual impacts*". After a high-level assessment of the five pre-selected reform themes in the first project phase, specific topics were selected for a more in-depth analysis. Here, we present a broader understanding of the main findings.

The Netherlands: strong economic performance, but….

In terms of (macro-) economic performance and (industrial) competitiveness, the Netherlands performs very well, both in the European Union and globally. This good position is reflected in international benchmarks, ranked 4th (out of 137 countries) in the World Economic Forum's Global Competitiveness Report 2017-2018[175] and 4th in the IMD's World Competitiveness Ranking 2018.[176] Recently, the OECD concluded that, although there are significant near-term risks including "Brexit", the Dutch economy shows strong economic growth and it is projected to remain robust.[177] The CPB also forecasts a robust economic performance for 2018 and 2019, although they warn of the severe negative economic impacts of a "hard Brexit".[178]

…..several structural challenges are ahead

Despite this strong economic performance, there are still economic (policy) fields that are not functioning optimally. A broad range of publications from various institutions and stakeholders[179] reveal a number of priorities for structural reform, notably in **housing** (i.e. lack of affordable houses for certain groups), the **labour market** (i.e. segmentation, unbalance in job-flexibility), the **pension system** (i.e. second-pillar pensions, risk sharing), **public finance** (i.e. tax distortions, coherence), the **energy transition** (slow transition so far), **R&D investments** (i.e. low private investments) and **access to capital** (i.e. SME access, market distortions). The pre-selected five themes closely relate to this priority list:

- Innovation and investment in R&D&I and energy transition (theme 1);
- Employment and productivity (theme 2);
- Taxation and income shares (theme 3);
- Access to finance and competition in financial services (theme 4);
- Public procurement (theme 5).

---

174 Treaty on stability, coordination and governance in the economic and monetary union, February 2012.
175 World Economic Forum (2017). "The Global Competitiveness Report 2017-2018". See: http://reports.weforum.org/global-competitiveness-index-2017-2018/.
176 IMD (2018). "World Competitiveness Yearbook 2018". See: https://www.imd.org/wcc/world-competitiveness-center-rankings/competitiveness-2018-rankings-results/.
177 OECD (2018). "Economic Survey 2018".
178 CPB (2018). "Macro-economische verkenning" (Macroeconomic reconnaissance).
179 See section 1.2 for a brief overview.

5.2 Summary of findings and further reflection

For two of the five pre-selected themes (3 and 5), no further in-depth analysis was carried out. These themes are briefly discussed here; the other three themes follow.

Taxation - Recent developments in the field of taxation were largely driven by the previous coalition agreements of 2010[180] and 2012[181], as well as the subsequent annual Tax Plans. As described in section 1.2.4, the main identified reform areas relate to (i) the labour market, (ii) the housing market and (iii) corporate tax policy. In relation to the labour market, it is important to mention that there is a fundamental discussion on the desired shift in tax burden from labour to other taxation grounds, e.g. capital or consumption.[182] Wide-ranging reforms of the fiscal system are currently being prepared, including changes that should increase peoples' take-home income from work. In the area of housing, the planned reforms are an accelerated reduction of mortgage interest tax deductibility (MID) in the top income bracket and revoking the exemption of a national rental value to be added to taxable income for mortgage-free houses. The third reform area (corporate taxes) is being robustly debated in the Dutch parliament, as multiple parties question the effectiveness of this measure.

Reflection Ecorys - The analysis indicates that various (structural) fiscal reforms have been announced and, in some cases, implemented. In the light of the European Semester, it seems useful to wait for the actual implementation and impacts of the announced fiscal reforms. As the detailed set-up of the reform is still unclear, this advice applies for the overall fiscal reform package, but specifically for the reforms in labour and income taxation. The announced reform in the field of corporate taxes (i.e. the decision to abolish dividend tax) raises more questions: there are serious doubts over its effectiveness and the risk of negative side effects has been flagged. Reforms to the fiscal distortion of the housing market are under way, with various initiatives to reduce (over a long-term period) the home mortgage interest deduction. In this respect, the accelerated reduction of the interest deduction for the top tier of the income tax scale is noticeable. At the moment, the fundamental problem for the housing market is the (regional) imbalance between demand and supply. The 'National housing agenda' of May 2018 aims to reduce this imbalance, for example, by increasing the housing supply and through more effective use of the current supply. The reforms in the MID and the ambitions in the recent housing agenda appear to be valuable steps forward, however it is still uncertain whether these measures can address the various distortions in the housing market as for example, discussed in the 2018 country report.[183] The national housing agenda is mainly based on high-level agreements; the more detailed implementation will only become visible in the coming 2-3 years.

Public procurement - The Dutch system performs well, although there is room for improvement in several areas: (i) the participation of SMEs in public procurement is still limited; (ii) procurement expertise at contracting authorities/entities and tenderers could be improved; (iii) certain "semi-public" sectors are exempted from public procurement requirements; and (iv) strategic procurement could be further developed. Initiatives to improve legislation through dialogue and awareness campaigns have gained momentum in recent years.

---

180 VVD, CDA (2010). "Regeerakkoord 2010 - Vrijheid en verantwoordelijkheid" (Coalition agreement 2010, freedom and responsibility).

181 VVD, PvdA (2012). "Regeerakkoord 2012 – Bruggen bouwen" (Coalition agreement 2012, building bridges).

182 IMF (2013). "Concluding Statement of the 2015 Article IV Consultation", p. 11. See: https://www.imf.org/en/Publications/CR/Issues/2016/12/31/Kingdom-of-the-Netherlands-2015-Article-IV-Consultation-Press-Release-Staff-Report-and-43694.

183 In the 2018 country report (p. 25-26) specific reference is given to ongoing distortions, like the impact of social housing on price setting, underdevelopment of the private rental market and lack of incentives to move out of a social house ("scheefhuren").

