Economic Policy Council Report
2017

Preface

The Economic Policy Council was established in January 2014 to provide independent evaluation of economic policies in Finland. According to the government decree (61/2014) the council should evaluate:

1. the appropriateness of economic policy goals;

2. whether the goals have been achieved and whether the means to achieve the policy goals have been appropriate;

3. the quality of the forecasting and assessment methods used in policy planning;

4. coordination of different aspects of economic policy and how they relate to other social policies;

5. the success of economic policy, especially with respect to economic growth and stability, employment and the long-term sustainability of public finances;

6. the appropriateness of economic policy institutions.

The members of the Council are appointed by the government for a five-year term based on a proposal by economics departments of Finnish universities and the Academy of Finland. The Council members participate in the work of the Council in addition to their regular duties. The Council is hosted by the VATT Institute for Economic Research.

This is the fourth report of the Economic Policy Council. In this report we first evaluate the government's fiscal policy and its long-term sustainability. In this context we also comment on the implications of the social and health

care reform for fiscal sustainability. As in the previous reports, in addition to fiscal policy, the Council concentrates on selected key issues. This year we have chosen to evaluate in more detail education and innovation policies. We discuss issues related trends in education level concentrating on policies related to those without secondary education and on policies related to university-level education. We also address the effects of recent policy decisions, particularly related to the reforms of vocational education, university admission systems and research funding.

Evaluation of the social and health care reform and the regional reform are left to the last report of the current Council. By then the details of the reforms should be sufficiently clear and their evaluation easier.

The Economic Policy Council has resources to commission research projects to support its work. These reports are published as attachments to the Council report, but the authors of the reports are responsible of their content. Any opinions expressed in them may or may not be in agreement with the Council views.

Seven background reports are published in connection with this Council report. Ludger Woessmann from the University of Munich compares vocational and general education based on international experiences and experiences from the German apprenticeship system. Allan Seuri from the Council secretariat and Hannu Vartiainen from the University of Helsinki evaluate the funding system of the Finnish universities. Tuomas Takalo from the Bank of Finland and Otto Toivanen from Aalto University write a report on the Finnish innovation policy. Ilpo Kauppinen and Olli Ropponen from the VATT Institute for Economic Research discuss taxation and migration. Roope Uusitalo and Allan Seuri from the Council and Hanna Virtanen from ETLA evaluate the potential benefits of extending compulsory schooling age up to 18. Aleksi Kalenius from the Finnish Delegation to the OECD compares the developments in the Finnish education level to the other OECD countries. Jani-Petteri Ollikainen from the secretariat evaluates the effects of vocational school reform.

Several experts have attended Council meetings, contributed to the parts of the report or commented the text. We thank Mika Tammilehto and Jukka Haapamäki from the Ministry of Education and Culture, Hannu Karhunen from the Labour Institute of Economic Research, Jukka Rantala of the Finnish Centre for Pensions, Anu Räisänen of the Finnish education evaluation

centre. We would also like to thank Veliarvo Tamminen and Ilari Ahola of the Ministry of Finance and Henna Laasonen of the Statistics Finland for patiently responding to several detailed questions by the Council. Jani-Petteri Ollikainen has been a competent research assistant for the Council. We also thank former member of the Council Jukka Pirttilä (University of Tampere) for his inputs to this report. We are also thankful to Tiina Heinilä, Päivi Tainio, Marjo Nyberg, Raija-Liisa Aalto, Riitta Kajander and Anita Niskanen of VATT for their help in administration and communication.

The report is published in English which is the working language of the Council. A Finnish summary is attached to the report. The report will be translated to Finnish and the Finnish language version will be published during the spring.

The resources of the Council were increased in the 2017 budget and we now have a secretariat consisting of two full-time economists. We hope that the increased resources will show up as an improvement in the quality of the report. Past reports of the Council have been widely discussed in the media. Promoting domestic economic policy discussion is one of the key tasks of the Council and we hope that also this report will generate lively discussion on the economic policies implemented by the government.

Helsinki, 23rd of January 2018

Roope Uusitalo
Chairman

Mikko Puhakka
Vice-Chairman

Torben M. Andersen

Anneli Anttonen

Kaisa Kotakorpi

Seppo Orjasniemi
Secretary General

Allan Seuri
Researcher

Contents

1. Summary

1.1. Fiscal policy should adapt to improved economic outlook

Growth has finally picked up and the Finnish economy has recovered from the recession that started with the financial crisis in 2008. According to the most recent forecasts, GDP grew by about 3% in 2017. The Ministry of Finance December forecast predicts GDP growth of 2.4% in 2018. According to most estimates, the output gap has already closed or will close in 2018 and production has reached its potential level.

As a consequence, employment increased by 80,000 persons from November 2016 to November 2017 and the unemployment rate is decreasing. In November 2017 the seasonally adjusted employment rate of the population aged between 15 and 64 was 70.4%. According to current forecasts, the employment rate will be 70.7% at the end of the government's term in 2019.

The government target for the employment rate is 72% by 2019. Reaching this target would require some 45,000 additional jobs. While positive and negative surprises may happen and economic forecasts are always uncertain, it is unlikely that this target will be reached without new policy initiatives. Taking into account the uncertainty of employment forecasts, measured by the distribution of past prediction errors, the likelihood that the government will reach its employment target is currently about 16%.

Compared to the dismal economic performance in the wake of the financial crisis, the revival of growth is good news. However, the long-run growth prospects of the economy are still only modest. The current upturn is cyclical and is expected to end after 2018. A typical estimate for the long-run growth rate of the Finnish economy is between 1% and 1.5%. The seasonally

adjusted unemployment rate is still 8.2% and the prolonged crisis has increased the fraction of the long-term unemployed. Currently 34% of the unemployed have been without work for more than a year. Government debt has increased rapidly over the past 10 years and is now about 61% of GDP. General government has been running deficits since 2009, and despite the faster economic growth the deficits are predicted to remain above 1% of GDP until the end of the government's term.

The upturn has been stronger than predicted by forecasts published as late as in the spring of 2017, emphasizing the difficulty in forecasting cyclical variations and in particular forecasting the turning points of the business cycle. However, uncertainty is a natural feature of forecasts. This uncertainly should be taken into account in interpreting forecasts and in using forecasts in policy planning. The Council encourages organizations that publish economic forecasts to report the confidence intervals or standard errors of their forecasts. Such a practice would both display the uncertainty attached to point estimates and, in the long term, increase the accountability of forecasters. Understanding the uncertainty of economic forecasts is also essential in the planning of prudent fiscal policy.

The change in the business cycle situation stresses the difficulties in fine-tuning economic policies to stabilize the economy. There are risks that counter-cyclical fiscal policies implemented to enhance domestic demand become pro-cyclical when economic growth becomes faster than expected.

The government's economic programme was formulated on the premise that the business cycle situation would gradually improve. The strength of the recovery and the associated improvement in government finances has been a surprise to forecasters. The overall stance of fiscal policy has not been changed accordingly. If anything, fiscal policy has become looser over the government's term in office.

The fiscal policy stance has changed from expenditure consolidation combined with a commitment not to increase the tax/GDP ratio to expenditure consolidation combined with a loosening on the revenue side. The tax reductions increase the deficit and require larger expenditure cuts in future than would otherwise be necessary to ensure fiscal sustainability.

1.2. Fiscal policy targets will not be reached

The key economic policy targets listed in the government's programme are to increase employment and to stabilize the public debt. At the beginning of its term the government stated that living on debt will be brought to an end in 2021. This loose statement can be interpreted in several different ways. The general government fiscal plan published in September 2015 defines more explicit fiscal targets. According to this plan, the government aims to reduce the structural deficit to 0.5% of GDP, reducing the central government and local government deficits to 0.5% of GDP and keeping the pension system surplus at 1% of GDP.

The medium-term objective for the structural deficit is also one of the requirements that Finland has agreed to as part of the EU fiscal compact. This structural deficit target is set at 0.5% of GDP. In the general government fiscal plan, the government now also presents an adjustment plan that would eventually ensure that the medium-term objective for the structural deficit is met. According to this plan, the government will implement gradually tightening fiscal policy in 2018 and in 2019.

However, according to the latest forecasts, the government is unlikely to meet these deficit targets. While the tax base is growing at an exceptional pace, the central government deficit remains large.

The government has complied with the central government spending limits, the growth in general government expenditures has decelerated and the share of general government expenditure relative to GDP is forecast to decrease in 2017-2019. However, the tax cuts in 2017, 2018 and 2020 will affect revenues and the budget balance adversely. Altogether, the discretionary tax policy decisions in 2015-2017 imply a loss of EUR 1.1 billion of tax revenues (measured in static terms). In December 2017 the Ministry of Finance forecast that general government finances should improve by EUR 1.9 billion by 2019 in order to reach the nominal deficit target.

The medium-term objective for the structural balance applies to general government net lending, corrected for cyclical and one-off events. By definition, the recent improvement in the nominal net lending figures due to the economic recovery does not lead to improvements in the structural balance. The structural imbalance between general government revenues and expenditures needs to be corrected at some point.

In 2015-2016 fiscal policy had to be balanced between the short-run concerns for activity and the medium-run problem of addressing the fiscal sustainability problem. The change in the business cycle situation has removed this dilemma. Fiscal policy should not be expansionary in the current business cycle situation, and there is a need for reforms which reduce the structural budget deficit and addresses the sustainability problem.

1.3.　　 Public finances are still unsustainable

In its programme, the government also announces that it will initiate measures to close the sustainability gap, which is currently estimated to require a permanent budget improvement of about 3% of GDP. In addition to measures aiming at promoting growth and employment and direct cuts in spending, a key part of the plan is to reduce expenditures by EUR 3 billion by reforming the social and health care sector. The potential effects of the social and health care reform will be discussed in more detail in the Council's next report. This report considers some of the public finance implications of the reform.

While the government has followed its expenditure consolidation programme, the reduction in taxes has kept the structural deficit rather large. More consolidation measures will be needed to close the sustainability gap by 2021. As age-related expenditures are projected to increase in future decades, general government debt is set to increase and net financial wealth will decline from its current level.

Public debt makes up only a relatively small share of total government liabilities. Pension liabilities constitute a much larger burden for the public sector than the headline public debt. Public debt is also smaller than public assets. Hence, focusing on public debt provides an overly narrow view of the financial situation of the public sector. General government net worth, i.e. net financial wealth less the present value of liabilities, is a more comprehensive measure of government fiscal position. The difference in the present value of expected future expenditures and expected future revenues, ie. the sustainability gap, is even better measure as it captures changes in expenditures that can be forecast with reasonable accuracy.

Closing the sustainability gap is one of the motivations for the health care reform. However, another key objective of the reform is to make health care

provision more demand-driven, which works actively against any expenditure reductions. Resolving the conflicting objectives would require efficiency improvements beyond the EUR 3 billion, or the 1.5% percentage points of the sustainability gap, savings target. This is a very ambitious target.

Currently, the plans for the social and health care reform do not adequately pinpoint the mechanisms by which the proposal would result in the planned expenditure reductions, without leading to negative effects on health care quality, or without affecting other budget items. The regional reform moves social and health care spending inside the central government spending limits. If the social and health care reform does not lead to the planned savings, health care expenditure will crowd out other central government spending items or lead to a breach of the spending limit framework.

Furthermore, some elements of the freedom of choice reform in health care are more likely to increase than decrease expenditure. The proposed system features a risk of overprovision to certain population groups. Common pool problems imply that providers face incentives to shift costs from primary to special health care, or from the county to the national level.

Further, consequences of increased reliance on private providers in a publicly funded healthcare system have not been adequately analyzed. Obtaining desirable outcomes regarding costs and healthcare quality within the new system hinges on whether the compensation system for providers succeeds in aligning the objectives of providers with the goals of the reform. Further, the role of occupational health care in the new system needs to be discussed and resolved. Overall, it is currently highly uncertain whether the social and health care reform will produce savings for the public sector.

1.4. Student intake in higher education should be expanded

The Finnish education system expanded rapidly until the turn of the century. The number of new students at Finnish universities increased by 60% between 1985 and 2000. In addition, polytechnics were created from the old vocational colleges in the 1990s and by 2000 they produced more graduates than the old universities. The education level increased rapidly, also at the lower end of the education distribution. The share of young people leaving school with no qualifications decreased substantially in the 1990s.

The expansion of the education system has largely ended after 2000. The number of new students at universities has decreased and the fraction of birth cohorts attending university has declined. At the same time the test scores of Finnish students in international comparisons are declining and the fraction of young people leaving school without any qualifications beyond comprehensive school has increased.

Education is still a highly profitable investment in Finland – both privately and socially - and there are no signs of a decline in the returns on education. Changes in working life driven by technological change and globalization are likely to further increase the demand for skills in the future. The Council therefore recommends that the government implements policies aiming to reverse the decline in educational achievement and to improve education at all levels. The number of students completing university degrees should increase and the number of students leaving school without secondary schooling should decrease.

The Council endorses several specific policy reforms in education. Lowering day care fees may increase participation in early education. The vocational education reform will make vocational education more practical and, it is to be hoped, more useful and motivating for students. University admission reform stands a good chance of making the admission system more effective and reducing the years spent queuing for university education.

However, there are some causes for concern related to these education policies. The main goal of lowering fees in early education is to improve incentives to work and thereby to increase employment. The policy may well succeed in that, but it is unlikely to increase participation rates for the most vulnerable groups since they face no changes in incentives as low income families are paying zero fees already. Making vocational education more practical carries the risk of putting less weight on developing the general skills that are necessary if vocational school graduates intend to pursue further studies in polytechnics or universities. General skills may also be in high demand when changes in working life require retraining in the future. Increasing the efficiency of the university admission system will be necessary, but the main instrument by which the government can affect the education level is the degree targets set in negotiations with universities. Without an increase in these targets, and the funding associated with the targets, the government is unlikely to reach the goals it has set in its Vision 2030 for higher education.

1.5. Public R&D funding has decreased, with increased strategic steering

The government has cut funding to higher education and R&D. While these budget cuts have contributed to consolidating public finances, they may have adverse effects on productivity in the long run.

R&D expenditures as a share of GDP increased until 2010 but declined after that. Public funding for R&D as a share of total government expenditures levelled off around year 2005, and started to decline from 2010 onwards.

Cuts to R&D subsidies have probably reduced R&D activity. However, the rationale for these types of subsidies is weaker in a small open economy such as Finland than in larger countries, as the positive spillovers to a large extent accrue to foreign firms and consumers.

The current government has implemented changes also to the structure of funding for R&D and innovations. The new strategic research funding programme has resulted in a considerable reallocation of funds between different public research institutes, and between research institutes and universities. This programme, together with the funding programme to promote university profiling and sector-specific programmes by Tekes, contain an element of increased governmental guidance of research funding. The high application costs associated with large-scale competitive funding programmes have to be properly weighed against the expected benefits.

The Council agrees with the aim of increasing the sizes of research units in the university sector through a trend towards greater profiling of research activities. The government should not rely only on the university funding system to achieve this goal. The funding system provides incentives for individual universities to increase their productivity. Such high-powered incentives may, however, also produce undesired effects, for example an unbalanced development between different fields of research. On the whole, structural change within the university sector requires coordination and also discretionary measures.

International migration affects the availability of highly skilled labour and therefore the innovative potential of a country. The extent and pattern of emigration from Finland appears comparable to other European countries. Like other countries with relatively low income inequality, emigrants from

Finland tend to be positively selected, i.e. they have relatively high income and education. However, it is unclear to what extent migration decisions are affected by differences in taxation between countries, as good quality-empirical evidence is very limited. There appears to be no clear reason at present change tax policy based on concerns about emigration, but rather to target foreign experts with favourable tax treatment.

1.   Yhteenveto

1.1.   Finanssipolitiikan tulisi sopeutua muuttuneeseen talousnäkymään

Suomen talous on elpynyt finanssikriisistä vuonna 2008 alkaneesta taantumasta ja kääntynyt jälleen kasvuun. Tuoreimpien ennusteiden mukaan BKT kasvoi noin 3 prosenttia vuonna 2017. Valtiovarainministeriön joulukuun ennusteen mukaan kasvu jatkuu ja BKT kasvaa 2,4 prosenttia vuonna 2018. Useimpien arvioiden mukaan tuotantokuilu umpeutuu vuonna 2018, ja tuotanto on saavuttanut tämänhetkisen potentiaalinsa.

Kasvun myötä työllisyys kasvoi 80 000 henkilöllä marraskuusta 2016 marraskuuhun 2017 ja työttömyysaste pienenee. Marraskuussa 2017 15–64-vuotiaiden kausitasoitettu työllisyysaste oli 70,4 prosenttia. Nykyisten ennusteiden mukaan hallituskauden lopussa vuonna 2019 työllisyysaste on hieman alle 71 prosenttia.

Hallitus tavoittelee työllisyysasteen nostoa 72 prosenttiin vuoteen 2019 mennessä. Tavoitteen saavuttaminen edellyttäisi noin 45 000 uutta työpaikkaa. Ennusteiden perusteella on epätodennäköistä, että tämä tavoite saavutetaan ilman uusia toimenpiteitä. Aikaisempien ennustevirheiden jakauman perusteella voidaan arvioida, että työllisyystavoite saavutetaan noin 16 prosentin todennäköisyydellä.

Rahoituskriisin jälkeisen taantuman jälkeen kasvun elpyminen on hyvä uutinen. Talouden pitkän aikavälin kasvunäkymät ovat kuitenkin edelleen vaatimattomia. Nykyinen nopea kasvuvauhti on suhdannesyklin normaali ilmiö, ja kasvun odotetaan hidastuvan vuoden 2018 jälkeen. Tyypillinen arvio Suomen talouden pitkän aikavälin vuotuisesta kasvuvauhdista on 1–1,5 prosenttia. Kausitasoitettu työttömyysaste on edelleen 8,2 prosenttia, ja pitkit-

tynyt kriisi on lisännyt pitkäaikaistyöttömien määrää. Tällä hetkellä 34 prosenttia työttömistä on ollut vailla työtä yli vuoden. Julkinen velka on kasvanut nopeasti kymmenen viime vuoden aikana ja on nyt noin 61 prosenttia suhteessa BKT:seen. Julkisyhteisöjen rahoitusasema on ollut alijäämäinen vuodesta 2009 lähtien, ja nopeammasta talouskasvusta huolimatta julkisen sektorin alijäämän ennustetaan pysyvän yli 1 prosentissa suhteessa BKT:seen hallituskauden loppuun asti.