Reflection Ecorys - The Dutch government has taken steps to address most issues concerning public procurement but it will take time for their impact to become clear. One point of attention, whether certain sectors fall outside the scope of the procurement directives, is subject to a principled (legal) debate between the Commission and the Dutch government. To our knowledge, there are no specific (policy) studies that assess the impact of a (potential) change in public procurement requirements of the (semi-) public sector. The sector itself considers the procurement obligation to lead to increased costs with no benefits. Until a legal decision on this point has been reached, no reforms are expected. Given the fact that many of these initiatives are still being rolled out, there seems no urgent need for new reforms.

5.2.1 Investments in R&D&I and energy transition (theme 1)

The Netherlands is a RDI frontrunner, but private RDI investments lag behind

Various rankings and publications indicate that the Netherlands performs very well in the field of R&D&I and is in many aspects a "frontrunner". Nevertheless, private investment in R&D&I has been below the EU average for many years,[184] which may undermine the growth of the Dutch economy in the longer term. The underlying reason for the low private investments is not directly clear and various causes have been suggested (e.g. by the Rathenau Institute and CPB). Our in-depth data analysis focused specifically on this element. Policy-wise, the Dutch government mainly focuses on strengthening existing policy instruments (e.g. the Innovation Box and SBIR program) and new initiatives such as the SME+ innovation fund. Most of these existing policy instruments have been evaluated and revised in the last couple of years or will be evaluated in the near future (e.g. the WBSO). As a result, the impacts to date of these reforms are not always clear and will be visible in the coming years.

With regard to the energy transition, it is clear that the Netherlands lags behind in terms of realisation of its energy and climate targets. The climate agreement, which is currently being negotiated between the Dutch government, private market players and NGOs will determine the pathway towards a low-carbon economy and (related to that) the level of public and private investment. Various reports emphasize that the Netherlands needs to significantly intensify its investment in order to reach the various energy and climate objectives. Current estimates indicate the national costs of the climate and energy transition at EUR 2 to EUR 4 billion per year (depending on the scenario, based on realisation of the 2030 targets).[185]

Private R&D expenditures are slightly below EU average, well below benchmark countries

The data analysis shows that Dutch public R&D expenditures are at the level of the benchmark for north-west Europe. However, Dutch private R&D expenditures are slightly below the EU average and well below the benchmark. This picture does not change after including 0.09% R&D expenditures of Dutch businesses on national non-business institutes (compared with the EU average of 0.06% of GDP). In addition, Dutch companies spend 0.51% of GDP on R&D partnerships, of which 0.24% is spent abroad (no comparable EU figures are available).

[184] European Commission (2018). "European Innovation Scoreboard 2018".
Deuten, J. (2015). *Rathenau Instituut* "R&D goes global: Policy implications for the Netherlands as a knowledge region in a global perspective".

[185] PBL (2018). "Kosten energie- en klimaattransitie in 2030 – update 2018" (Costs of energy- and climate transition in 2030 – update 2018).

Dutch R&D intensity thrice as low in "giant" companies

By company size, medium-sized companies devote the greatest share of their resources on R&D. Microenterprises (with less than 10 workers) account for 10% of Dutch R&D expenditure. Given that they employ 15% of the employees, this points to a below-average R&D intensity of microenterprises. Among Dutch companies with 10 or more workers, those with a turnover of more than EUR 100 million account for 90% of sales and spend 0.6% of their sales on their own (in-house) R&D compared with 1.8% for smaller companies, averaging to 0.7 per cent (equivalent to 1.4 per cent of gross value added). Community Innovation Survey (CIS) data confirm these findings, although this only covers expenditure on total innovation (including product innovation, process, services and marketing innovation), which is too broadly defined for the purpose of this study. All in all, this confirms a hump-backed relation between R&D and company size found in previous literature.

Dutch R&D intensity is far below the EU average in professional services

By sector, Dutch R&D is far below EU average in only one sector: professional services (which account for 8.0% of GDP compared with an EU average of 6.5%) spend only 1.0% of sector added value on R&D compared with 3.8% in the EU. These figures are excluding specialized R&D companies, which contribute to 0.5% of GDP in the Netherlands compared with 0.8% in the EU. On the other hand, the Netherlands are EU frontrunners in a number of sectors covered by the Dutch top-sector policy (consisting of numerous sector-specific policy initiatives for high-performing sectors) such as agriculture and logistics – however agriculture does not contribute much to R&D and the transport sector spends little on R&D.

Zooming in on more detailed manufacturing services, R&D expenditure lags behind the EU average in the manufacturing of "hardware" (computers and electronic and optic instruments) and of transport equipment (both cars and other), which may be explained by the presence of multinationals. Of these, only the "hardware" sector is among the sectors covered by the Dutch top-sector policy. These sectors, as well as pharmaceuticals are characterised by high product safety demands (whether regulatory or not), high (although below EU-average) levels of R&D due to experimental R&D and high levels of outsourcing abroad, suggesting that product testing rather than product development is outsourced (abroad). The EU exports more cars and medicinal and pharmaceutical products than they import. Hence, product safety requirements do not seem to hurt the competitiveness of the EU.

Three factors correlate with the Dutch R&D intensity

Beyond sector indicators, few factors were identified that correlate with R&D intensity. Here it is noted that for R&D tax deductions and outsourcing, yes/no indicators rather than monetary values were used since the monetary values are by definition highly correlated with total R&D expenditure. It is also noted that correlation does not imply causality. The factors with significantly positive effects in all models are:

- Percentage of high-educated workers in science or technical studies in the sector;
- Wage-cost subsidy of R&D personnel (called WBSO);
- The occurrence of outsourcing except for co-operation with Dutch R&D institutes.

In addition, R&D intensity is decreasing in both the company-to-sector turnover ratio and log turnover, indicating both monopoly underinvestment and efficiency of scales.

The significant impact of high-tech workers on product innovation is confirmed by a model estimated using CIS data. In addition, the only barrier with a significant negative effect on product innovation was a lack of high-tech workers. This is confirmed by the top-10 of "tight" occupations with high demand/supply ratios, of which the top-three are all high-tech occupations.

The lack of high-tech workers and the non-availability of the WBSO[186] for service innovations might also help explain why R&D intensity is particularly low in professional services (including for example engineering services). However, a strong presence of large public high-tech institutes such as TNO, TU Delft and TU Eindhoven may explain why private R&D companies generate relatively lower turnover.

Sector growth and flexwork initially also had a significantly positive effect on R&D intensity but both effects became insignificant after controlling for the significantly positive percentage of young workers (aged 15-29). Initially, an R&D equipment tax deductibility (called RDA) also had a significantly positive effect (although smaller than for the WBSO) for companies with less than EUR 100 million turnover. It should be noted that until and including 2015, RDA and WBSO tax treatments were capped, but the caps were removed in a 2016 reform integrating RDA and WBSO. However, this effect of the RDA disappeared after controlling for the occurrence of outsourcing, which suggests that the RDA was also used for outsourced R&D.

Policy suggestions: strengthen tax incentives, improve labour mobility and ensure stability

For policy conclusions, it seems fair to conclude that wage-cost subsidies are more likely to induce businesses to hire additional R&D staff than tax deduction of R&D equipment induces businesses to purchase additional equipment. Two likely reasons are that the wage-cost subsidy targets the main component of R&D costs and that the Dutch wage-cost is specific to R&D personnel working in the Netherlands. Removing the caps in the 2016 WBSO reform is likely to induce more R&D (providing sufficient high-tech workers are available).

Eurostat data help to identifying underperforming sectors with regard to R&D through international comparison. However further breakdowns of R&D are not available in Eurostat data for most countries in north-west Europe. One reason may be that national offices only survey detailed information on R&D among companies with 10 or more workers, as is the case in the Netherlands. In that case, further international comparisons would be possible by separately publishing statistics for companies with 10 or workers, as Eurostat does for job vacancy statistics.

One investment priority is the professional services sector where R&D intensity is far below the EU average, although strong public institutes such as TNO, TU Delft and TU Eindhoven may partially compensate this. One option is to extend the wage-cost subsidy beyond product innovation and software development to include certain professional services such as engineering and private R&D services. The negative coefficient of "R&D institutes" on R&D intensity indicates that outsourcing R&D to professional services would mainly substitute in-house R&D, so the main rationale should be to offer companies more options for R&D. Other investment priorities could be the "hardware" sector (computers, electronic and optical products) where R&D intensity is the highest among Dutch sectors but still quite below the benchmark for north-west Europe. Options could be an awareness campaign (also for students) and a further "top-sector" policy focus on this sector. Co-operation with universities has a very uncertain positive effect. However, an additional argument to invest in this are potential indirect effects, for example through increasing the supply of students in the right fields of study or network effects – it is hard to disentangle these effects but evidence from literature indicates that their combined effect is positive.

The finding that both monopoly underinvestment and efficiency of scale explain why R&D intensity is low in very large companies is an argument against favouring certain size

[186] Wet Bevordering Speur- en Ontwikkelingswerk (Act to Promote work in R&D); a wage-cost subsidy for R&D staff.

classes of companies. Outsourcing abroad should not be discouraged because outsourced R&D (typically product testing) and in-house R&D (typically product innovation) are complementary. Rather, subsidies should be targeted at R&D in the home country, as is the case for the wage-cost subsidy scheme (WBSO) in the Netherlands.

The importance of highly educated technical workers also offers possibilities for policy makers, apart from formal education. First, it is noted that to increase labour supply, more people should attend high-tech education. Reducing income tax of high-tech workers is not necessarily sufficient to induce a choice for a tech education, especially because low-tech risk unemployment due to robotization. Perhaps recognizing high-tech talent early in school and challenging them may help to maintain innovative potential without causing mass unemployment for low-tech workers.

An example is the (strengthened) training of unemployed people with a medium or high technical education. R&D staff lost jobs during the economic crisis of 2009 and 2010, although later, and to a lesser extent, than other personnel. Another angle are high-tech workers from non-EU countries hired on temporary work permits; they are more likely to become unemployed than their Dutch colleagues and might benefit from training in one specialization, since non-EU high-tech educated workers tend to have a more general technical education.

The finding that R&D expenditures increase more than proportionally with sales (although the inclusion of the percentage of young workers masks this effect) indicate that R&D expenditures are quite volatile and pro-cyclical, implying delayed R&D during a time of economic decline with the risk of not being the first with new innovations. Stable or anticyclical government support over the business cycle are likely to mitigate such delays.

5.2.2 Employment and productivity (theme 2)

Need for labour market reforms, especially with regard to flexible jobs

In the field of employment, several publications highlight three main challenges for structural reform in the Netherlands, i.e. (i) job flexibility, (ii) shortage of skilled (technical) personnel and (iii) labour force participation. Of these three, the (too) high level of job flexibility and related negative social effects are seen as the most urgent structural problem. This is emphasised in a recent OECD publication[187], which (amongst other things) recommends reducing the excessive incentives to self-employment. The current coalition is preparing new legislation to restore a sustainable market balance (WAB, Act Labour Market in Balance), but this is still in preparation. On labour-force participation, a major reform with regard to the employment of disabled people was implemented in 2015 (Participatiewet); the first effects seem positive, but more measures are announced in 2017. Pertaining the (increased) employment of women no major reforms are implemented or planned. The shortage of skilled (technical) personnel is expected to increase in the coming years, despite various initiatives.