Talouskasvu on ollut voimakkaampaa kuin vielä keväällä 2017 julkaistuissa ennusteissa ennakoitiin. Talouskuvan nopea muuttuminen korostaa suhdannevaihteluiden ja erityisesti suhdannekierron käännekohtien ennustamisen vaikeutta. Epävarmuus on kuitenkin ennusteiden luonnollinen piirre, joka olisi otettava huomioon ennusteiden tulkitsemisessa ja käytettäessä ennusteita talouspolitiikan suunnitteluun. Arviointineuvosto kannustaa talousennustajia raportoimaan ennusteidensa luottamusvälit. Tällainen käytäntö muistuttaisi ennusteiden käyttäjiä kasvuennusteisiin liittyvästä epävarmuudesta ja helpottaisi ennusteiden osuvuuden arviointia. Taloudellisten ennusteiden epävarmuuden ymmärtäminen on tärkeää myös finanssipolitiikan suunnittelussa.

Suhdannekuvan nopea muutos korostaa vastasyklisen talouspolitiikan suunnittelun ja ajoittamisen vaikeutta. On olemassa vaara, että kotimaisen kysynnän kohentamiseen tähtäävä elvyttävä suhdannepolitiikka vaikuttaa vasta kun talous jo kasvaa. Hallituksen talouspoliittisen ohjelman taustalla oli odotus talouskasvun hitaasta elpymisestä kohti pitkän aikavälin kasvuvauhtia. Ulkoisen kysynnän kasvun aloittaman elpymisen voimakkuus ja siihen liittyvä julkisen talouden kohentuminen ovat tulleet yllätyksenä. Finanssipolitiikan yleistä viritystä ei ole kuitenkaan muutettu vastaamaan muuttunutta suhdannekuvaa. Tämän sijaan veropolitiikasta on tullut kaiken kaikkiaan keventävää hallituksen toimikauden aikana.

Hallituskauden alussa finanssipolitiikkaa määrittivät menojen kasvun vakauttaminen ja sitoumus olla nostamatta veroastetta. Hallitus on pitänyt kiinni päätöksistä menojen vakauttamiseksi, mutta keventänyt verotusta huomattavasti. Julkisen talouden kestävyyden kannalta verotuksen keventäminen on ongelmallista ja lisää tarvetta julkisen talouden vakautukselle tulevaisuudessa.

1.2. Finanssipoliittisia tavoitteita ei saavuteta

Hallituksen ohjelmassa luetellut keskeiset talouspoliittiset tavoitteet ovat työllisyyden lisääminen ja julkisen talouden vakauttaminen. Hallitus totesi toimikautensa alussa, että velaksi eläminen loppuu vuoteen 2021 mennessä. Tätä tavoitetta voidaan tulkita monin eri tavoin. Syyskuussa 2015 julkaistussa julkisen talouden suunnitelmassa määritellään tarkemmin julkisen talouden rahoitusasemaa koskevat tavoitteet. Suunnitelman mukaan hallitus pyrkii pienentämään rakenteellista alijäämää 0,5 prosenttiin suhteessa BKT:seen, pienentämään valtionhallinnon ja paikallishallinnon vajetta 0,5 prosenttiin suhteessa BKT:seen ja pitämään eläkejärjestelmän ylijäämän yhdessä prosentissa suhteessa BKT:seen.

Keskipitkän aikavälin tavoite rakenteellisen alijäämälle (MTO) on yksi EU:n finanssipoliittisessa sopimuksessa asetetuista vaatimuksista. Hallitus on asettanut rakenteellisen alijäämän tavoitteeksi 0,5 prosenttia suhteessa BKT:seen. Julkisen talouden suunnitelmassa 2018–2021 hallitus esitti myös sopeutussuunnitelman tämän keskipitkän aikavälin tavoitteen saavuttamiseksi. Suunnitelma perustui julkisen talouden asteittaiseen sopeuttamiseen vuosina 2018 ja vuonna 2019.

Viimeisimpien ennusteiden mukaan hallitus ei kuitenkaan täytä asettamiaan alijäämätavoitteita. Vaikka veropohja kasvaa poikkeuksellisen nopeasti, julkisen talouden alijäämä on edelleen suuri.

Hallitus on noudattanut valtiontalouden menokehyksiä. Julkisyhteisöjen menojen kasvu on hidastunut ja julkisyhteisöjen menojen osuuden suhteessa BKT:seen ennustetaan pienenevän vuosina 2017–2019. Vuosille 2017, 2018 ja 2020 päätetyt veronalennukset vaikuttavat kuitenkin julkisen sektorin tuloihin ja heikentävät budjettitasapainoa. Kaiken kaikkiaan harkinnanvaraiset veropoliittiset päätökset vuosina 2015–2017 merkitsevät 1,1 miljardin euron verotulojen menetystä (staattisesti arvioituna). Joulukuussa 2017 valtiovarainministeriö ennusti, että julkisyhteisöjen rahoitusaseman pitäisi kohentua 1,9 miljardilla eurolla vuoteen 2019 mennessä, jotta nimelliselle alijäämälle asetettu tavoite saavutettaisiin.

Rakenteellisen rahoitusaseman keskipitkän aikavälin tavoite perustuu julkisen talouden nettoluotonantoon, josta poistetaan suhdanteiden ja kertaluonteisten toimien vaikutus. Määritelmän mukaan suhdannetilanteesta johtuva nimellisen rahoitusaseman kohentuminen ei johda rakenteellisen tasapai-

non kohentumiseen. Julkisen talouden tulojen ja menojen välinen rakenteellinen epätasapaino on jossain vaiheessa korjattava.

Vuosien 2015–2016 aikana finanssipolitiikan mitoittamisessa jouduttiin tasapainoilemaan kotimaisen kysynnän elvytystarpeen ja keskipitkän aikavälin sopeutustarpeen välillä. Suhdannetilanteen muutos on poistanut tämän dilemman. Nykyisessä taloustilanteessa finanssipolitiikan ei tulisi olla elvyttävää. Sen sijaan pitäisi keskittyä tekemään toimia, jotka pienentävät rakenteellista alijäämää ja parantavat julkisen talouden pitkän aikavälin kestävyyttä.

1.3. Julkinen talous on edelleen kestämättömällä uralla

Hallitusohjelman mukaan hallitus käynnistää toimenpiteitä kestävyysvajeen korjaamiseksi. Tämänhetkisten arvioiden mukaan tämä edellyttäisi julkisen talouden tasapainon kohentamista pysyvästi noin 3 prosentilla suhteessa BKT:seen. Kasvun ja työllisyyden edistämiseen tähtäävien toimien ja menojen välittömän leikkaamisen lisäksi keskeinen osa hallituksen suunnitelmaa on menojen vähentäminen 3 miljardilla eurolla uudistamalla sosiaali- ja terveydenhuoltojärjestelmää. Sote-uudistuksen mahdollisista vaikutuksista keskustellaan yksityiskohtaisemmin neuvoston seuraavassa raportissa. Tässä raportissa tarkastellaan vain joitakin sote-uudistuksen vaikutuksia julkiseen talouteen.

Vaikka hallitus on pitänyt kiinni päättämistään menoleikkauksista, verojen alentaminen on pitänyt rakenteellisen jäämän melko suurena. Kestävyysvajeen kuromiseksi umpeen vuoteen 2021 mennessä tarvittaisiin lisää toimenpiteitä. Koska ikääntymiseen liittyvien menojen arvioidaan kasvavan tulevina vuosikymmeninä, julkisen talouden velka kasvaa ja nettovarallisuus laskee nykyisestä tasosta.

Julkinen bruttovelka muodostaa vain suhteellisen pienen osan valtion vastuiden kokonaismäärästä. Eläkevastuut muodostavat julkiselle sektorille paljon suuremman taakan kuin julkinen velka. Julkinen bruttovelka on myös pienempi kuin julkisen sektorin rahoitusvarallisuus. Näin ollen julkinen velkaantuminen antaa suppean kuvan julkisen sektorin taloudellisesta tilanteesta. Julkisyhteisöjen nettovarallisuus, eli rahoitusvarallisuus vähennettynä vastuiden nykyarvolla, antaa jo kattavamman kuvan julkisyh-

teisöjen taloudellisesta tilanteesta. Tulevien tulojen ja menojen erotuksen nykyarvo, eli kestävyysvaje, on vielä kattavampi mittari, sillä se sisältää arvion ennustettavissa olevasta menojen kasvusta.

Kestävyysvajeen pienentäminen on yksi sote-uudistuksen taustalla olevista motiiveista. Sote-uudistuksen toinen keskeinen tavoite on parantaa terveydenhuoltopalveluiden saatavuutta ja lisätä valinnanvapautta. Tavoite on osittain vastakkainen menosäästötavoitteen kanssa. Näiden ristiriitaisten tavoitteiden yhteensovittaminen edellyttäisi, että tuottavuusparannukset ylittäisivät suunnitellun 3 miljardin euron säästötavoitteen. Asetettu säästötavoite on kuitenkin jo itsessään hyvin kunnianhimoinen.

Hallituksen maakunta- ja sote-uudistuksiin liittyvissä lakiesityksissä ei osoiteta riittävän selkeästi niitä mekanismeja, joiden avulla uudistus johtaisi suunniteltuihin menojen vähennyksiin aiheuttamatta kielteisiä vaikutuksia terveydenhoidon laatuun tai muihin budjetin määrärahoihin. Maakuntauudistus siirtää sosiaali- ja terveydenhuoltomenot valtion kehyssäännön piiriin. Jos sote-uudistus ei johda suunniteltuihin säästöihin, vaarana on, että terveydenhuoltomenot syrjäyttävät muita valtion budjettitalouden menoeriä tai johtavat valtiontalouden kehysmenettelyn heikentymiseen.

Valinnanvapausuudistus sisältää piirteitä, jotka todennäköisesti pikemminkin kasvattavat kuin vähentävät menoja. Ehdotettu järjestelmä sisältää riskin palveluiden ylitarjonnasta joillekin väestöryhmille. Palveluntuottajien kannusteet kustannusten siirtämiseen perusterveydenhuollosta erikoissairaanhoitoon kapitaatiopohjaisessa rahoitusmallissa, sekä maakuntien rahoitukseen liittyvä pehmeän budjettirajoitteen riski, voivat osaltaan vaikeuttaa kustannusten hallintaa. Yksityisen tuotannon osuuden merkittävän kasvattamisen vaikutuksiin julkisesti rahoitetussa terveyspalvelujärjestelmässä ei ole myöskään kiinnitetty riittävästi huomiota. Toivotun kustannuskehityksen saavuttaminen ja terveyspalveluiden laadun varmistaminen uudessa järjestelmässä riippuu siitä, miten hyvin kannustinjärjestelmät onnistuvat yhdenmukaistamaan terveydenhuollon palveluntuottajien tavoitteet uudistuksen tavoitteiden kanssa. Myös työterveyshuollon rooli uudessa järjestelmässä pitäisi ratkaista. Kaiken kaikkiaan on epävarmaa, tuottaako sosiaali- ja terveydenhuoltouudistus säästöjä julkiselle sektorille.

1.4. Korkeakoulutuksen aloituspaikkojen määrää tulisi lisätä

Suomen koulutusjärjestelmä laajeni nopeasti vuosisadan vaihteeseen saakka. Vuosina 1981–2000 suomalaisten yliopistojen uusien opiskelijoiden määrä kasvoi 60 prosenttia. Lisäksi 1990-luvulla luotiin vanhoja opistoasteen kouluja yhdistämällä ammattikorkeakoulujärjestelmä, joka vuoteen 2000 mennessä tuotti enemmän korkeakoulututkinnon suorittaneita kuin vanhat yliopistot. Koulutustaso kasvoi nopeasti myös koulutusjakauman alimmassa päässä. Ilman perusasteen jälkeistä koulutusta jääneiden nuorten osuus väheni merkittävästi 1990-luvulla.

Koulutusjärjestelmän laajeneminen on suurelta osin päättynyt vuoden 2000 jälkeen. Yliopistojen uusien opiskelijoiden määrä on kääntynyt laskuun, ja yliopistossa opiskelevien osuus ikäluokasta alentunut. Samaan aikaan suomalaisten opiskelijoiden tulokset kansainvälisissä vertailuissa ovat laskeneet, ja ilman toisen asteen tutkintoa olevien nuorten osuus kasvanut.

Koulutus on Suomessa edelleen erittäin kannattava investointi - sekä opiskelijalle että yhteiskunnalle - eikä koulutuksen tuottojen pienentymisestä ole näkyvissä merkkejä. Teknologisen kehityksen ja globalisaation mukanaan tuoma työelämän vaatimusten muutos lisää todennäköisesti osaamisen kysyntää myös tulevaisuudessa. Arviointineuvosto suosittaa, että hallitus pyrkii kääntämään koulutustason negatiivisen trendin ja lisäämään koulutusta kaikilla tasoilla. Korkeakoulututkinnon suorittaneiden opiskelijoiden määrän pitäisi kasvaa ja ilman toisen asteen koulutusta jäävien opiskelijoiden määrä tulisi kääntää laskuun.

Arviointineuvosto pitää useita viimeaikaisia koulutuspoliittisia uudistuksia hyvinä. Päivähoitomaksujen alentaminen voi lisätä osallistumista varhaiskasvatukseen. Ammatillisen koulutuksen uudistus voi onnistuessaan tehdä ammatillisesta koulutuksesta käytännönläheisemmän, ja toivottavasti myös opiskelijoille hyödyllisemmän ja motivoivamman. Korkeakoulujen valintakoeuudistuksella on hyvät mahdollisuudet tehdä valintajärjestelmästä tehokkaampi, mikä voi vähentää yliopistokoulutukseen "jonottamiseen" käytettyjen vuosien määrää.

Näihin koulutuspoliittisiin uudistuksiin liittyy kuitenkin joitakin kysymysmerkkejä. Varhaiskasvatusmaksujen alentamisen tärkeimpänä tavoitteena on parantaa kannustimia työntekoon ja siten lisätä työllisyyttä. Tässä mak-

sualennus voi hyvinkin onnistua, mutta se ei todennäköisesti lisää kaikkein heikoimmassa asemassa olevien lasten varhaiskasvatukseen osallistumista, sillä näiden perheiden kannustimet eivät uudistuksessa muutu. Päivähoito on ollut pienituloisille perheille ilmaista jo aiemmin. Ammatillisen koulutuksen muuttumiseen käytännönläheisemmäksi liittyy riski, että yleissivistävien aineiden painoarvo vähenee. Yleissivistävien aineiden tuottamat valmiudet ovat tarpeen, jos ammatillisen koulutuksen suorittaneet haluavat jatkaa opintojaan korkeakouluissa. Tällaisten valmiuksien kysyntä voi myös kasvaa tulevaisuudessa, jos työelämän muutokset edellyttävät uudelleenkouluttautumista. Korkeakoulujen valintajärjestelmän tehokkuuden lisääminen on tarpeen. Tärkein keino, jolla hallitus voi vaikuttaa koulutusmääriin, on kuitenkin korkeakoulujen kanssa käytävissä neuvotteluissa asetettavat tutkintotavoitteet. Ilman tutkintotavoitteita ja niihin liittyvän rahoituksen kasvattamista hallitus tuskin saavuttaa niitä koulutustason kohottamistavoitteita, jotka se on asettanut Visio 2030 -strategiassaan.

1.5. Valtion tutkimusrahoitus on vähentynyt ja strateginen ohjaus voimistunut

Hallitus on vähentänyt korkeakoulutukseen sekä tutkimus- ja kehitystoiminnan tukeen tarkoitettuja resursseja. Leikkaukset ovat osaltaan parantaneet julkisen talouden tasapainoa, mutta niillä saattaa olla epäedullisia vaikutuksia tuottavuuden kasvuun pidemmällä tähtäimellä.

T&K-menot suhteutettuna kokonaistuotantoon kasvoivat vuoteen 2010 asti, mutta ovat sen jälkeen pienentyneet. Julkisen T&K-toimintaan kohdistuvan rahoituksen osuus julkisista menoista tasaantui vuonna 2005, ja alkoi laskea vuoden 2010 jälkeen.

Pienentynyt panostus T&K-tukiin on todennäköisesti vähentänyt T&K-toimintaa. Toisaalta ei ole kovin selkeää syytä sille, että nimenomaan Suomen kaltaisen pienen avotalouden kannattaa tukea T&K toimintaa. Tuen myönteiset vaikutukset valuvat helposti ulkomaisille yrityksille ja ulkomaisille kuluttajille.

Hallitus on myös muuttanut T&K-toimintaan ja innovaatioiden edistämiseen tarkoitetun rahoituksen rakennetta. Uusi strategisen tutkimuksen ohjelma on kohdentanut rahoitusta uudelleen julkisten tutkimuslaitosten välillä ja toisaalta tutkimuslaitosten ja yliopistojen välillä. Tämä yhdessä yliopistojen

voimakkaamman profiloinnin ja TEKESin sektorikohtaisten ohjelmien kanssa on merkinnyt julkisen vallan kasvavaa ohjausta tutkimuksen rahoituksessa. Kilpaillun rahoituksen osuuden kasvamisesta aiheutuu tutkimusorganisaatioille merkittäviä kustannuksia, joita tulisi punnita uudistuksista saatavia odotettuja hyötyjä vasten.

Arviointineuvosto pitää yliopistojen profiloitumista ja yliopistojen tutkimusyksiköiden koon kasvattamista hyvänä kehityssuuntana Pelkästään yliopistojen rahoitusjärjestelmän kautta tapahtuva ohjaus ei kuitenkaan riitä. Rahoitusjärjestelmä kannustaa yliopistoja parantamaan tuottavuuttaan, mutta voimakkaat kannustimet saattavat johtaa myös eri tieteenalojen epätasaiseen kehitykseen. Ylipäätään yliopistojen rakenteellinen muutos vaatii koordinaatiota ja harkinnanvaraisia toimenpiteitä.

Kansainvälinen muuttoliike vaikuttaa korkeakoulutetun työvoiman saatavuuteen ja siten maan innovaatiokykyyn. Maastamuuton laajuus ja muuttajien valikoituminen ovat Suomessa samantyyppisiä kuin muissa Euroopan maissa. Maissa, joissa tulojakauma on suhteellisen tasainen, maastamuuttajat ovat usein hyvätuloisia ja korkeasti koulutettuja. Kunnollisen empiirisen todistusaineiston puuttuessa on kuitenkin epäselvää, miten paljon verotus vaikuttaa muuttopäätöksiin. Suomen tuloverotusta ei ole tällä hetkellä tarpeen muuttaa maastamuuton vuoksi. Sen sijaan ulkomaisten avainhenkilöiden lievempi verokohtelu on järkevä ratkaisu.