No evidence that flexwork hurts productivity

A negative Pearson correlation between flexwork and R&D and productivity might suggest that flexwork hurts both as found in previous literature. However, after controlling for the percentage of high-tech workers and young workers both negative effects disappear. Hence, no evidence is found for a causal relation of flexwork on productivity in either the short or the long term, neither directly nor via pathways of company training or R&D. This finding contradicts the argument that flexible work enhances productivity through enabling

[187] OECD (2018). "Economic Survey 2018".

companies to hire workers only when sufficient work is available and suggests that any short-term positive effect is offset by long-term negative effects.

Company training boosts levels of productivity, but not in the short term

In initial model estimations, company training is positively correlated with the level productivity although not with sector growth. Company training is not correlated with changes in productivity either. This suggests that company training increases productivity in the long-run rather than the short run, but a longer time series is needed for more definite conclusions.

Policy suggestions: create right balance in flexible employment and cooperate with employers for training

As indicated, the absence of a correlation in the productivity equation indicates that longer-run negative effects of flexwork may offset the positive short-run effects. Employers are aware of the need to retain scarce workers, and labour hoarding was the main reason why employment in the Netherlands initially was less affected in the crisis of 2009 than in other countries.[188]

The mixed and uncertain findings suggest a complex relationship between flexwork and productivity which is worthwhile to investigate further. One finding of Boeri and Garibaldi (2007) for Italy that flexwork causes a shift to low-productivity sectors is particularly interesting to explore for the Netherlands, because low-productivity sectors are stronger represented in the Netherlands than at the EU average. A policy implication is that regulations of flexwork may need to be balanced, allowing flexwork so that companies can adjust employment levels in the short run but discouraging flexible employment contracts as a standard to avoid negative long-run effects (also from a worker point of view; for example low old-age pension contributions are a long-term risk).

With regard to company training, an important policy implication of the absence of short-term effects on production or productivity is to ensure that training is available on a structural basis. In the Netherlands, training in some sectors is organized through sector funds, funded by employers who contribute a percentage of the wage sum. Such funds may theoretically prevent underinvestment in training for fear of poaching of workers by competitors. However, it should be kept in mind that employers only have an interest to send their own workers to train in skills they need in their current work. For the unemployed, the above is an argument to cooperate with employers to train recently hired unemployed workers, rather than to demand that employers invest in the general employability of workers. When co-operating with employers, a well-known challenge is to commit employers to hire given individual unemployed workers after their training. Sometimes it suffices to refer workers selected by employers to existing training programs approved by employers. However, if a new training program needs to be set up, an additional challenge is to keep the whole process till workers complete training under one or two years, because otherwise the recruitment needs may change in the meantime or employers may have found other solutions and the training of the unemployed workers may be wasted.

[188] Ecorys (2010), Labour hoarding door bedrijven, www.arbeidsdeskundigen.nl/dossiers/participatie/onderzoeksrapporten/document/akc/741.

5.2.3 Access to finance and competition in financial services (theme 4)

Need to further strengthen market competition; access to finance improved

The analysis is focused on two key problems for the Netherlands, i.e. (i) the sub-optimal functioning of the Dutch market for credit facilitation and (ii) the access to finance for SMEs. Various publications indicate a sub-optimal market situation, including a high level of concentration. Although access to capital in the Netherlands improved over time, the situation is still not optimal; especially the financing of SMEs is a point to consider (small-sized loans, relatively high risks for traditional banks).

Various initiatives to strengthen competition in the SME financing market were undertaken, both by the government and by private organisation (sometimes with government support). This includes the introduction of a microcredit scheme, and two initiatives for an SME stock exchange (see below). Other suggestions relate to the creation of a "light" banking licence, or the shift towards a more market-oriented financial system (suggestion CPB). No specific initiatives have been initiated yet.

Case studies: introduction of alternative sources of finance for SMEs

With respect to loan capital, some initiatives have been initiated in the past, with private credit institution Qredits slowly gaining traction over the past decade. The set-up of Qredits is focused to address typical market failure of provision of credit to small companies. For SME credit, an explicit condition is that the SMEs are not able to obtain financing at the regular banks. As Qredits works on a sustainable basis – currently proceeds exceed costs – the initiative can be considered successful in providing loans to the correct kind of companies with a positive financial outlook.

An alternative form of loan capital is the emission of bonds via stock exchanges. While the Alternext initiative failed, NPEX managed to be successful and new plans for a SME stock exchange hosted by Euronext are in the making. These initiatives offer an alternative to the main banking loan channels, but are accompanied with significant higher transaction costs associated with the provision of information to future investors. Hence, banking loans will retain a competitive advantage in comparison to these alternative channels. Nonetheless, a slow growth achieved by NPEX and the possible launch on a new Euronext initiative offer some promises of alternative channels for loan capital for firms.

In addition to loan capital, companies may obtain equity. For this the same stock exchange channels are open as for the emission of bonds, with NPEX focused on a segment with smaller emission amounts that the initiative Euronext is exploring. Additionally, venture capital is increasing in the Netherlands, including for SMEs, but due to its nature, this option may not be suitable for all SMEs seeking additional capital.

Policy suggestions: re-energize the policy debate, facilitate further market developments

While these initiatives show some positive development in the creation of alternative sources of finance for SME, the nature of the instruments or the conditions to access them, make them only an indirect substitute for banking credit. The review of the available documentation shows that, despite the fact that various initiatives were implemented, the market for business financing still performs sub-optimally; in particular the critical market review of the ACM of 2015 is still relevant.