2.   Recent economic developments

Over the last few years Finland's economy has been struggling through a period of very slow or non-existent growth. During the last year the situation has dramatically improved. Starting from the third quarter of 2016, annual growth rate has exceeded 2 per cent, and is now about 3 per cent. There are, however, signs that growth will slow down at least somewhat in the near future.

Private investment and net exports have been the main contributing factors to the better performance. The growth in production has increased capacity utilization and labour productivity. The higher level of growth has increased demand for labour, and the employment rate has slowly started to increase. The rate of unemployment, however, has remained high and there still seem to be severe mismatch problems. Also, the labour force participation rates of younger age groups have continued to decline.

Many forecasts anticipate that robust growth will continue in 2018, and at the same time aggregate output is nearing its potential level. The rapid acceleration in growth requires a rethinking of fiscal policy measures, since previously the economic recovery was expected to be slow and continue until 2020. Growth is expected to slow down towards its long-term rate in 2019 and 2020.

The recent upswing was largely unforeseen. While the current consensus view among professional forecasters is that growth will continue, these forecasts do contain a considerable amount of uncertainty.

This Chapter discusses recent economic developments and their implications for the appropriate fiscal policy stance. The change in the economic situation in Finland requires a rethinking fiscal policy, and expansionary policy is inappropriate in the current stage of the business cycle. Fiscal policy decisions and policy targets are discussed in more detail Chapter 3.

2.1.   GDP growth and its components

After four years of low or non-existent growth, Finland's economy started to grow surprisingly fast from the end of 2015. In 2016, real GDP increased by 1.9%, and in the first half of 2017 growth continued at an annual rate of 2.9%. Private consumption and private investment were the main drivers of growth in 2015 and 2016. As private demand has a rather large import share, its growth kept implied that growth in net exports was negative in 2014-2016. Growth in exports accelerated at the beginning of 2017 and as a consequence the growth contribution of net exports became positive. These developments are depicted in Figure 2.1.1. Economic growth is thus broadly based and the private sector's capital stock has started to increase. In the first half of 2017 output was growing in almost all industries. Employment in all the major regions has started to grow also.

Figure 2.1.1: Private investments and net exports the main drivers of growth in 2017
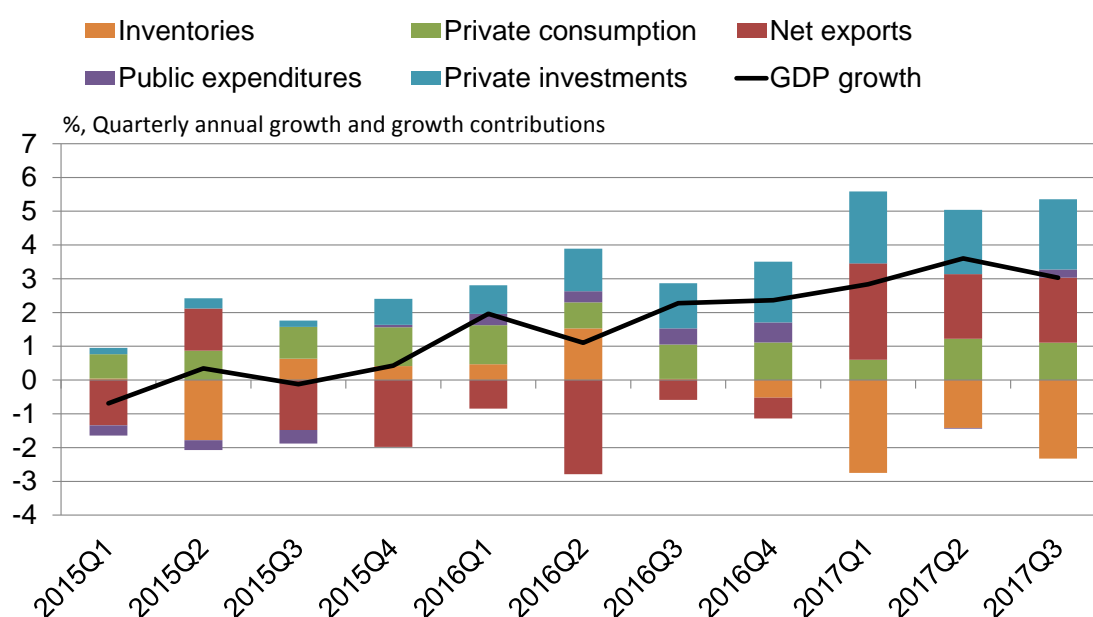
Sources: Statistics Finland and EPC calculations.

The views of forecasting organisations concerning economic growth for 2017-2019 are rather uniform. Growth is forecast to peak in 2017 and to slow down gradually towards its long-term rate. In 2018 the economy is forecast to grow by 2.4% with exports the main source of growth. Despite improving net exports, the current account balance is forecast to remain negative in the near future.

The growth forecasts of various national and international organizations are summarized in Table 2.1.1. The GDP growth rate is expected to decelerate towards a medium-term growth rate of 1.5%. While domestic consumption has supported GDP over the past few years, its growth is forecast to decelerate. In 2016 the household savings ratio turned negative and is forecast to decrease further in 2017-2019. The high level of consumption is partly supported by low interest rates and also by consumer confidence as employment prospects have improved. Possible slower growth in private consumption due to a drop in confidence is one of the main risks for the domestic economy.

Table 2.1.1: Forecast for GDP volume growth rates (per cent)

	2017	2018	2019
Ministry of Finance (19 Dec 2017)	3.1	2.4	1.9
Bank of Finland (18 Dec 2017)	3.1	2.5	1.6
OECD (28 Nov 2017)	3.1	2.5	2.0
European Commission (9 Nov 2017)	3.3	2.7	2.4
IMF (13 Oct 2017)	2.8	2.3	1.8
PTT (26 Sept 2017)	3.0	2.6	
PT (20 Sept 2017)	3.6	2.5	
ETLA (19 Sept 2017)	2.9	2.0	1.8

Figure 2.1.2 decomposes annual GDP growth into growth in employment, hours worked per employee and productivity per hour worked. Growth in productivity per hour worked has been the main driver of GDP growth in 2016-2017, but also the number of employed persons has started to increase. According to the quarterly national accounts, in the first half of 2017 the number of employees grew at an annual rate of 0.9%, while productivity per hour worked increased by 3.2%. The cost competitiveness pact took effect at the beginning of February. One element in the pact was an extension

in annual working hours by 24 hours without additional compensation. The statistics show, however, that hours worked per employee have continued to decline. Similar declining trend in annual working hours per employee is evident in many countries, see Economic Policy Council (2016).

Figure 2.1.2: GDP growth contributions by employment, hours worked by employee and productivity per hour worked
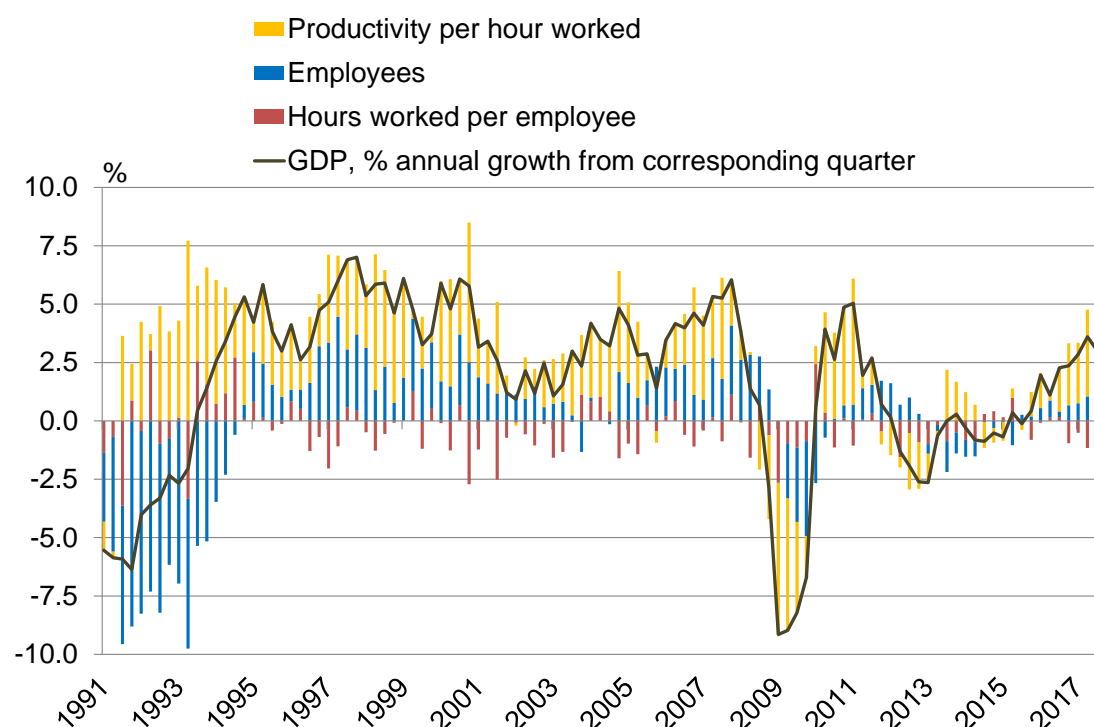

Sources: Quarterly National Accounts, Statistics Finland and EPC calculations.

The working-age population (15-64 year-olds) is decreasing, which will affect economic growth in coming years. If the declining trend in hours worked continues in the near future, potential economic growth will depend on growth in productivity and changes in the employment rate. In 2017 the employment rate for the age group 15-64 has increased by ½ percentage points to slightly above 70%, but it is still about 1.5 percentage points below the peak of 2008 and 2% below the target set by the government.

Any potential increase in the employment rate is also constrained by the labour force participation rate of persons in the prime age bracket (20-64 year-olds) (see Figure 2.1.3). In the first decade of the 2000's the labour force participation rate of this group was on average 78.9%, while in 2017 it reached 80.5% on average. The current level is the highest since 1990. While the labour force participation of prime-aged people has slightly increased

since 2013, there are divergent trends between different age groups; the participation rate of 45-64 year-olds has been increasing since 1989 while the participation rate of 25-44 year-olds has declined since 2008. This decline applies to both men and women.

Figure 2.1.3: Participation rates in different age groups, 12 months moving average
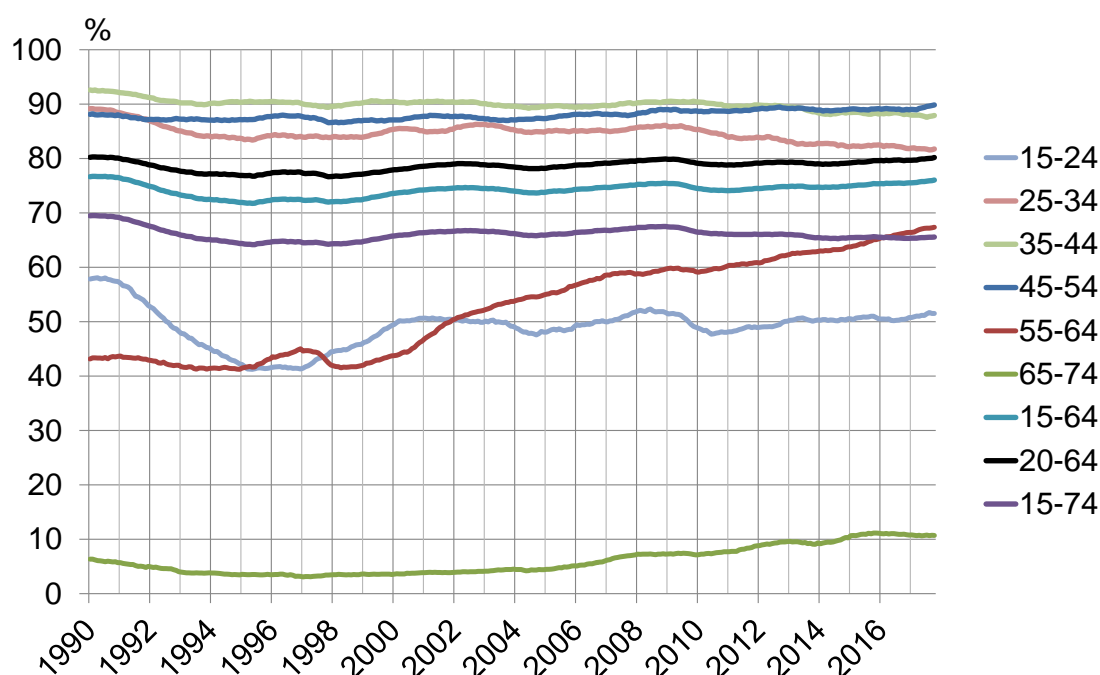
Sources: Statistics Finland and EPC calculations.

2.2. Structural unemployment and potential output

After years of economic downturn, the business cycle situation has improved. This change requires rethinking of the appropriate fiscal policy measures. Correct timing of countercyclical measures is essential as the lag of the fiscal response to the business cycle phase is usually quite long. Whereas expansionary policy is usually called for in an economic downturn, the same policy would be inappropriate in an expansion.

In the 1980's average trend growth was 2.7%, while the actual GDP growth rates varied between 1.3% and 5.2%. Figure 2.2.1 shows the business cycles between 1997 and 2017. The long-term trend is equivalent to potential GDP as estimated with the methodology developed by the European Commission.

The figure shows the business cycle peaks in 2000, 2007 and 2011 and the corresponding troughs in 2003, 2009 and 2015. The Finnish economy is now experiencing a recovery and output is likely to reach its potential level in 2018.

The view of the business cycle situation changed substantially as new information accumulated during 2017. As late as in the spring of 2017, the business cycle situation was considered to be only slowly improving. However, the revised quarterly National Accounts data in July 2017 showed that economic growth had been rapid already in 2016 with 1.9% annual growth. The revised statistics and new indicators also led to a change in growth forecasts for 2017.

In spring 2017, the estimate of potential output by the Ministry of Finance and its forecast for 2017-2021 were published alongside the General Government Fiscal Plan. The output gap, the difference between potential and actual output, was forecast to be closed by 2021. The autumn forecast for the level of GDP in 2021 is 3.9% higher than the forecast in spring 2017.

Figure 2.2.1: Gross domestic product is forecast to reach its potential level
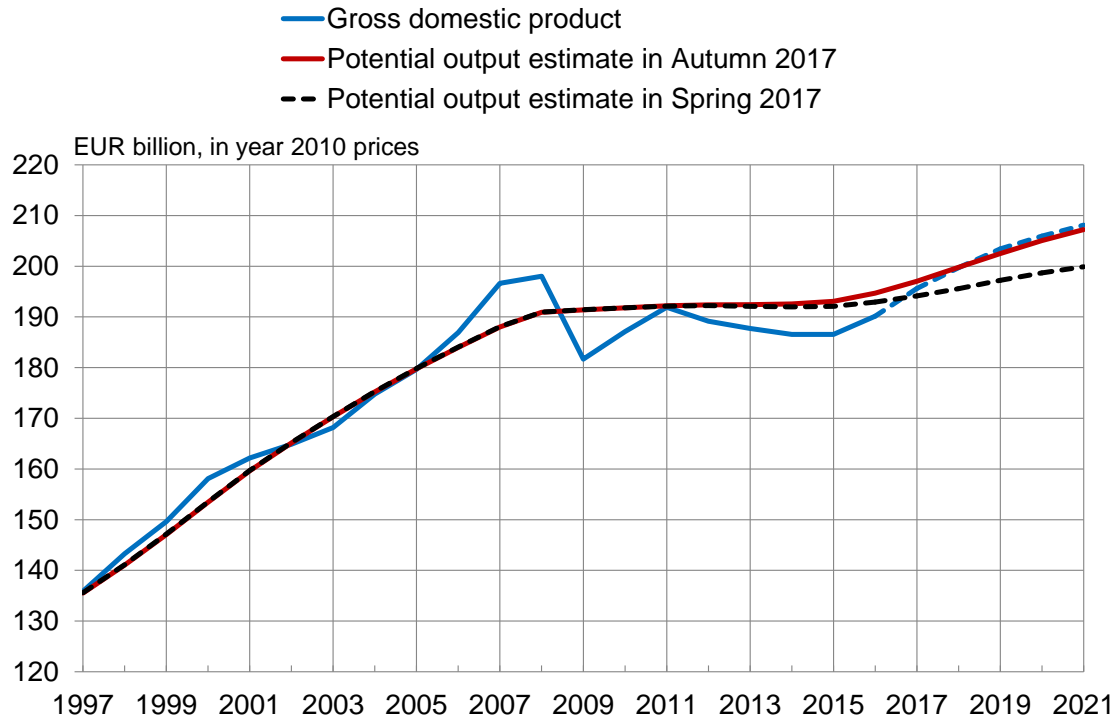
Sources: Statistics Finland and Ministry of Finance Autumn 2017 forecast.

The revised forecasts indicated that the economy was above its potential already in 2017. However, in the light of the revised statistics and forecasts
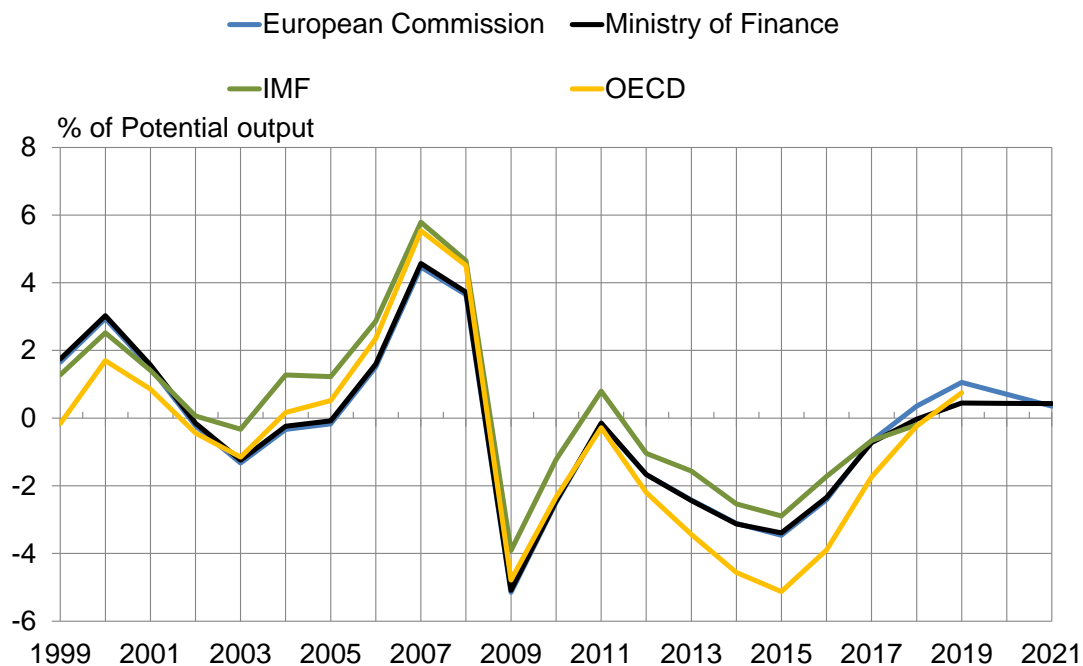
the estimates for potential output have been revised upwards. In 2017-2021, potential output is estimated to grow at an annual rate of 1.3%, which is on average 0.7 percentage points higher than what was estimated in spring 2017. The higher growth rate is due to revised estimates of the growth in total factor productivity (TFP) and increased capital accumulation. The results also show that TFP has not decreased as much as was previously predicted. The latest estimates for potential output by the Ministry of Finance indicate that the output gap is closing fast, and after 2019 actual output is estimated to be above potential.