Given the perceived low prioritisation of strengthened competition in financial services, it seems worthwhile to pay again attention to this market and to re-energise the policy debate and develop a new vision on the future of the banking sector. The competent regulators (DNB, AFM and ACM, but also the CPB) published various reports/analyses in recent years, which seem to form a solid basis to develop a concerted policy 'road map' or

action plan for the coming years and to strengthened competition among financial services. Various interesting angles can be added, such as: (i) the role of De Volksbank, which is still owned by the government and currently reconsidering its position in the market, (ii) strengthened implementation of the ACM-recommendations[189] for more transparency in the market, reducing existing switching barriers, etc., (iii) follow-up on CBP-suggestions[190], such as increased marketability of securities and reduced information asymmetry to assess creditworthiness via a credit register, and (iv) exploiting the potential of fintech companies as market alternatives[191]. The suggestions of the CPB to shift towards a more market-oriented financial sector, can also be linked to the recent EU initiative of the 'Capital Markets Union'. This initiative aims to facilitate SMEs with better access to finance through public capital markets.[192] With regard to the access to capital for SMEs we would (also) recommend the Dutch government to take an active role in facilitating various developments in the market (e.g. crowdfunding, fintech and initiatives like NPEX/Alternext). The market clearly needs an active and stimulating public authority to compensate market failures. In this context it is however important to ensure at national level a good balance between stimulating market conditions (i.e. room for new market entrants, new business models, no unnecessary administrative burdens, etc.) and the protection of public interests (i.e. protection of consumer interests, system stability, fraud, money laundering, etc.).

189 ACM (2015). "Concurrentie op de markt voor MKB financiering" (Competition on the market for SME financing).

190 CPB (2015). "Marktfinanciering en bankfinanciering in perspectief. Een wereld zonder banken?" (Market financing and bank financing in perspective. A world without banks?).

191 DNB & AFM (2016). "Meer ruimte voor innovatie in de financiële sector" (More room for innovation in the financial sector).

192 For more details see the press release d.d. 24 May 2018; web link: http://europa.eu/rapid/press-release_IP-18-3727_en.htm.

Annex A: Remarks on the use of CBS microdata

A1. Introduction of CBS microdata

The Dutch Statistical Office (CBS) provides under certain strict conditions access for third parties to their microdata sets. This access is regulated via a system of licences, which are granted to institutions or companies for a period of five years. Ecorys Netherlands has obtained such an "institutional license" to use CBS microdata. Beside this license, the CBS assesses every individual project (proposal) in more detail before they grant access, for example in relation to the objective of the research study, the proposed data handling methodology and proposed researchers. Once the permission is granted, only authorised researchers have the possibility to access the microdata and to carry out further analysis on the data in a protected IT-environment. Given the risk of revealing confidential data (e.g. at company or personal level), the CBS checks all output-data, which is intended to be used by the researchers. More details are provided on the site of the CBS microdata service.[193]

A2. Summary of key microdata sets used for the analysis

In this section we briefly summarize the main characteristics of the key microdata sets we used for this analysis. More details are provided in the guidance documents of the CBS microdata service. In our analysis we mainly used the following sets:

- CBS Microdata on R&D (RTD);
- General company register 1994-2017 (ABR) and the BTW-register 2007-2017 (value added tax, VAT);
- Community Innovation Survey (CIS);
- Labour Force Survey (LFS or EBB).

Table: summary of key CBS microdata sets

	Description
Microdata on R&D (RTD)[194]	CBS microdata on R&D - Data is based on annual survey (1995-2015) covering roughly 4,000 company units per wave. It includes data on R&D personnel, expenditures, incomes and tax deductions at company unit level: • R&D personnel: breakdown by six research fields: technical, physics, social sciences, medical, agriculture, language; • R&D Expenditures: breakdown in several categories: (1) own R&D expenditures, (2) R&D expenditures by Dutch third parties (e.g. companies, universities) and (3) R&D expenditures by non-Dutch third parties. The category 'own R&D expenditures' is divided in (a) personnel costs, (b) investments in buildings, equipment, etc., (c) R&D investments; • Type of R&D expenditure: This indicator is divided in: (1) Fundamental research, (2) Applied research, (3) Experimental development; • R&D incomes/tax deductions: breakdown in (1) income due to R&D work for third parties in NL, (2) income due to R&D work for third parties outside NL and (3) fiscal benefits related to WBSO and RDA.

[193] CBS Microdata service: www.cbs.nl/en-gb/our-services/customised-services-microdata/microdata-conducting-your-own-research.

[194] CBS: www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/research-development.

	Description
Link to other CBS data files (ABR, BTW)	Via a company identifier (BE-ID) it is possible to link the R&D microdata to more general company and sectoral characteristics. Useful data-sets are the annual registers ABR (general company register) 1994-2017 and BTW (VAT) 2007-2017. These data sets cover the whole Dutch business population and contain company level information on: • Economic sector/activity (SBI/NACE Rev 2); • Number of employees (+ development over time); • Age of the company; • Location of the company (based on postal code); • Ownership and loan structure; • Turnover.
Community Innovation Survey (CIS)	CBS microdata CIS - CBS data on innovation are available from the biennial Community Innovation Survey (CIS) 1996-2014, each covering three years. The 2014 survey covered 6,342 company units with more than 10 employees.[195] Reference period is the last three years. The data set includes mostly yes/no indicators, for example on: product or process innovation goods/services.
Labour Force Survey (LFS or EBB)	Labour Force Survey (LFS/EBB) – 198-2016, 60-70 thousand persons per wave; information on the relationship between individuals and the labour market. Characteristics of individual persons are connected to their current or future position on the labour market: • Person-ID; specific ID-number to follow a person over time; • Level of education; • Type of job; breakdown in (1) fixed contracts, (2) temporary contracts, (self-employed. To some extent also temporary agency workers.

[195] CBS (2017). "Innovatie en internationalisering – Inventarisatie van bronnen en populatieschets" (Innovation and internationalisation – Assesment of sources and population sketch). See: www.cbs.nl/-/media/_pdf/2018/13/innovatie%20en%20internationalisering.pdf.