The Ministry of Finance and the European Commission forecast that actual output will be at or above its potential level in 2018. Both institutions forecast the business cycle to peak in 2019. From 2020 onwards expansion in productive capacity and the functioning of the labour market will become crucial for GDP growth.

Assessing potential output and the output gap involves uncertainties. The Ministry of Finance and the European Commission (EC) use a commonly-agreed production function methodology (PF) to assess the output gap. The implementation of PF methodology to the case of Finland was recently assessed by Huovari et. al (2017). They argue that in the Commission's estimation process technical choices are made to ensure small variations in results between forecasting rounds. Their results were also in line with the common view that there is a degree of uncertainty in the PF methodology.

Only four organizations publish their estimates of potential output and the output gap for Finland. These estimates are collected in Figure 2.2.2. While there are differences between estimates for previous developments in the output gap, the view of the output gap in 2018 is quite uniform.

Figure 2.2.2: Output gap estimates by different organizations

Sources: Ministry of Finance Autumn 2017 forecast, IMF, OECD and European Commission.

Although estimates for potential output have been revised, estimates for structural unemployment have remained almost unchanged. Both the Ministry of Finance and the European Commission estimate structural unemployment, defined as the non-accelerating wage-inflation rate of unemployment (NAWRU), to be at 7.3% in 2017 with the actual unemployment forecast being 8.6% (see Figure 2.2.3). The unemployment gap, the difference between actual and structural rates, is estimated to be, on average, 30.000 persons in 2017-2019. Closing the unemployment gap would raise the employment rate to 71.3% in 2019.

In the Ministry's Autumn forecast, structural unemployment is predicted to decrease, with actual unemployment keeping the difference between actual and structural unemployment unchanged.[1] One sign of the unemployment

---

[1] This result is partly due to the specification of the PF method, where the trend component of unemployment is estimated using real unit labour costs, which in turn are decreasing in 2017-2018 due to reductions in employers' social security contributions. The idea of NAWRU focuses on wage-setting; monetary wage growth rises above the normal rate if and only if unemployment is below its structural value. The reduction in employers' social security contributions due to the competitiveness pact affects the link between unit labour costs, wages and unemployment, and the resulting structural unemployment rate estimate is downwards-biased. For further discussion on NAWRU see the previous report by the Economic Policy Council (2016).

rate reaching the structural level would be the accelerating of wage growth. However, moderate outcomes in wage negotiations during the autumn of 2017 suggest that the unemployment is still above the structural rate of unemployment.

Figure 2.2.3: Forecasts for the unemployment rate and NAWRU by the Ministry of Finance and NAIRU estimate by the OECD
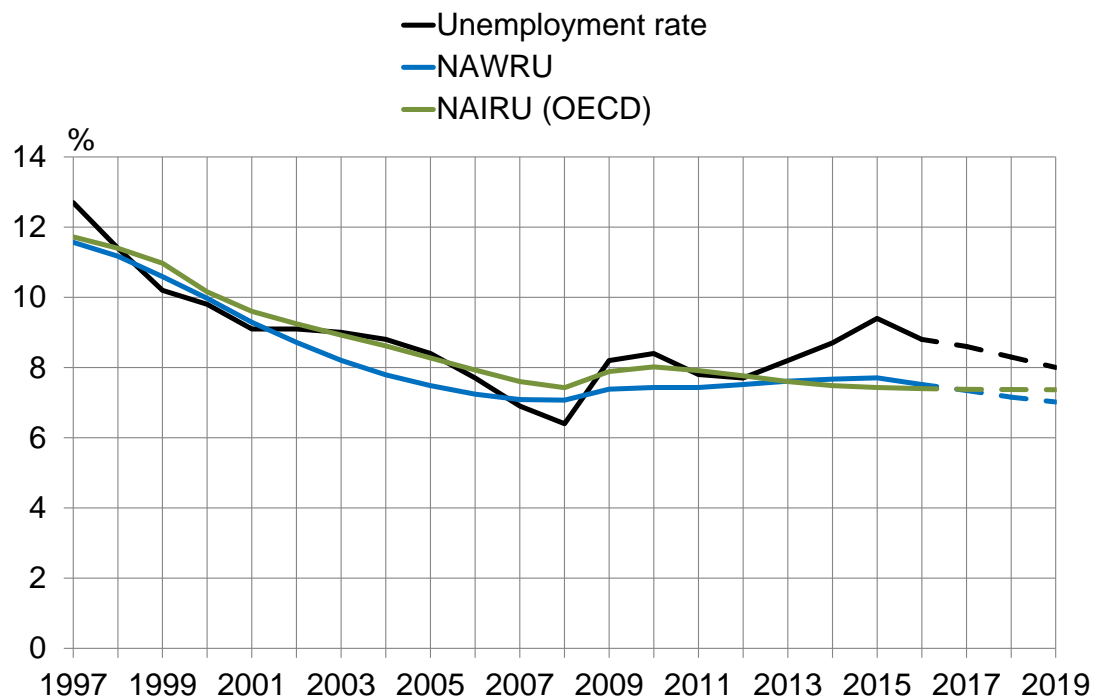
Sources: Ministry of Finance Autumn 2017 forecast, European Commission and OECD.

A commonly used indicator of structural problems is the Beveridge curve (Figure 2.2.4), which plots the relationship between the vacancy rate (vacant jobs/labour force) and the unemployment rate. In a recession the number of vacancies decreases and the unemployment rate increases, while in an expansion vacancies increase and unemployment decreases. The outward movement of the curve in 2012-2015 indicates that unemployment became more structural.

Figure 2.2.4: Unemployment and vacancy rate, 2006–2017, annual averages
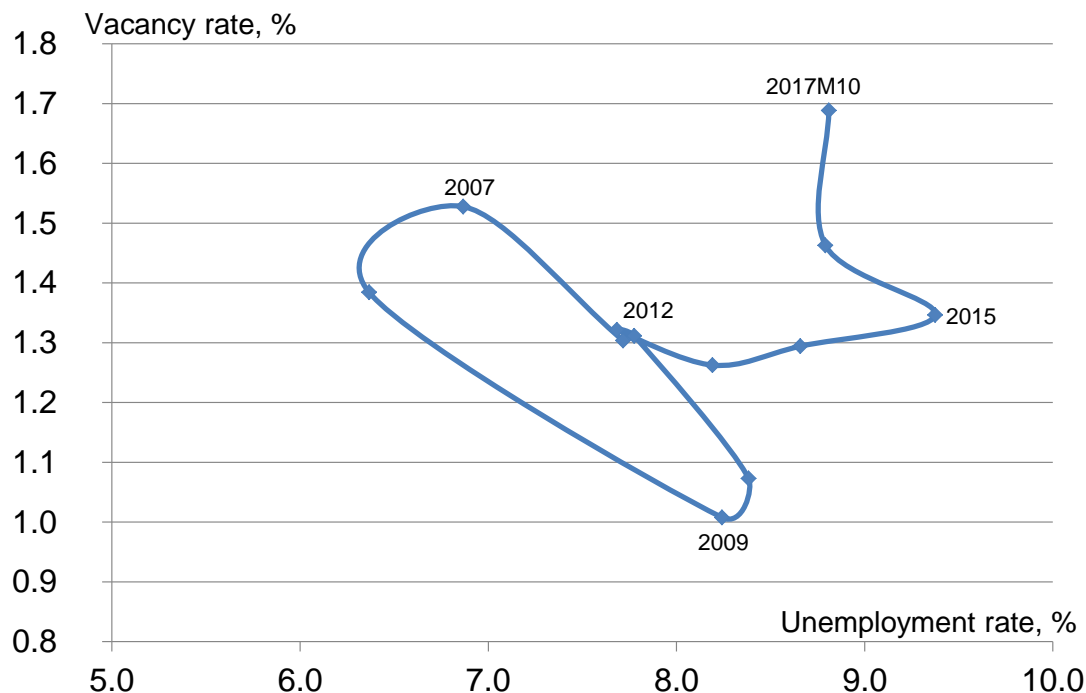
The vacancy rate has increased significantly in 2017 but the unemployment rate has not changed much. One reason could be that the labour force has increased due to increased participation. However, Figure 2.1.3 above shows that the participation rate has not increased in 2017. Our interpretation is that while the business cycle has become favourable and demand for labour has risen rapidly, it seems that the mismatch of the skills of the unemployed with the requirements of available jobs and the regional mismatch of vacancies and the unemployed has worsened.

The future outlook for structural unemployment given by NAWRU is affected by the forecasts for real unit labour costs and unemployment. If growth increases demand for labour more than is forecast, there is no reason why unemployment could not drop below the current estimates of structural unemployment.

Although there have been upward revisions to growth rates and growth is expected to remain above the long-run rate in the coming years, it is important to note that the structural problems have not been solved. Structural unemployment is rather high and the high indebtedness of households is a possible destabilizing factor. In addition, as revealed by Figure 2.2.4, the

matching process between workers and employers has become less efficient after 2012.

## 2.3. Uncertainty in the GDP forecasts of the Ministry of Finance

The public discussion on the economic outlook is often based on the point forecasts produced by different forecasters. Differences between the headline GDP growth forecasts by different organizations are rather small and revisions are made in a parallel manner. Figure 2.3.1 illustrates the simultaneous revision of GDP growth forecasts for 2017 during the summer. Before and after revision, the variation between the forecasts by different forecasters has been of the same magnitude.

A key reason for the considerable revision in the outlook was the revision of the Quarterly National Accounts data for 2016 in the spring and summer of 2017. It seems that the forecast by the Ministry of Finance was one of the most pessimistic in the second half of 2016 and the first half of 2017. This does not imply that Ministry of Finance forecast would be biased in any particular direction. Based on forecasts over a longer period, the National Audit Office (2016a) reported that forecasts by the Ministry of Finance have been unbiased. There are forecast errors, but they are of the same order of magnitude as those of other Finnish forecasters.

Predicting future events is always uncertain and turning points in a business cycle are especially difficult to forecast. This applies to the years 2016-2017, when the National Accounts information was also substantially revised. Large forecast errors are likely to materialize also in future particularly at business cycle turning points.

While point forecasts are necessary for budgeting and fiscal planning, the policy makers should also be aware of the size of forecast errors. Good and consistent communication of the uncertainty involved in such forecasts should make it easier to compare the point forecasts by different forecasters. In this connection two questions are particularly important: 1) What is the size of the expected forecast error? 2) How to communicate this uncertainty? Below we will answer these questions. The uncertainty of the Quarterly National Accounts data is assessed in Box 2.1.

Figure 2.3.1: Revision of the growth outlook for 2017 in the second half of 2017
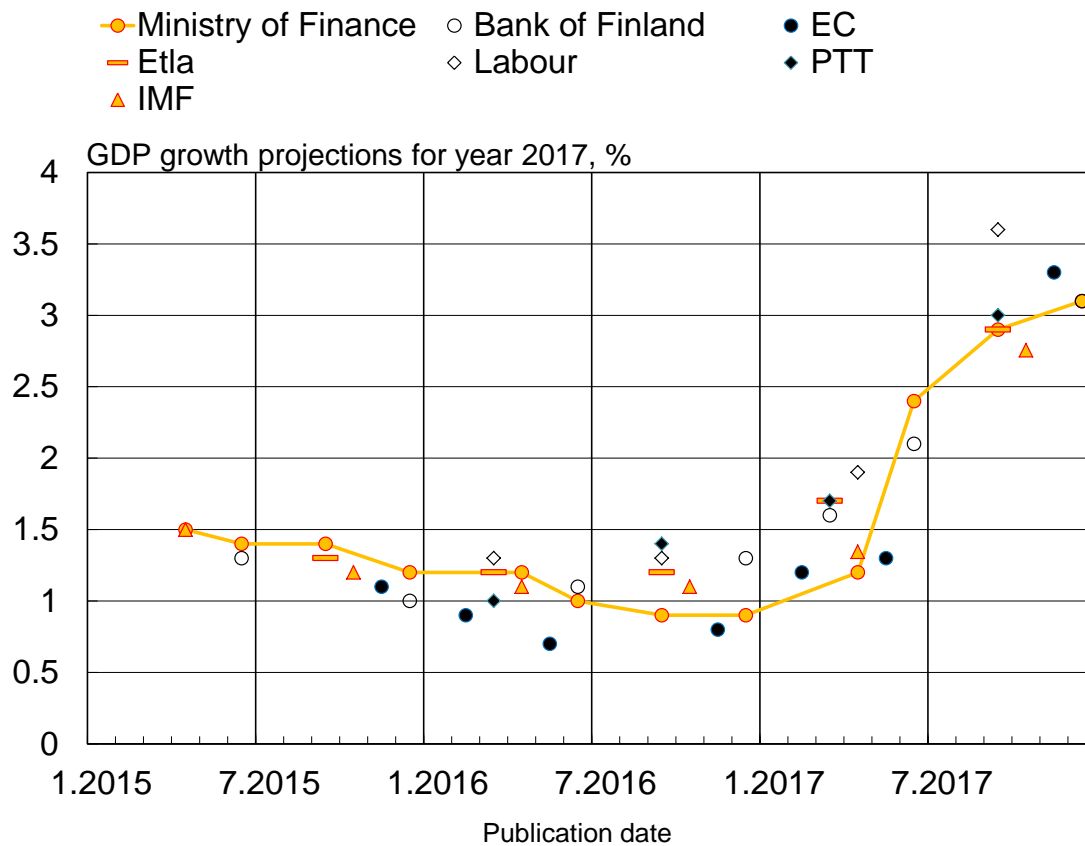
Sources: Minsitry of Finance, Bank of Finland, European Commission (EC), Research Institute of the Finnish Economy (Etla), Labour institute for Economic Research (Labour), Pellervo Economics Research (PTT) and IMF.

A number of central banks including Sveriges Riksbank, Bank of England and the U.S. Federal Reserve publish measures of uncertainty for their GDP and inflation forecasts. These measures are usually based on the past forecast errors by the institution itself or by other key forecasters in the country. Most often, the distribution of forecast errors for different time horizons is assumed to remain unchanged in the future, which makes it possible to present a probability distribution around the point forecasts. Some institutions, e.g. the Bank of England, adjust the properties of the distribution function in the forecast years. Confidence intervals around the forecasts of key macroeconomic variables can also be constructed using macroeconomic models, as is done by e.g. Norges Bank, or with a combination of past errors and the model's errors.

To calculate a probability distribution for the Ministry of Finance's forecast we compared the forecasts for the GDP growth rate for the years 1980-2016 to the National Accounts data published in July 2017. Over this long time period, the definition in the National Accounts data has been revised several times, which may have an effect on our results. While comparing the forecast to pre-revision data would yield a more direct assessment of the forecast error, it would reduce our sample as changes in statistical definitions are not usually included in the forecasts. While GDP growth rates for some years have been revised substantially after a number of years, on average the revisions have been close to zero.

The accuracy of a forecast depends on the forecast horizon and the forecasting date. Table 2.3.1 reports a metric for forecast errors (root mean square errors - RMSE) where larger errors matter more than smaller errors. The table reports forecasts for the forecast year and the following year. Historically, large sudden negative shocks are more common than positive shocks, which tends to increase forecast errors over a longer horizon.[2]

Table 2.3.1: Forecast error of GDP growth rate forecasts by the Ministry of Finance for the forecast year (T) and the following year (T+1)

	Forecast year		Number of observations	
Forecast round	T	T+1	T	T+1
Spring	1.7	4.3	37	9
Summer	1.4	1.9	26	25
Autumn	1.1	2.7	37	37
Winter	1.0	2.0	17	15

Note: Computed as root mean square errors.
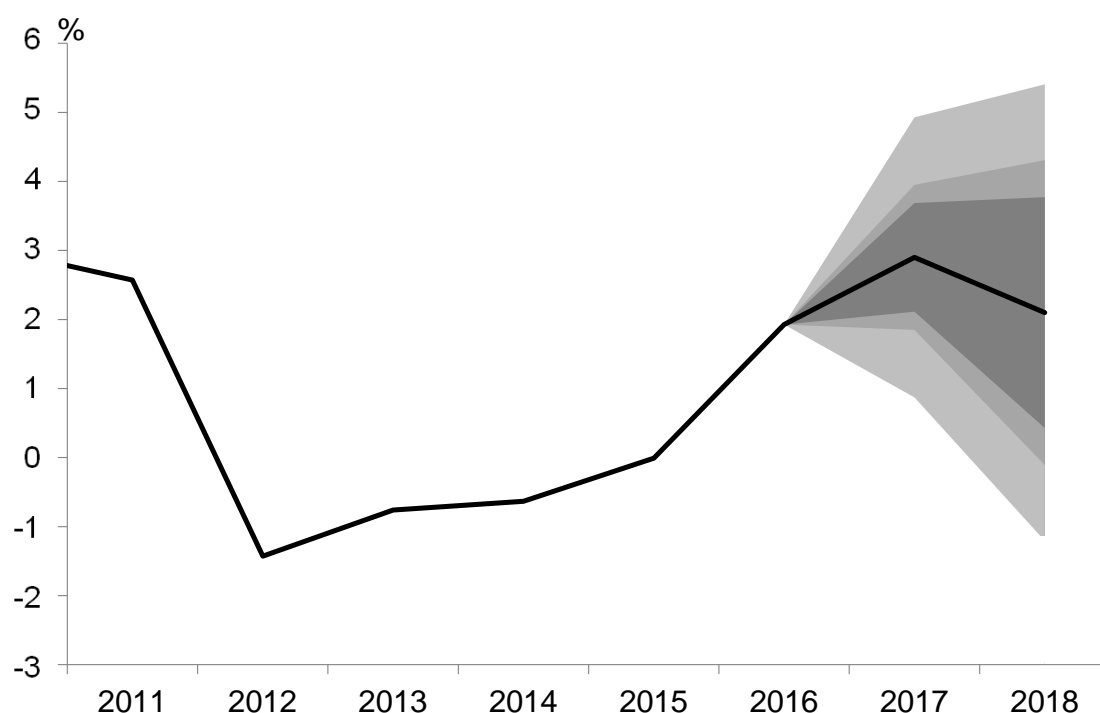
Source: EPC calculations.

Figure 2.3.2 shows the GDP growth forecast by the Ministry of Finance published in September 2017 with confidence intervals constructed by adding the 50th, 70th and 90th percentiles of the absolute forecast errors of each horizon on both sides of the forecast. The figure also shows how uncertainty increases as the forecast horizon extends. There is a 75% probability that the actual outcome for the annual growth rate for 2017 is between 1.2% and

---

[2] A solution to these problems is to use empirical quantiles of absolute forecast errors as a measure of accuracy.

3.6%. Uncertainty increases with forecast horizon. For 2018 there is a 25% probability that actual growth will be negative.

As our sample covered 37 autumn forecasts with unbiased and symmetric forecast errors, the measure for forecast errors presented here may be considered as a reliable indicator of the uncertainty associated with forecasts made by the Ministry of Finance.

Figure 2.3.2: Annual GDP growth and forecast with associated 50%, 70% and 90% confidence intervals


Sources: Statistics Finland, Ministry of Finance Autumn 2017 forecast and EPC calculations.

The same methodology can be used to assess the forecast for the employment rate. The government has set its employment rate target at 72%. Although current point estimates indicate that the target will not be met, it is naturally possible that sufficiently large positive surprises occur and the target will be reached.

Ministry of Finance forecast an employment rate of 70.7% for 2019. Unfortunately, there are not enough data to evaluate the accuracy of employment forecasts by the Ministry of Finance up to 2019. However, the Bank of Finland has a good record of published employment rate forecasts for a forecast horizon of three years. In December 2017 Bank of Finland forecast employ-

ment rate or 70.4% for 2019. Using the distribution of past forecast errors to assess uncertainty we have calculated that there is about a 16% probability that the employment rate in 2019 will be 72% or above. However, there is almost equal probability that employment rate in 2019 is below its 2017 level. The probability distribution of the Bank of Finland employment rate forecast is presented in Figure 2.3.3.

Figure 2.3.3: Employment rate forecast by Bank of Finland and associated 68%, 95% and 99% confidence intervals
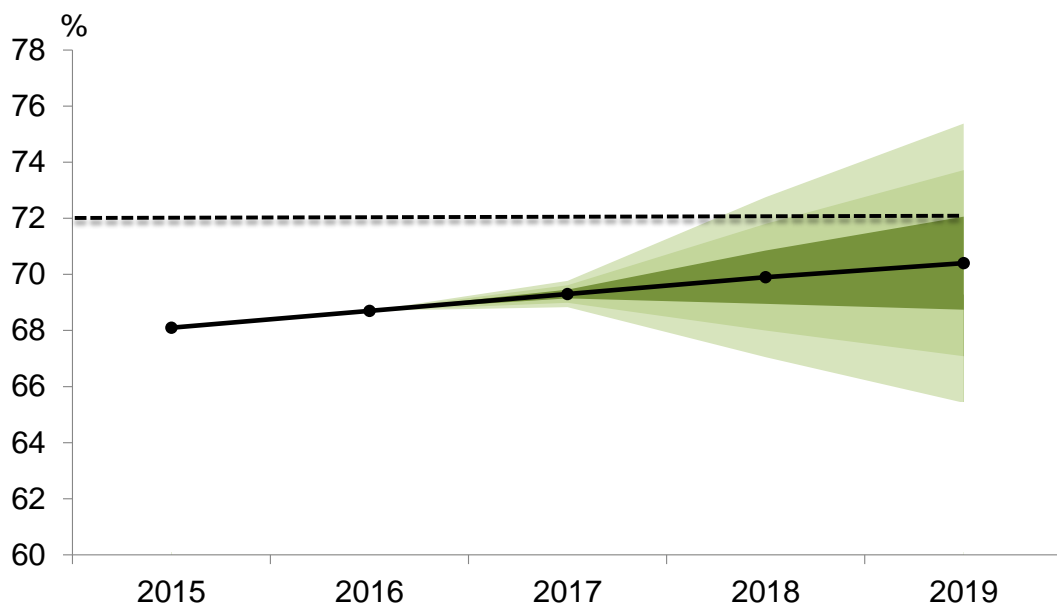
Sources: Bank of Finland and calculations by EPC.

The discussion above illustrates the uncertainty underlying forecasts of key economic variables. While these variables are necessary for budgeting decisions, discussion should not focus only on point estimates. Since the uncertainty underlying the forecasts is rather large, it is important to take the uncertainty explicitly into account both when assessing future economic developments and the probability of reaching policy targets. It is rather obvious that the accuracy of forecasts decreases with the length of the forecast horizon. Hence little is known about the cyclical position of the economy four years ahead. This does not imply that forward planning is meaningless, but it stresses the importance of taking into account how to respond if developments differ from plans and objectives set and of having buffers to accommodate such uncertainty.

The uncertainty underlying economic forecasts should be more explicitly communicated when forecasts are presented to give a more informed plat-

form for discussion of economic developments and economic policy. Measures of this uncertainty, like the fan charts presented above, can bring relevant information into these discussions and eventually increase accountability. Professional forecasters should be able to discuss the varying nature of uncertainty in their forecasts. Also, there is a need to educate users of the forecasts to ensure that they understand the information that a good forecast contains.

Box 2.1 Revisions to the Quarterly National Accounts statistics

Revision of national statistics is an important reason for forecast errors. Forecasts are based on various indicators, including the latest available statistics from the Quarterly National Accounts, published quarterly by Statistics Finland. Using the vintage data for Quarterly National Accounts releases for 1999-2016, collected by the OECD, we are able to illustrate the uncertainty in the national accounts statistics. Quarterly data, and naturally also growth rates, are revised in each publication for several quarters retrospectively. By assuming that each data point has its final estimate in the 20th release, i.e. after 5 years, we may calculate the expected revisions to each quarterly figure.

The standard deviation of revisions for the first release of a seasonally adjusted quarterly GDP growth figure is 1 percentage point; after one year, i.e. in the fifth release, the standard deviation of revisions is still 0.68 percentage points. Quite naturally, forecasts based on this information inherit much of this uncertainty.
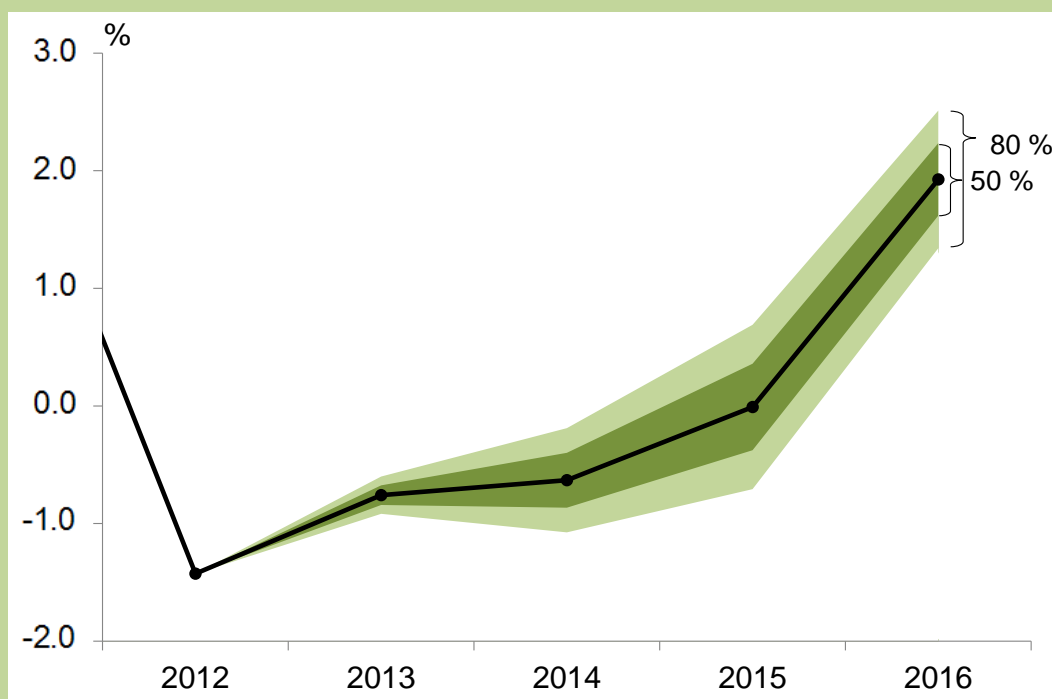
The uncertainty in growth numbers declines as Statistics Finland obtains more information. On average, revisions to quarterly growth figures for GDP, real private consumption and real gross fixed capital formation have been unbiased. The growth numbers for both real imports and exports, however, have been revised upwards in the first four releases.

Statistics Finland publishes its first estimate of the annual GDP growth rate in March the following year. With each publication of quarterly national accounts, the annual growth rates are also revised. The standard deviation of revisions to the first estimate of the annual growth rate is 0.6 percentage points. After one year, the standard deviation is still 0.5 percentage points. These estimates indicate that the picture of past economic growth is also

quite uncertain.

The past annual GDP growth rates for the years 2012-2016 and the associated 50% and 80% confidence intervals are shown in Figure 1. According to current statistics, GDP grew by 1.9% in 2016 and 0% in 2015. As shown in Figure 1, the final growth number is between 1.6% and 2.2% with 50% probability. For growth in 2015, the 50% confidence interval spans between -0.4% and 0.4%.

Figure 1: Past annual GDP growth rates according to Quarterly National Accounts data released in September 2017 and the 50% and 80% confidence intervals

Sources: OECD and EPC calculations.

The uncertainty in the growth numbers presented in the Quarterly National Accounts affects the economic indicators that are based on it. As the Quarterly National Accounts are based on statistical techniques they tend to be revised when the economic situation deviates from normal times. As more information becomes available the statistics are revised towards their final numbers. Meanwhile the uncertainty delays possible counter-cyclical fiscal policy measures.

2.4.   Council views

The economic upturn has increased productivity and demand for labour and the estimates for potential output have been revised upwards. There has been a rapid acceleration of growth and output is now close to its potential level.

Despite the recovery, problems remain in the labour market. The unemployment rate has declined only slowly and there are indications of a severe mismatch between demand and supply for labour in the different regions of the country and with respect to skills. At the same time the labour force participation rates of prime-aged workers are declining.

The Council notes that reaching the government's objective of a 72% employment rate is unlikely. Estimates by the European Commission and the OECD indicate that structural unemployment has not declined and will remain at the current levels in the near future. It is conceivable that high structural unemployment might become an obstacle for further growth.

The change in the economic situation in Finland requires a rethinking of the fiscal policy stance. Rapid growth, output being close to its potential level, and structural problems in the labour market imply that expansionary fiscal policy is inappropriate in the current state of the economy.

The economic outlook for 2018-2019 is bright, as aggregate output in Finland is expected to grow faster than potential output. However, forecasts entail uncertainty, which should be taken into account in formulating the appropriate fiscal policy measures. Uncertainty about future economic developments and the need to maintain fiscal space provide a further reason to refrain from implementing expansionary policies.

3.   Fiscal policy

The long recession has made the government's fiscal policy difficult. On the one hand, pressures from increasing debt and unsolved fiscal sustainability pointed to the need for fiscal consolidation. On the other hand, low growth and high unemployment called for an expansionary fiscal policy. The conflicting pressures on fiscal policy were resolved by opting for a consolidation programme that implied a gradual tightening over the government's term.

The improvement in the business cycle situation relaxes some of the constraints on fiscal policy, as both the need for consolidation and the business cycle situation now point towards a tighter fiscal policy stance. The current high growth and the labour market situation imply that expansionary fiscal policy should be avoided, and therefore the long-run issues related to debt consolidation and fiscal sustainability should have more weight in policy considerations.

The output gap has narrowed and GDP growth is at its highest level since 2008. However, medium- and long-run fiscal sustainability are still problematic. Hence neutral or preferably slightly tighter fiscal policy would be appropriate. Yet, the government's current fiscal stance is slightly expansionary. The cyclically adjusted deficit increased in 2017 and will increase further in 2018. Overall, fiscal policy has been pro-cyclical over the government's term.

One goal in the government's programme is that general government net borrowing should be zero by 2019. Furthermore, the general government fiscal plan for the years 2018-2021 restates that the structural balance should reach -0.5% of GDP in 2019. According to forecasts published in the autumn of 2017, neither of these goals will be reached. The current forecast for the structural balance for 2018 is -1.3% of GDP.

The general government debt-to-GDP ratio started to decline in 2016 (Figure 3.1). This decline is forecast to continue in the future years. Although the debt ratio is historically high, low interest rates have helped to maintain interest expenditures at a reasonable level.

Figure 3.1: General government debt and net lending
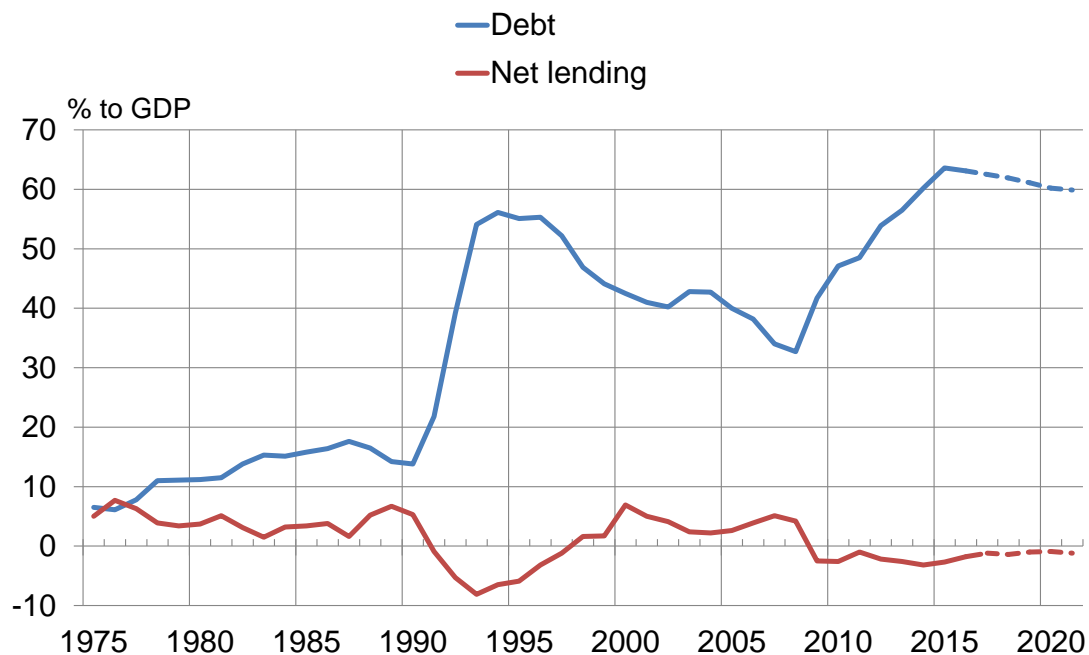
In coming years the deviation from the EU budget rules is unlikely to be significant, but this does not imply that sound fiscal policy should not be followed. In May 2017, the European Council allowed Finland some flexibility in the rules of the preventive arm of the Stability and Growth Pact. However, the structural balance will decline below the adjusted MTO of -1.1% of GDP in the years 2018-2021. There is therefore still a strong need for fiscal consolidation. In this chapter we describe the government's discretionary fiscal measures and assess the fiscal policy stance. Furthermore, we discuss the expenditure ceiling decisions and the budget bill for 2018 and briefly describe the distributive effects of fiscal policy decisions.

## 3.1. Discretionary fiscal measures and fiscal policy stance

The economic upswing that started in 2016 has radically changed the fiscal situation of general government. Tax revenues have increased more than was predicted and unemployment insurance expenditures have declined. In 2017-2020 the effect of increasing tax revenue, however, will be mitigated by tax rate reductions, mostly due to labour tax cuts associated with the competitiveness pact and the regional reform.

In 2015 Prime Minister Sipilä's government launched a consolidation programme to reduce public sector deficits and to stop the growth in public debt. The consolidation programme mainly consists of expenditure cuts.

Figure 3.1.1 compares the consolidation programme put forward in the government programme (blue line) with the actual decisions made in the budget bills for 2015, 2016 and 2017 (red line). The figure shows the annual cumulative effect of most of the expenditure decisions. The figure is based on the follow-up (by the Ministry of Finance) of the consolidation measures listed in Annex 6 of the government programme. Some changes in spending, such as the expenditure effects of the competitiveness pact and temporary additional expenditure due to increased immigration, are not included in the Figure.

Overall, the expenditure adjustments closely follow the plan presented in the government's programme. In 2017, there was a negative gap of EUR 171 million compared to the initial plan. In 2020 the annual effect of the legislated spending cuts will be some EUR 160 million lower than those listed in the government's programme.