Annex B: Overview literature

Accountant Week (2018). News article, 3 April 2018, "Zakelijke dienstverlening in top 3 branches verstrekt kredit Qredits" (Financial services in top 3 sectors provided Qredit's credit). Retrieved from: https://accountantweek.nl/artikel/zakelijke-dienstverlening-in-top-3-branches-verstrekt-krediet-qredits.

ACM (2015). "Concurrentie op de markt voor MKB financiering" (Competition on the market for SME financing). Retrieved from: https://www.acm.nl/nl/publicaties/publicatie/14430/Concurrentie-op-de-markt-voor-MKB-financiering.

ACM (2016). Retrieved from: https://www.acm.nl/nl/publicaties/publicatie/14430/Concurrentie-op-de-markt-voor-MKB-financiering.

AFM (2017). "Evaluatie crowdfundingvoorschriften" (Evaluation crowdfunding regulation). Retrieved from: https://www.afm.nl/nl-nl/professionals/nieuws/2017/juli/crowdfunding-onderzoek.

ASMI (2016). "Statutory Annual Report 2016" p. 51. Retrieved from: http://www.asm.com/Downloads/2016_Statutory_annual_report.pdf.

AWVN (2014). "Toekomst van werk" (The future of work). Retrieved from: www.nautilus-educatief.nl/files/Download/AWVN2014ToekomstVanWerk.pdf.

Becker, B. (2015), "The Determinants of R&D Investment: A Survey of the Empirical Research", Journal of Economic Surveys 29 (5), 917-942.

Bernardo et al (2017), "Uncovering Offshore Financial Centers: Conduits and Sinks in the Global Corporate Ownership Network", Scientific Reports, volume 7, Article number: 6246.

Boeri, T. and P. Garibaldi (2007), Two Tier Reforms of Employment Protection: a Honeymoon Effect? The Economic Journal, Vol. 117, Issue 521, June 2007, F357-F385.

Borghans, L., Fouarge, D., Grip, A. d., & Thor, J. v. (2014). "Werken en leren in Nederland" (Working and learning in the Netherlands).

CBS (2017). "Innovatie en internationalisering – Inventarisatie van bronnen en populatieschets" (Innovation and internationalisation – Assesment of sources and population sketch). Retrieved from: www.cbs.nl/-/media/_pdf/2018/13/innovatie%20en%20internationalisering.pdf.

CBS (2018). "Private equity and venture capital 2007-2016". Retrieved from: https://www.cbs.nl/nl-nl/maatwerk/2018/16/private-equity-en-venture-capital-2007-2016.

CBS (2018). "Weer meer vast werk maar flexwerk groeit harder" (Steady work increases again, but flexiwork grows faster). Retrieved from: www.cbs.nl/nl-nl/nieuws/2018/08/weer-meer-vast-werk-maar-flexwerk-groeit-harder.

CPB (2015). "Lessen uit zeven jaar stagnatie in de eurozone" (Lessons from seven years of stagnation in the Eurozone). Retrieved from: www.cpb.nl/publicatie/lessen-uit-zeven-jaar-stagnatie-in-de-eurozone.

CPB (2015). "Een wereld zonder banken? Marktfinanciering en bankfinanciering in perspectief" (A world without banks? Market financing and bank financing in perspective)

Retrieved from: www.cpb.nl/publicatie/een-wereld-zonder-banken-marktfinanciering-en-bankfinanciering-in-perspectief.

CPB (2016). "De flexibele schil van de Nederlandse arbeidsmarkt: een analyse op basis van microdata" (The flexible peel of the Dutch labour market: an analysis based on microdata). Retrieved from: https://www.cpb.nl/publicatie/de-flexibele-schil-van-de-nederlandse-arbeidsmarkt-een-analyse-op-basis-van-microdata.

CPB (2016). "Evidence on macroeconomic and sectoral productivity performance". Retrieved from: https://www.cpb.nl/en/publication/evidence-on-dutch-macroeconomic-and-sectoral-productivity-performance-some-stylised-facts.

CPB (2016). "Flexibiliteit op de arbeidsmarkt" (Flexibility on the labour market). Retrieved from: https://www.cpb.nl/publicatie/flexibiliteit-op-de-arbeidsmarkt.

CPB (2016). "Kansrijk innovatiebeleid" (Promising innovation policy). Retrieved from: https://www.cpb.nl/publicatie/kansrijk-innovatiebeleid.

CPB (2016). "Policy brief 2016/14". Retrieved from: https://www.cpb.nl/publicatie/flexibiliteit-op-de-arbeidsmarkt.

CPB (2017), "Productivity Slowdown - Evidence for the Netherlands". Retrieved from: https://www.cpb.nl/en/publication/productivity-slowdown-evidence-for-the-netherlands.

CPB (2018). "Eenverdieners onder druk" (Single earners under pressure). Retrieved from: https://www.cpb.nl/publicatie/eenverdieners-onder-druk.

CPB (2018). "Macro-economische verkenning" (Macroeconomic reconnaissance). Retrieved from: https://www.cpb.nl/publicatie/macro-economische-verkenning-mev-2018.

CPB (2018), "Frontier firms and followers in the Netherlands - Estimating productivity and identifying the frontier", CPB Background Document, July 2018.

Deuten, J. (2015). *Rathenau Instituut* "R&D goes global: Policy implications for the Netherlands as a knowledge region in a global perspective". Retrieved from: https://www.rathenau.nl/nl/kennisecosysteem/rd-gaat-internationaal.

Dialogic (2015). "Evaluatie innovatiebox 2010-2012" (Evaluation innovation box 2010-2012). Retrieved from: https://www.rijksoverheid.nl/documenten/kamerstukken/2016/02/19/evaluatie-innovatiebox-2010-2012.

DNB & AFM (2016). "Meer ruimte voor innovatie in de financiële sector" (More room for innovation in the financial sector). Retrieved from: https://www.dnb.nl/nieuws/dnb-nieuwsbrieven/nieuwsbrief-banken/nieuwsbrief-banken-juli-2016/index.jsp#.

DNB (2017). "Jaarverslag 2016" (Annual report 2016). Retrieved from: https://www.dnb.nl/nieuws/publicaties-dnb/jaarverslag/index.jsp.

DNB (2018). "Jaarverslag 2017" (Annual report 2017). Retrieved from: https://www.dnb.nl/nieuws/publicaties-dnb/jaarverslag/index.jsp.

ECN (2017). "Nationale Energieverkenning 2017" (National energy exploration 2017) p. 12. Retrieved from: http://www.pbl.nl/publicaties/nationale-energieverkenning-2017.

Elsevier (2018). "Quantitative analysis of research and innovation in key technologies in the Netherlands". Retrieved from: https://www.elsevier.com/research-intelligence/resource-library/quantitative-analysis-of-dutch-research-and-innovation-in-key-technologies.

Euronext (2014). News article, 9 April 2014, "Euronext bouwt Alternext Amsterdam af" (Euronext reduces Alternext Amsterdam). Retrieved from: https://www.euronext.com/nl/nieuws/euronext-bouwt-alternext-amsterdam-af.

European Commission (2016). "2016 SBA Fact Sheet — Netherlands". Retrieved from: https://ec.europa.eu/docsroom/documents/22382/attachments/26/translations.

European Commission (2018). "European Innovation Scoreboard 2018". Retrieved from: https://ec.europa.eu/docsroom/documents/30693.

European Commission (2018). Press release, 22 June 2018 "European Innovation Scoreboard 2018: Europe must deepen its innovation edge". Retrieved from: http://europa.eu/rapid/press-release_IP-18-4223_en.htm.

Eurostat (2018). "EU-28 exports, imports and trade balance in cars, 2002-2017". Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_trade_in_cars.

Eurostat (2018). "EU-28 exports, imports and trade balance in medicinal and pharmaceutical products, 2002-2017". Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php/International_trade_in_medicinal_and_pharmaceutical_products.

Garicano, L., C. Lelarge, and J. Van Reenen (2016). "Firm Size Distortions and the Productivity Distribution: Evidence from France." American Economic Review, 106 (11): 3439-79.

Gu, L. (2016), Product market competition, R&D investment, and stock returns, Journal of Financial Economics, Vol. 119, Issue 2, February 2016, 441-455.

Hirsch, B. and S. Mueller (2012), The Productivity Effect of Temporary Agency Work: Evidence from German Panel Data, The Economic Journal, Vol. 122, Issue562, August 2012, F216-F235.

Huizen van, T.M. & Akgündüz, Y.E. (2015). "De invloed van de baanmatch op trainingskansen flexwerkers" (The effect of the job match on the training chances of flexiworkers).

IMD (2018). "World Competitiveness Yearbook 2018". Retrieved from: https://www.imd.org/globalassets/wcc/docs/release-2018/one-year-change-2-columns.pdf.

IMF (2018). Press release, 28 February 2018 "Kingdom of the Netherlands: Concluding Statement of the 2018 Article IV Consultation". Retrieved from: www.imf.org/en/News/Articles/2018/02/28/ms022818-kingdom-of-the-netherlands-concluding-statement-of-the-2018-article-iv-consultation.

Kan, R. (2014). "Flexibel hoger onderwijs voor volwassenen – Adviesrapport" (Flexible higher education for adults – Advice report). Retrieved from: https://www.rijksoverheid.nl/documenten/rapporten/2014/03/12/flexibel-hoger-onderwijs-voor-volwassenen.

Kleinknecht, A., F.N. van Schaik and H. Zhou (2014), "Is flexible labour good for innovation? Evidence from firm-level data", Cambridge Journal of Economics 2014, 38, 1207-1219.

Kwink Groep (2016). "Evaluatie Energieakkoord voor duurzame groei" (Evaluation energy agreement for sustainable growth). Retrieved from: https://www.rijksoverheid.nl/documenten/rapporten/2016/10/14/evaluatie-energieakkoord-voor-duurzame-groei.

Ministries of Economic Affairs, and Finance (2017). Letter to parliament, 2 June 2017 "European Semester 2017".

Ministry of Economic Affairs and Climate (2014). "Aanvullend actieplan MKB-financiering" (Supplementary Action plan SME financing).

Ministry of Economic Affairs and Climate (2016). "Energieagenda – Naar een CO2-arme energievoorziening" (Energy agenda – Towards a low-CO2 emitting energy system). Retrieved from: https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/documenten/rapporten/2016/12/07/ea.

Ministry of Economic Affairs and Climate (2016). "Uitwerking aanvullend Actieplan MKB-financiering" (Implementation supplementary Action plan SME financing). Retrieved from: https://www.rijksoverheid.nl/documenten/kamerstukken/2016/12/06/kamerbrief-uitwerking-aanvullend-actieplan-mkb-financiering.

Ministry of Economic Affairs and Climate (2017). Letter to parliament, "Recente ontwikkelingen in de mkb-financieringsmarkt" (Recent developments in the SME financing market). Retrieved from: https://www.rijksoverheid.nl/documenten/kamerstukken/2017/05/09/kamerbrief-recente-ontwikkelingen-in-de-mkb-financieringsmarkt.

Ministry of Economic Affairs and Climate (2018). "Towards mission driven innovation policy and impact".

Ministry of Economic Affairs and Climate (2018). "Voorstel voor hoofdlijnen van het klimaatakkoord" (Outline of the Climate and Energy Agreement). Retrieved from: https://www.klimaatakkoord.nl/documenten/publicaties/2018/07/10/hoofdlijnen-compleet.

Ministry of Finance (2013). "Kabinetsvisie Nederlandse bankensector" (Cabinet vision on the Dutch banking sector). Retrieved from: https://www.rijksoverheid.nl/documenten/kamerstukken/2013/08/23/kabinetsvisie-nederlandse-bankensector.