Figure 3.1.1: The net effect of the government's net expenditure cuts on the central and local government budget balance
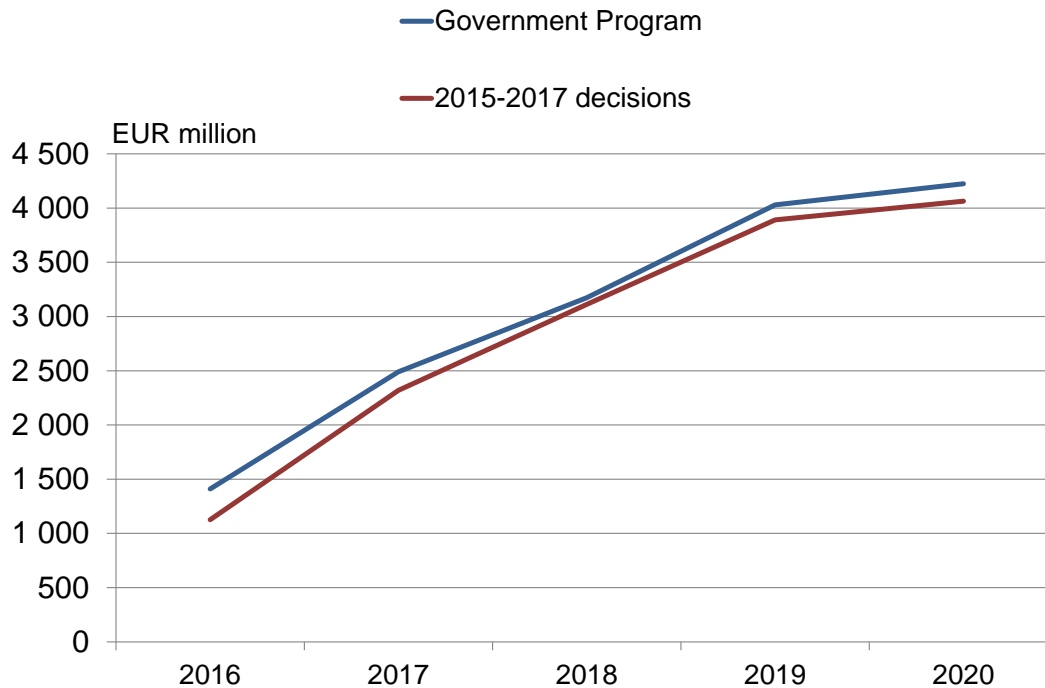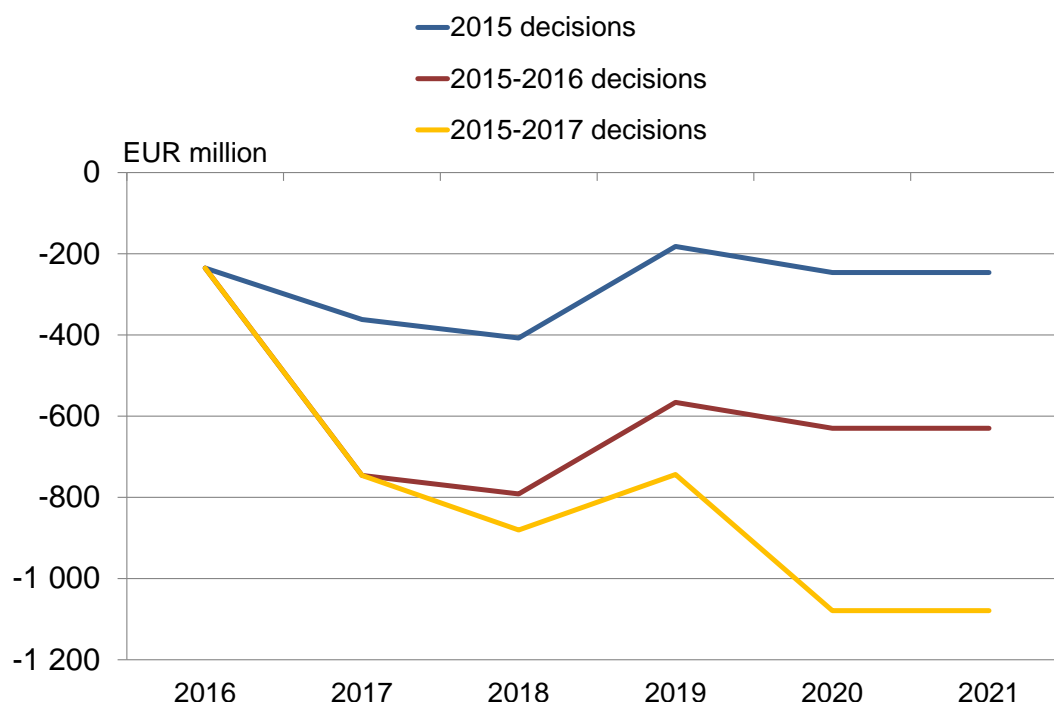

Sources: Appendix 6 of the government programme (May 2015) and follow-up tables of tax policy measures by the Ministry of Finance provided by the Ministry of Finance; calculations by the Economic Policy Council.

Figure 3.1.2 illustrates the budget impact of the tax policy measures. Adjustments to the income tax schedule due to inflation and earnings levels are not included in the Figure.[3] The annual tax revenues are also affected by changes in the timing of tax collection. For example, the collection of value added tax (VAT) on imported goods has been transferred from the Customs Authority to the Tax Administration, which delays tax collection. Also, from the beginning of 2017 cash-basis accounting for VAT payments by companies with turnover less than EUR 500,000 was introduced. After this reform, these firms can report and remit VAT only once they receive payments from their customers. The net effect for 2017 is estimated to be EUR -80 million, for 2018 EUR -200 million and for 2019 EUR 227 million. While these changes in legislation affect the general government budget in 2017-2019, they do not affect the actual tax burden. In the following calculations these changes are omitted.

_____

[3] All numbers presented refer to static estimates, i.e. direct effects of tax changes on revenue, in the absence of any behavioural effects.

Figure 3.1.2: The net effect of revenue adjustments on the central and local government budget balance (EUR million)

Sources: Appendix 6 of the government programme (May 2015) and additional information provided by the Ministry of Finance; calculations by the Economic Policy Council.

The blue line shows the static effect of the discretionary tax policy measures decided in 2015 on revenue in 2016-2020, compared to a situation with no tax changes. The main reason for the reduction in revenue in 2016 was the increase in the earned income tax credit. The deduction for entrepreneurial income and the removal of taxes on sweets and ice cream were expected to cut revenue further from 2017 on. In 2019, tax revenues are expected to increase due e.g. to the gradual increase in the cigarette tax and the reduction in the mortgage interest deduction. The tax policy decisions made in 2015 were mildly expansionary, with a static revenue loss in 2020 of almost 250 million.

The tax policy decisions made in 2016 changed the pattern substantially and they will clearly increase the deficit in every year in 2016-2020. The main reason for this change is the tax cuts related to the competitiveness pact. Although the shifting of payroll taxes from employers to employees is neutral with respect to general government finances, the compensation of increases in employees' employment pension contributions and unemployment insurance contributions via income tax cuts implies that the net effect is a reduction in revenue.

The tax cuts related to the competitiveness pact are estimated to reduce tax revenue by EUR 295 million. This reduction was partially compensated by increases in alcohol and energy taxes. The net effect of the tax policy decisions made in 2017 on tax revenue in 2018 was EUR -141 million.

The regional reform will change the tax base in 2020. As the government has announced that the regional reform will not increase labour income tax, adjustments to the central government tax schedule will lead to a decrease in tax income by EUR 305 million.

Compared to the case without any tax changes, the discretionary tax policy decisions made in 2015-2017 imply an estimated reduction in tax revenue of almost EUR 1100 million in 2020, cf. Figure 3.1.2. The overall scale of these tax reductions is large, especially given the general need for fiscal consolidation.

Figure 3.1.3 combines the two previous figures to describe the combined effect of expenditure- and revenue-side adjustments on public finances. The blue line represents the situation in autumn 2015 and the red line in November 2017.

To summarize, the expenditure and revenue side adjustments decided during the government's term have loosened fiscal policy compared with the fiscal policy plan laid out in the government's programme in 2015. In 2017-2018 the current consolidation programme will reduce the central and local government deficit by EUR 550 million less than planned, and this gap is projected to widen to EUR 700 million in 2019 and EUR 940 million in 2020. This change is mainly attributable to the reduction in tax revenue due to the tax cuts related to the competitiveness pact and regional reform. While the government has largely adhered to its expenditure consolidation programme, it has implemented a considerable fiscal loosening on the revenue side.

Figure 3.1.3: The net effect of expenditure and revenue adjustments on the central and local government budget balance
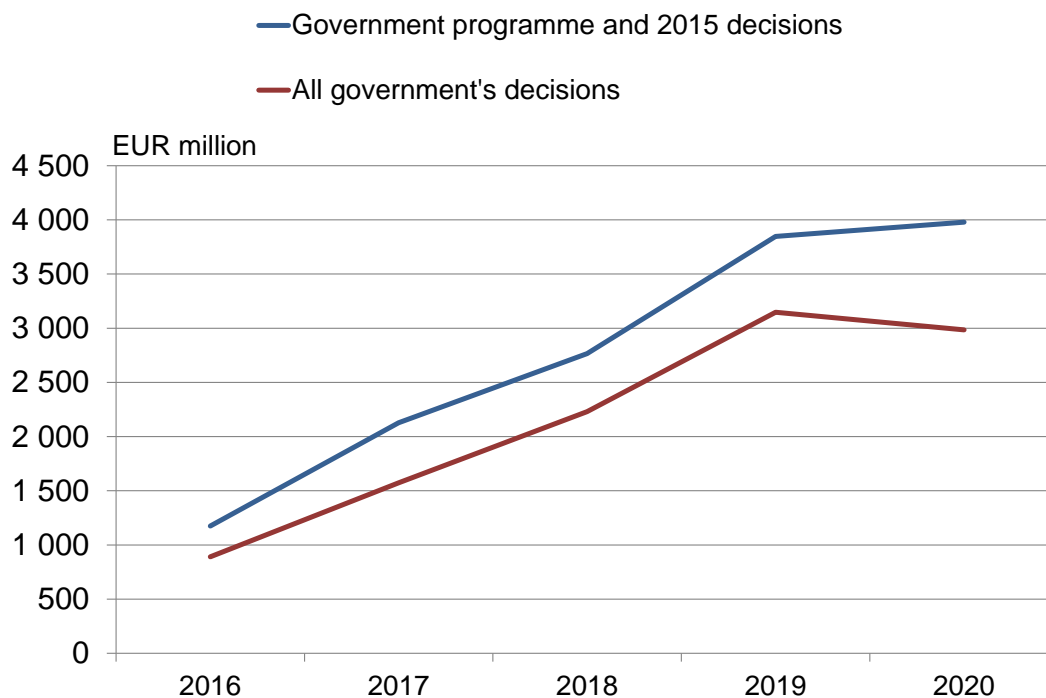
Sources: Appendix 6 of the government programme (May 2015) and additional information provided by the Ministry of Finance; calculations by the Economic Policy Council.

Although the tax cuts have decreased the effects of the government's consolidation programme on the central and local government budget balance, the government's decisions will improve the general government fiscal balance relative to GDP by approximately 1.3 percentage points by 2019. The cuts in expenditure and tax revenues will mostly affect central government. The improvement in the general government balance in 2017-2019 is forecast to be reduced by decreases in the surpluses of pension and social security funds (see Figure 3.1.4).

Figure 3.1.4: General government net lending and net lending by government sectors
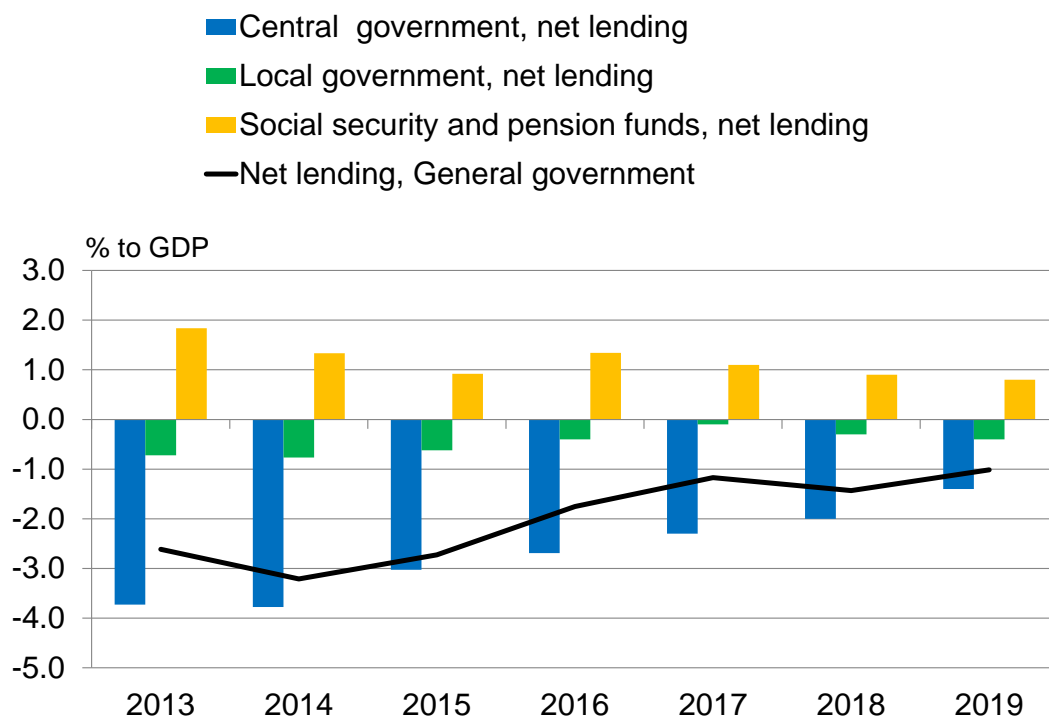

Sources: Statistics Finland and Ministry of Finance Autumn 2017 forecast.

The general government net lending to GDP ratio has improved in 2015-2017. Part of this improvement is due to economic growth in 2016 and 2017, while the remainder is due to the consolidation measures discussed above. The effect of government decisions on general government net lending can be assessed by removing the effect of the business cycle and one-off revenues and expenditures from the actual net lending figures. Changes in the resulting structural balance are often used as an indicator of the fiscal stance: the fiscal policy stance is expansive when the structural balance is worsening, and vice versa.

Figure 3.1.5 shows the evolution of the general government structural balance (the blue line). According to the autumn forecast by the Ministry of Finance, the general government structural balance will worsen by 0.4pp in 2017 and by 0.5pp and 0.1pp in 2018 and 2019 respectively. The increasing structural deficit indicates a slightly expansionary fiscal stance in 2017-2019 after contractionary fiscal policy in 2014-2016. Fiscal policy has thus been pro-cyclical rather than counter-cyclical.

Figure 3.1.5: Fiscal policy will be expansionary in 2018
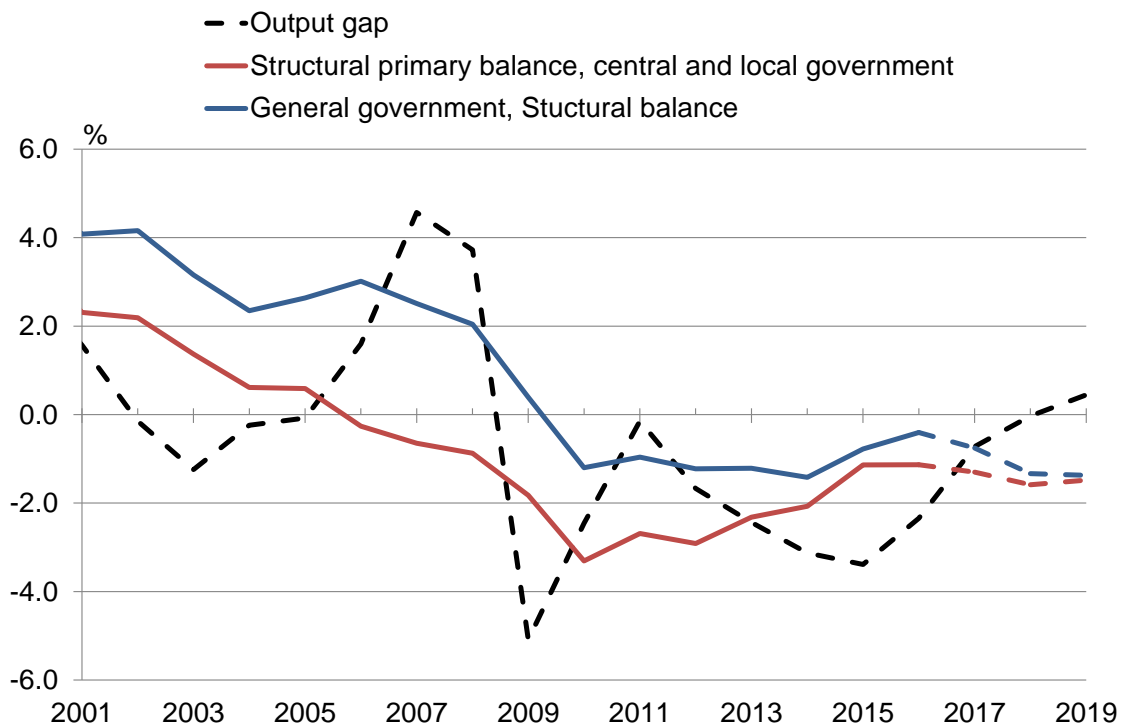
Sources: Ministry of Finance Autumn 2017 forecast and EPC calculations.

Measuring the fiscal stance by the change in the structural balance is not straightforward, as there are a number of factors affecting its development. The two main determinants that caused the structural balance to deteriorate in 2017-2018 are the income tax cuts and the decrease in pension funds' surplus. After the financial crisis, the surplus of pension funds has decreased because of there being more pensioners and lower returns. This development has in turn disguised the fiscal tightening of central and local government. Age-related costs have also started to increase over the past few years. Age-related health care expenditures relative to GDP are projected to increase by 0.2 percentage points between 2016 and 2020. Although this increase is not based on discretionary measures, the decision to finance these increasing costs through the deficit can be regarded as loosening fiscal policy.

The red line in Figure 3.1.5 presents the evolution of the structural balance of general government excluding pension funds. According to both indicators, the structural balance was improving between 2014 and 2016. The Ministry of Finance forecasts the surplus of pension funds to continue its declining trend in 2017-2019. When this effect is removed from the structural balance calculations, the fiscal policy stance in 2017 seems to be neu-

tral. In 2018 fiscal policy will be expansionary and in 2019 slightly contractionary.

3.2.   Fiscal rules and government's objectives

According to the government's objectives laid out in the general government fiscal plan for 2016-2019, the central government budget deficit should be at most 0.5% of GDP, the local government deficit at most 0.5% of GDP, the earnings-related pension funds surplus around 1% of GDP, with the other social security funds being approximately in balance at the end of the parliamentary period. These sectoral targets add up to balanced general government finances.

As required by the Stability and Growth Pact, the government has set a medium-term objective (MTO) for the general government structural balance at -0.5% of GDP. The government aims to achieve the objective no later than in 2019. As the MTO is set in terms of the structural balance, whether it is attained depends on the output gap estimate and on the nominal balance. Attainment of the MTO target in future will be more difficult to predict than attainment of nominal deficit targets as the output gap estimates will most likely be revised. Currently the Ministry of Finance predicts the output gap to be 0.4% of potential GDP in 2019, which means that the MTO of -0.5% of GDP is equivalent to a general government nominal balance of -0.3% of GDP.