Ministry of General Affairs (2018). "Kamerbrief over dividendbelasting" (Letter to Parliament on dividend tax). Retrieved from: https://www.rijksoverheid.nl/documenten/kamerstukken/2018/04/24/kamerbrief-over-dividendbelasting.

Ministry of Interior and Kingdom Relations et al (2018). "Nationale woonagenda" (national housing agenda). Retrieved from: https://www.rijksoverheid.nl/documenten/publicaties/2018/05/23/nationale-woonagenda-2018-2021.

Nielen S. (2016). "Temporary Agency Work and Firm Competitiveness: Evidence from German Manufacturing Firms". In: Trade Credit and Temporary Employment. Contributions to Management Science. Springer, Cham.

NMa (2009). "Rekening-courantkredietverlening aan het MKB" (Credit facilitation to SMEs"). Retrieved from: https://www.acm.nl/nl/publicaties/publicatie/6832/Rekening-courantkredietverlening-aan-MKB.

NU.nl (2016). News article, 7 January 2016, "Qredits krijgt toegezegde lening van Europese Investeringsbank" (Qredits granted loan from European Investment Bank). Retrieved from: https://www.nu.nl/ondernemen/4193603/qredits-krijgt-toegezegde-lening-van-europese-investeringsbank.html.

OECD (2018). "Economic Survey 2018". Retrieved from: http://www.oecd.org/eco/surveys/.

Panteia (2017). "Finance monitor".

PBL (2018). "Kosten energie- en klimaattransitie in 2030 – update 2018" (Costs of energy- and climate transition in 2030 – update 2018). Retrieved from: https://www.rijksoverheid.nl/documenten/rapporten/2018/03/28/kosten-energie-en-klimaattransitie-in-2030-update-2018.

Qredits (2017). "Sociaal Jaarverslag 2017" (Social annual report 2017). Retrieved from: https://cdn.qredits.nl/shared/files/documents/pdf/sociaal-jaarverslag-def.pdf.

Raad van State (2016). Press release, 20 September 2016 "Structurele hervormingen blijven nodig en zijn urgent" (Structural reforms remain necessary and are urgent). Retrieved from: www.raadvanstate.nl/pers/persberichten/tekst-persbericht.html?id=980.

Rao, N. (2016). "Do tax credits stimulate R&D spending? The effect of the R&D tax credit in its first decade", Journal of Public Economics, Vol. 140, August 2016, 1-12.

Rodríguez, A. and M. J. Nieto (2016). "Does R&D offshoring lead to SME growth? Different governance modes and the mediating role of innovation", Strategic Management Journal, Vol. 37, Issue8, August 2016, 1734-1753.

SEO (2016). "Evaluatie microfinanciering" (Evaluation micro financing). Retrieved from: http://www.seo.nl/pagina/article/evaluatie-microfinanciering/.

SEO (2017). "Tussenevaluatie sectorplannen 2017" (Interime evaluation sector plans 2017). Retrieved from: https://www.rijksoverheid.nl/regering/bewindspersonen/wouter-koolmees/documenten/rapporten/2017/12/12/tussenevaluatie-sectorplannen-2017.

Stuurgroep Kredietverlening (2012). "Kredietverlening aan het MKB" (Credit facilities to SMEs).

Tweede Kamer der Staten-Generaal. (2017, 2016, 2015 & 2014). "Evaluatie Wet werk en zekerheid" (Evaluation work and security Act).

Tweede Kamer der Staten-Generaal (2017). "Uitvoering en evaluatie Participatiewet" (Implementation and evaluation Participation Act). Kamerstuk 34352 nr. 60.

UWV (2017). "Tekort aan vakmensen houdt nog jaren aan" (Shortage of professionals will continue for years). Retrieved from: https://www.uwv.nl/overuwv/pers/persberichten/2017/tekort-aan-vakmensen-houdt-nog-jaren-aan.aspx.

UWV (2018). "Technische beroepen – factsheet arbeidsmarkt" (Technical employments – factsheet labour market). Retrieved from: www.werk.nl/xpsimage/wdo222551.

VNO NCW (2017). Press release, 29 March 2017 "MKB Nederland, LTO Nederland" (SME Netherlands, LTO Netherlands). Retrieved from: https://www.vno-ncw.nl/brieven-en-commentaren/inbreng-voor-de-kabinetsformatie-2017-brief-aan-de-informateur-mw-schippers.

VVD, CDA, D66 & ChristenUnie (2017). "Regeerakkoord 2017 - Vertrouwen in de toekomst" (Coalition agreement 2017 - Faith in the future). Retrieved from: www.kabinetsformatie2017.nl/documenten/publicaties/2017/10/10/regeerakkoord-vertrouwen-in-de-toekomst.

Witteman, J. (2014). News article, 10 April 2014, *de Volkskrant*, "Euronext Amsterdam sluit 'babybeurs' Alternext" (Euronext Amsterdam closes Alternext exchange). Retrieved from: https://www.volkskrant.nl/nieuws-achtergrond/euronext-amsterdam-sluit-babybeurs-alternext~b0e02d04/.

World Economic Forum (2015). "The Global Competitiveness Report 2015-16". Retrieved from: http://reports.weforum.org/global-competitiveness-report-2015-2016/methodology/.

World Economic Forum (2017). "The Global Competitiveness Report 2017-2018". Retrieved from: http://reports.weforum.org/global-competitiveness-index-2017-2018/.

Annex C: Thematic factsheets

N.B. These thematic factsheets are presented in a separate document.

Annex D: Data report

N.B. The data report is presented in a separate document.

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- one copy:
  via EU Bookshop (http://bookshop.europa.eu);

- more than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries
  (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm)
  or calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- via EU Bookshop (http://bookshop.europa.eu).

[Catalogue number]

Publications Office

doi:[number]