In addition to the MTO rule, fiscal policy is also constrained by the following three rules, which are derived from EU legislation: 1. The general government deficit should not exceed 3% of GDP; 2. Public debt should not exceed 60% of GDP; 3. The MTO is complemented by the expenditure benchmark, which is a rule that holds the growth rate of government spending at or below the country's medium-run growth rate of potential output. Spending above this rate must be matched by additional discretionary revenues. In spring 2017 the European Council set the expenditure benchmark for Finland's nominal net government expenditures in 2018 at 1.6%.[4] According to

---

[4] Net government expenditure comprises total government expenditure excluding interest expenditure, expenditure on European Union programmes fully matched by European Union funds, revenue and non-discretionary changes in unemployment benefit expenditure. Nationally financed gross fixed capital formation is smoothed over a 4-year period. Discretionary revenue measures or revenue increases mandated by law are factored in. One-off measures on both the revenue and expenditure sides are netted out. The benchmark for growth in expenditures in 2018 is calculated

the National Audit Office (2017), Finland will comply with the expenditure benchmark in 2017-2018.

New annual objectives for public finances were published in the general government fiscal plan. These aim at reaching the MTO in 2019. They are described in Table 3.2.1. The publication of annual objectives was a welcome change as this information can shed more light on the expected effects of planned government policy measures. The annual objectives indicate an annual fiscal tightening by 0.6pp for the structural balance in 2018 and 2019.

Table 3.2.1: Annual objectives as published in the Stability Programme in April 2017

General Government, % to GDP	2017	2018	2019	2020	2021
Structural balance	-1.7	-1.1	-0.5	0.0	-0.3
Net lending	-2.3	-1.6	-0.8	-0.2	-0.3
Expenditures	55.2	53.9	52.5	52.1	52.1
Gross debt	64.7	64.5	63.8	62.7	61.9

Source: General Government Fiscal Plan 2018-2021.

Every April, EU Member States are required to lay out their fiscal plans for the next three years. Eurozone Member States do this in documents known as stability programmes. The government published its stability programme as an appendix to the general government fiscal plan for 2017-2021. In the programme the government presented a scenario with accelerating growth in 2018-2019. The scenario was in line with the annual objectives. However, growth forecasts have improved, and an increasing tax base makes all the nominal objectives more easily attainable. After the revision of the output gap estimate, attainment of the indicated path for the structural balance will require more consolidation measures.

Recent statistics show that the debt-to-GDP ratio started to decline already in 2016 and the decline is forecast to continue in the next few years. The decrease in the general government debt-to-GDP ratio in 2017 is due to the improvement in local government balances and GDP growth. The debt-to-GDP ratio of central government will also increase in 2017.

---

as the sum of the 10-year average growth in potential output in 2012-2021 and the percentage change of GDP deflator in 2018.

With improving general government revenues and slow growth in expenditures there is no danger of breaching the 3% deficit threshold in the EU fiscal rules. As the debt-to-GDP ratio is forecast to continue declining, the 60% debt criterion will also be met.

Recent estimates by the Ministry of Finance show that the MTO was reached temporarily in 2016, when the structural balance was -0.4% of GDP. The change in the estimate is due to an upward revision in potential output – the output gap was larger in 2015 and 2016 than previously estimated. Due to the tax cuts that have been implemented and the narrowing output gap, the structural deficit increased again in 2017.

In spring 2017, the European Council granted Finland flexibility in the rules in the preventive arm of the Stability and Growth Pact under both the structural reform clause and the investment clause. Flexibility of 0.5 percentage points was granted due to the pension reform that has been implemented and the competitiveness pact, as both are expected to improve the long-run sustainability of public finances. Flexibility of 0.1 percentage points is also allowed to take account of national investment expenditure in projects co-financed by the EU.

This flexibility is granted for a period of three years. In total the flexibility decreases the MTO target by 0.6 percentage points, i.e. the structural balance is allowed to worsen to -1.1% of GDP. According to the Ministry of Finance forecast, the structural balance will be below this threshold from 2018 onwards.

This flexibility is built into the Stability and Growth Pact to allow room for reforms during economic downturns. The European Council made its decision in early summer 2017, partly based on the view that Finland was still experiencing an economic downturn. With the current view on economic growth, the flexibility in the EU fiscal rules allows pro-cyclical fiscal policy in 2018-2019.

Figure 3.2.1: General government structural balance will deviate from its target of -0.5% of GDP
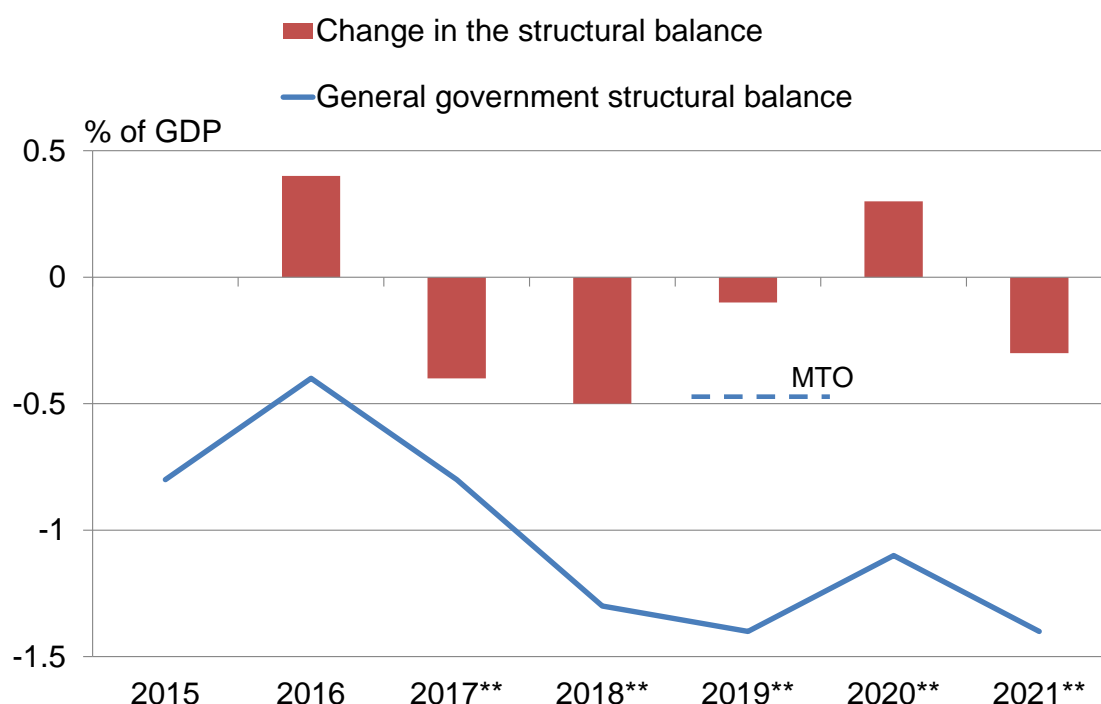
Sources: Ministry of Finance Autumn forecast 2017 and European Council.

In the budgetary bill for 2018 the government repeated its commitment to reaching the MTO target of -0.5% by 2019. Given the current forecast for the structural balance, reaching the MTO target would require adjustments of 0.9% of GDP during 2018-2019.

Because of the revisions in the potential output estimates, the annual objectives for the structural balance are hardly comparable to recent forecasts per se. Table 3.2.2 below illustrates the changes in economic outlook and the effects of revisions in potential output estimates. The growth forecast for the years 2017-2020 remained about the same between the general government fiscal plan (GGFP) for 2017-2020 and that for 2018-2021. The multi-year objectives were published alongside the general government fiscal plan for 2018-2021. The scenario in the stability programme assumed faster than forecast GDP growth, but it did not expect the output gap to be closed. The National Accounts statistics for 2016, published in August 2017, drastically changed the view of the business cycle and the output gap. For example, the outlook for the structural balance improved quite substantially compared to the multi-year objectives. However, the current estimates for the future path of the structural balance show a slow deterioration compared to the slow

improvement in the multi-year objectives. The same conclusion also applies to the nominal balance.

Table 3.2.2: Changes in fiscal outlook in 2016-2017

General Government Fiscal Plan for 2017-2020, April 2016							
	2015	2016	2017	2018	2019	2020	2021
Nominal balance	-2.7	-2.5	-2.1	-1.8	-1.4	-1.3	
Structural balance	-1.3	-1.5	-1.4	-1.4	-1.2	-1.3	
Real GDP growth	0.5	0.9	1.2	1.2	1.1	1.1	
Output gap	-2.4	-1.7	-1.2	-0.7	-0.3	0.0	
General Government Fiscal Plan for 2018-2021, April 2017							
Nominal balance	-2.7	-1.9	-2.3	-2.0	-1.7	-1.1	-1.2
Structural balance	-1.2	-0.9	-1.7	-1.5	-1.4	-1.0	-1.2
Real GDP growth	0.3	1.4	1.2	1.0	1.2	1.0	1.0
Output gap	-2.6	-1.7	-1.0	-0.9	-0.5	-0.2	0.0
Ministry of Finance forecast, September 2017							
Nominal balance	-2.7	-1.8	-1.2	-1.4	-1.0	-0.9	-1.2
Structural balance	-0.8	-0.4	-0.8	-1.3	-1.4	-1.1	-1.4
Real GDP growth	0.0	1.9	2.9	2.1	1.8	1.3	1.1
Output gap	-3.4	-2.3	-0.7	0.0	0.4	0.4	0.4

Sources: General Government Fiscal Plan 2017-2020 and 2018-2021 and Ministry of Finance.

Table 3.2.2 also illustrates the change in the government's fiscal policy line. While the GGFP for 2017-2020 still included the slowly improving nominal and structural balances, the tax cuts made as part of the competitiveness pact in autumn 2016 worsened their expected trajectory. Also, the fiscal tightening indicated by the annual objectives in terms of both the structural and nominal balance will not come about since the tax cuts introduced in the budget bill for 2018 worsen the general government fiscal position further.

The forecast by the Ministry of Finance shows that the objectives set for net lending by central government and the social security funds are not likely to be met. While slightly above its target in 2017, the social security funds surplus is forecast to decrease in the medium run due to increasing pension payments.[5] The central government deficit is declining steadily towards -

---

[5] In 2016 the net lending of other social security funds turned positive after hikes in unemployment insurance contribution rates.

1.4% of GDP in 2019. In nominal terms, the gap between the forecast and the deficit target in 2019 is EUR 2.4 billion.

3.3. Central government spending limit decision and budget bill for 2018

Central government on-budget spending, i.e. spending by ministries, government institutions and agencies, is partly constrained by spending limits.[6] The spending limits include about 80% of budgetary items excluding expenditures that depend on cyclical conditions, interest on central government debt, financial investment expenditure and expenditures related to technically transmitted payments and external funding contributions. Changes in the criteria for cyclical expenditures, e.g. unemployment benefits, housing allowances and basic social assistance, are included in the spending limits. Compensation to municipalities for tax criteria changes, e.g. changes in the basis of labour or income taxes, are excluded from the ceiling.

Each year government makes a spending limit decision for central government spending for the following four years. The spending limit rules are defined in the government's programme. Current spending limits ensure that central government spending will be EUR 1.2 billion (in real terms) lower in 2019 than in the previous ceiling decision made by the previous government.

On 28 April 2017 the government fixed the spending limits for the period 2018-2021. For 2018, the spending limit is set at EUR 44 billon, which is EUR 500 million less than in 2017. Expenditures outside the spending limits, EUR 11.4 billion in 2018, are forecast to increase slowly in the next few years. The ceiling decisions for 2018 and 2019 are summarized in Table 3.3.1.

Most of the EUR 500 million decrease is due to the transfer of the appropriation "transfer to the state television and radio fund" to outside of the spending limits. Although the appropriation is of a permanent nature, it was an exceptional transfer in accordance with the proposal of a parliamentary

---

[6] Central government spending that is not included in the budget economy consists of funds owned by central government, Universities and those limited liability companies that are governed by central government and operate outside markets.

working group. Another item that was moved outside the spending limits is housing allowances for students, which were incorporated within the system of regular housing allowances. As both of these expenditures are not cyclically dependent, they should come under the ceilings. To avoid circumventing the spending limits, their location should be reconsidered.

In addition to expenditures allocated to administrative branches, there is an unallocated reserve of EUR 144 million in 2018 and EUR 109 million in 2019 and also supplementary budget provisions of EUR 300 million for both years to be allocated later. These amounts are not included in the on-budget spending figures for 2018 and 2019.

The spending limit decision included a structural adjustment for 2019 due to the regional reform with associated taxation and expenditure changes - the spending limits will rise by EUR 12 billion. As expenditures by municipalities are expected to decrease by an equal amount, the regional reform is supposed to be neutral in terms of general government spending and the overall tax burden.

Table 3.3.1: Ceiling decisions for 2018 and 2019 and the budget bill for 2018

EUR million		2018	2019
Ceiling decision 14.4.2016	Administrative ceilings	44 830	44 300
	Price and structural adjusted ceilings	44 481	43 896
Ceiling decision 28.4.2017	Administrative ceilings	44 481	56 483
	Price and structural adjusted ceilings*	44 453	44 045
Budget Bill for 2018	Expenditure within the ceilings	44 043	
	Expenditure outside the ceilings	11 632	
	Central government expenditures	55 675	
	supplementary budget reserve	300	
	unallocated reserve	110	

*The postponed regional reform is removed from the administrative ceiling for 2019.

After the regional reform, the share of central government expenditures under the spending limit of total on-budget expenditures will rise to 83%, while central government on-budget spending relative to GDP is expected to increase by over 13 percentage points to 68.2%. The general government spending to GDP ratio is expected to decrease by 2.7 percentage points. However, after the spending limit decision the regional reform was postponed to 2020, leaving the spending limits for 2019 imprecisely defined.

The health care and regional reform will increase the effectiveness of spending limits in controlling future growth in general government expenditures. On the other hand, if social and health care expenditures continue their increasing trend, tight central government spending limits will force cuts in spending on other items.

The government submitted its 2018 budget proposal to parliament on 19 September 2017. Expenditures are EUR 55.7 billion, which is about EUR 183 million more than in the budget for 2017. At constant prices and without structural changes, total appropriations will decrease by approximately 0.3%.

In the government's budget bill, central government expenditures for 2018 are higher than forecast in spring 2017. While expenditures within the spending limits have remained at the level set, expenditures outside the ceiling have increased by EUR 200 million. This increase is due to compensation of tax revenue-decreasing measures to regional government. At the general government level, this increase nets out.

Although the nominal increase is only minor, the budget includes some structural changes. Appropriations for the Ministry of Finance are increased by EUR 180.5 million to prepare for the social and health care and regional reforms. Appropriations for financial investments by the Ministry of Economic Affairs and Employment are reduced by EUR 100 million. Appropriations for the government's key projects increase by EUR 250 million. Debt-servicing costs amount to EUR 1.2 billion, which is EUR 100 million less than in the current year. The central government debt total is estimated to increase to EUR 110.2 billion, i.e. to 47.5% of GDP.

Revenues are estimated to be around EUR 52.7 billion, which is EUR 3 billion more than in 2017. To cover the deficit of approximately EUR 2.9 billion, new debt must be issued. Income tax is cut by EUR 300 million to compensate for the increase in employees' social security contributions associated with the competitiveness pact. Half of this tax cut is compensated with hikes on alcohol and industrial fuel taxes.

3.4.   Distributive effects of economic policy

Assessments of the distributional effects of the current fiscal policies have been provided by the Research Department of the Finnish Parliament, Nordea Bank and the Ministry of Finance. This is a welcome development. The Economic Policy Council has earlier criticized the government for not publishing an assessment of the distributional implications of the consolidation package, see EPC (2016).

The results of the assessment by the Research Service of the Finnish Parliament are shown in Figure 3.4.1. In these calculations, the static effect of government policies on the income distribution is calculated by comparing disposable income in micro-level data for 2015 to a simulated counterfactual situation with amended legislation, between 2015 and 2018. The aim is to compare the distribution of disposable income to a distribution that would have prevailed with unchanged policies. See e.g. Bargain and Callan (2010)

The results show that between 2015 and 2018 the disposable income of people in the lowest income decile will decrease by one per cent and for those in the second and third income deciles by 0.2 per cent due to policy decisions. The disposable income of people in fifth to the tenth income deciles will increase by 0.1 to 0.6 percent. The calculations take into account changes in taxation and benefits in the years 2015-2018. The calculations omit changes in indirect taxation and a cut in the duration of unemployment insurance. The distributional effects of other economic policies, as well as possible dynamic effects stemming from individual reactions to policy changes, are also omitted. While static effects tell only a partial story, they are relatively easy to interpret and are subject to less uncertainty and less vulnerable to ad hoc assumptions than dynamic estimates.

Overall, the results by the Ministry of Finance are qualitatively similar to those reported in Figure 3.4.1, but of a somewhat different magnitude as their analysis considers only the budget bill for 2018. The calculations by the ministry indicate a decrease in annual disposable income in the lowest income decile of 0.3%. The estimates show that the disposable income of people in the lowest income deciles are affected by cuts in unemployment benefits, housing allowances and freezing the index for basic pensions.

Figure 3.4.1: Static effect of government decisions on disposable income by income decile in 2015-2018
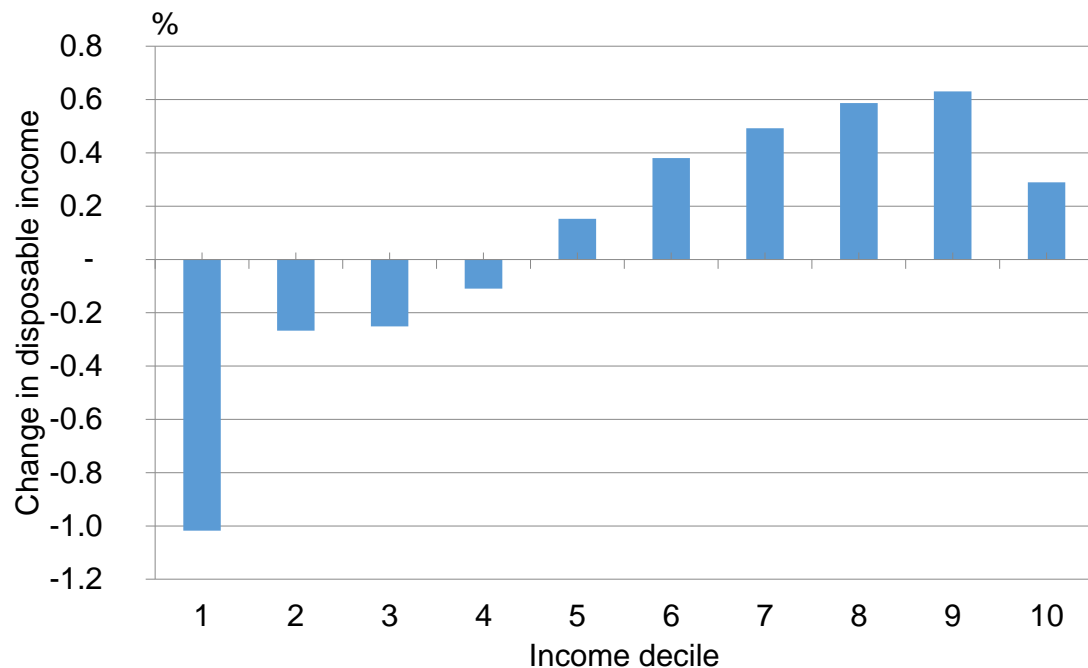
Source: Research Service of Finnish Parliament.

Figure 3.4.2 shows the structure and timing of the agreed expenditure cuts. Half of the expenditure cuts is on social benefits and health care services and freezes on indices.[7] The expenditure cuts are also likely to decrease the disposable income of people in the lowest income decile in 2019 and 2020.

---

[7] In the Finnish system, many social benefits such as pensions and central government grants are tied to a price index. The government froze the index adjustments on these benefits and government grants to universities, and additionally abolishes price indexing of child benefits and the student aid.

Figure 3.4.2: Structure and timing of expenditure cuts in 2016–2020, general government (EUR million)
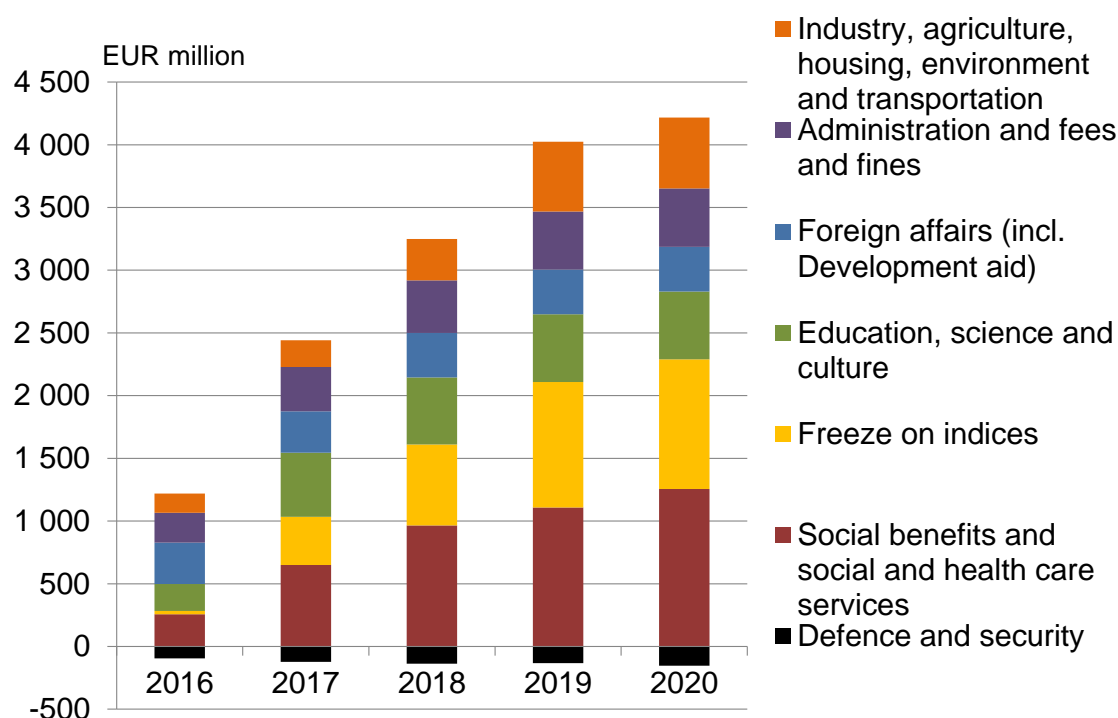
Sources: Appendix 6 of the government programme (May 2015) and additional information provided by the Ministry of Finance.

The government has compensated some of the effects of the freeze on indices, for example by an increase in the basic pension. However, both the cuts in social benefits and the freezes on indices are likely to increase the use of social assistance. Furthermore, the improved economic situation has not reduced the number of households receiving social assistance. Statistics by the Social Insurance Institution of Finland (Kela) show that 34% of people in the 18-64 age group receiving unemployment benefit from Kela also received social assistance.

3.5.   Council views

The economic situation has improved during 2017. Output has grown more rapidly than expected and the output gap has closed.

The government's fiscal policy is mildly expansionary. This is mainly due to income tax cuts in 2017 and 2018 related to the competitiveness pact. Overall, fiscal policy has been procyclical, tight in 2015 - 2016 and loose in 2017 - 2018.

Loosening of fiscal policy relative to the plan in the government's 2015 programme makes it difficult to reach fiscal policy targets. According to current forecasts, the structural deficit will be substantially larger in 2019 than the goal set in the government program. The domestic targets for general government nominal balance will not be reached either.

EU fiscal rules will not be binding for fiscal policy in the near future. European Council has granted Finland flexibility with respect to the medium-term objective (MTO) for the structural balance requirement of EU legislation and the Stability and Growth Pact. Yet long-term sustainability would require tighter budgets, particularly at times when the economy is growing faster than its long-term trend.

Some expenditure items have been moved outside the spending limits. The spending limit rules state that this should be avoided. The cyclicality of expenditure items outside the spending limits, e.g. housing allowances, should be reassessed.

As fiscal consolidation has been implemented mainly on the spending side, the measures have decreased relative incomes of people dependent on transfers. The static effects on the income distribution are still not very large. Based on the structure of the consolidation programme, the forthcoming measures are likely to further increase income inequality in the coming years.

4.   Sustainability of Public Finances

One of the main fiscal policy goals of the current government is to ensure fiscal sustainability, i.e. to ensure that commitments on education, health care and pensions can be financed from government revenues, also in the future. Current policies do not meet the sustainability requirement. According to the government's own assessment, a permanent adjustment of the public budget in the order of 3% of GDP is required to balance expected future expenditures with expected future revenues. In its programme, the government has committed to make the necessary savings and structural changes to close the sustainability gap. Postponing adjustment would increase the required adjustment and shift the burden to future generations, and generally reduce the credibility of economic policy.

The sustainability gap is the permanent adjustment of the primary budget balance (in % of GDP) needed to ensure that the present value of taxes can cover the present value of expenditures (plus cost of serving initial net debt). The sustainability gap depends on the population growth projection and various other assumptions, and thus the gap estimate needs to be updated regularly.

The sustainability gap can be divided into four elements: future growth in age-related spending, future costs of existing public debt, structural primary deficit in the base year of the calculation and future changes in property income. The EPC's breakdown of the sustainability gap estimate is given in Table 4.1 below. Approximately half of the sustainability gap is caused by forthcoming increases in age-related costs. Interest payments induced by the current debt increase the sustainability gap by 0.8 percentage points. In

this report, the effect of age-related health care costs on long-run sustainability is discussed in Chapter 5.

Table 4.1: Decomposition of the S2 sustainability indicator

Present value of interest expenditure of the initial debt	0.8
Primary deficit in base year	0.2
Change in capital income	0.6
Changes in aged-related expenditure	1.6
S2 sustainability gap	3.2

Sources: Ministry of Finance and EPC calculations. Numbers are calculated with a framework provided by the Ministry of Finance in September 2017 using modified assumptions on composition of financial wealth.

In this chapter we focus on the role of assets in the sustainability calculations. The starting point is the government balance sheet, which describes both assets and liabilities. We add to this the implicit liabilities like future pensions obligations to provide a more comprehensive view of public finances. We then discuss the returns on the assets and the effects on fiscal sustainability of the assumptions about future returns. Finally, the uncertainty related to public finances – the fiscal risks – are analysed, as these need to be managed to minimize debt accumulation due to possible negative future events.

4.1.   General government balance sheet and net worth

As the fiscal sustainability assessment is affected by the wealth and liabilities accumulated in the past and the assumed evolution of these in the future, analysis of future expenditure and revenue flows has to be complemented with a view of the current general government balance sheet. The information on the net asset position of general government given in the balance sheet is a crucial starting point for the fiscal sustainability assessment.

The general government balance sheet consists of general government financial assets and liabilities. The general government balance sheet for 2015 is presented in Table 4.1.1. Liabilities are divided into two parts, financial liabilities and pension liabilities, and assets are divided into two parts based on the liquidity of the assets. The value of financial liabilities is based

on market values and covers all forms of government financial liabilities. Pension liabilities include the present value of accrued pension rights.

The value of general government financial assets exceeds the market value of government financial liabilities, leaving the general government net debt position negative. In total, the value of general government financial assets is slightly over EUR 270 billion, while general government gross debt is "only" EUR 133 billion. Most of the financial assets are held by pension funds. These assets are accumulated to cover the funded part of accrued pensions.

The largest items on the liability side of the general government balance sheet are public debt and pension liabilities. The market value of government debt and other financial liabilities amounts to EUR 160 billion. Compared to these financial liabilities, pension liabilities are a much larger item. As pension liabilities refer to pensions to be paid in the future, their current value also depends on the discount rate. The liabilities in Table 4.1.1 are based on a discount rate of 3.5%. Total general government liabilities are almost EUR 800 billion, of which pension liabilities are EUR 640 billion.

Table 4.1.1: General government balance sheet for 2015

EUR billion					
Liabilities		Financial assets			
Debt securities	113.3	Currency and deposits	18.6		
Loans	30.4	Debt securities	44.2		
Other liabilities	16.1	Market equities	122.7		
Financial liabilities	159.7 -	Liquid assets	185.5	= Net debt	-25.8
Pension liabilities*	638.7	Loans	30.9		
		Other equities	39.6		
		Other assets	15.0		
Total	798.4 -	Total	271.0	= Net liabilities	527.4

Sources: Financial Accounts by Statistics Finland, EPC and Appelqvist et. al. (2017).
* Pension liabilities are the current value of all earned pensions at the end of 2015 calculated using a real discount rate of 3.0% till 2026 and discount rate of 3.5% from 2027 onwards.

Adding up assets and liabilities yields net liabilities which, according to Table 4.1.1, equal EUR 527.4 billion.[8] The general government net worth can be

---

[8] In addition to its financial liabilities, government is subject to drawing rights by the European Stability Mechanism (ESM). The past actions of government have also created contingent liabilities and guarantees. Although

defined as net liabilities plus real assets. The real assets consist mostly of land, buildings and structures. Two thirds of the real assets are owned by local government and almost one third by central government.

The evolution of general government net worth in 2010-2015 is shown in Figure 4.1.1. The numbers are based on the financial accounts data by Statistics Finland and on information by the Finnish Centre for Pensions.

Figure 4.1.1: The evolution of general government net worth
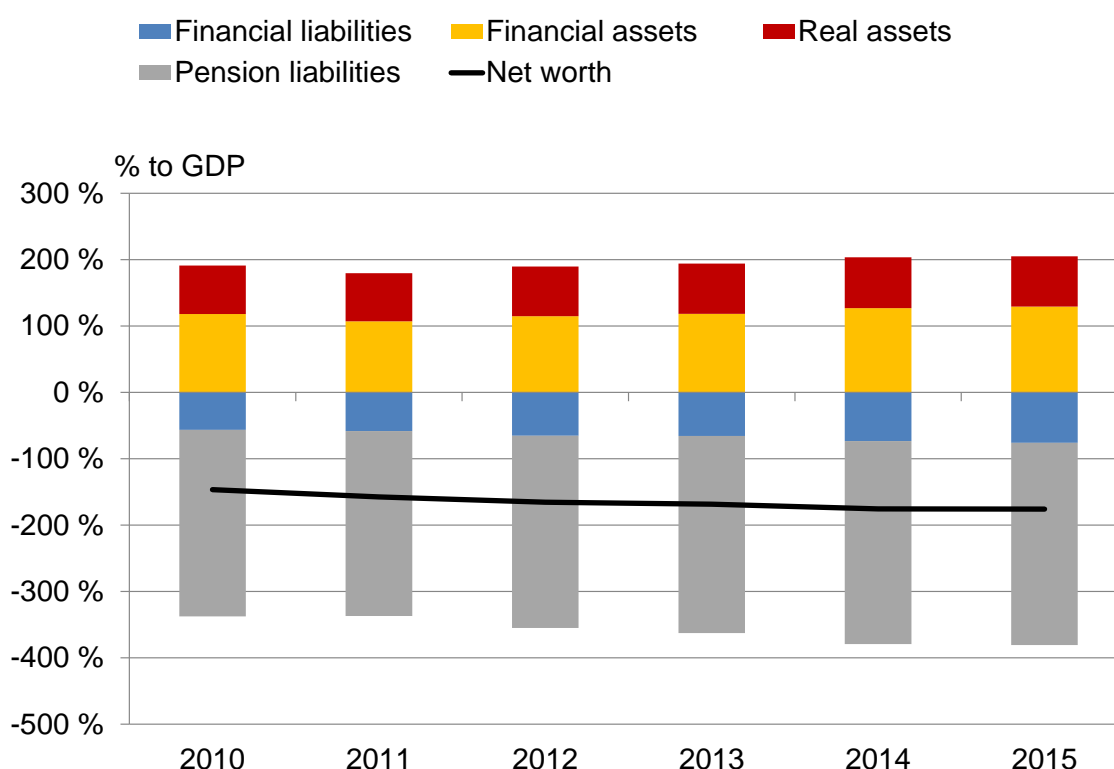
Sources: Statistics Finland, EPC calculations and Finnish Centre for Pensions.

In 2015 the general government net worth was -176% relative to GDP. The value of financial and real assets was 205% of GDP, but financial liabilities of -76% relative to GDP and pension liabilities of -305% of GDP make the net worth highly negative. In 2010 the general government net worth was -281% relative to GDP.

the probability of the materialization of some of these liabilities is non-zero, it is assumed that they will not cause any costs in the future.

General government net worth has decreased over time. This is mainly due to higher pension liabilities. It is also an inevitable feature of a partially funded pension system. As only 25% of accrued pensions are pre-funded and the rest will financed through a pay-as-you-go system. Financing pensions in future creates a burden for future generations, since only about a quarter of accrued pension rights are pre-funded.

The general government balance sheet shows that public debt makes up only a relatively small share of total government liabilities and that headline public debt is smaller than public assets. Hence focusing on public debt provides an overly narrow view of the financial situation of the public sector.

Including assets and implicit debt in the balance sheet and calculating net worth is already more informative. Further improvements are possible by including expected changes in revenues and expected changes in government obligations. Sustainability calculations do this, and therefore provide a more appropriate measure of the fiscal situation of the public sector than public debt.

## 4.2. Financial assets and liabilities in sustainability calculations

As general government holds a large portfolio of assets, the returns on these assets have an important effect on the sustainability calculations. In the calculations by the Ministry of Finance, the real rate of return of pension funds in the long run is kept constant at 3.5%. This assumption is similar to that made in the long-run calculations of the Finnish Centre for Pensions (Eläketurvakeskus). The same real rate of return is assumed for the financial wealth of other sectors of general government.

If the returns on different assets vary, the composition of the assets becomes important for estimating average asset returns. In general, the return on equities is higher than the return on bonds.

Figure 4.2.1 shows the distribution of general government financial assets and liabilities between the subsectors. In 2016 central government financial assets amounted to approximately EUR 63.5 billion, of which EUR 35 billion was in form of shares and other equities. The financial assets of pension funds amounted to EUR 190 billion. The Finnish Pension Alliance (TELA)

estimates that half of the financial wealth of pension funds is in the form of shares and other equities, i.e. EUR 95 billion. The Ministry of Finance excludes all mutual funds from the sum of shares and other equities and comes up with a much smaller estimate, EUR 35.6 billion in 2016, for the equity holdings of the pension funds.

Figure 4.2.1: Composition of net financial wealth in each subsector of general government.
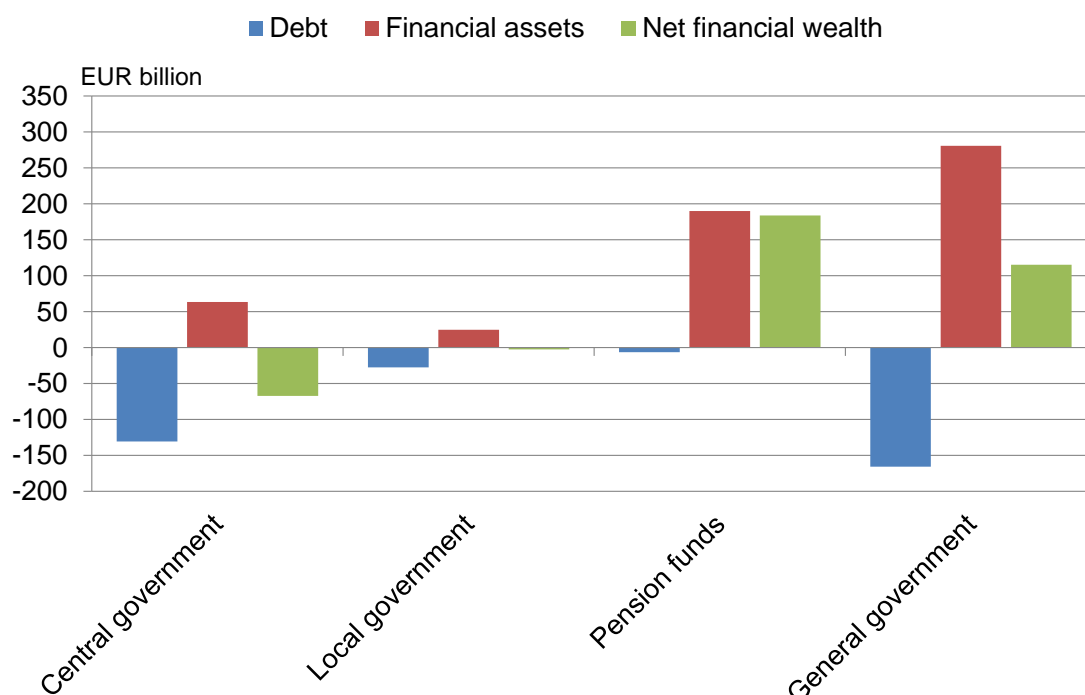
Sources: Statistics Finland and calculations by EPC.

As the rate of return on bonds and shares is assumed to be equal in the sustainability calculations, the composition of the financial wealth of pension funds has only a small effect on the sustainability gap estimate. If the return on equities is higher than the return on bonds, the allocation of assets matters too.

In a report published in September 2017, the Economic Policy Council calculated that assuming a 4.5% return on the equity holdings of the pension funds and using the allocation estimates for shares and bonds of the Finnish Pension Alliance would lower the estimated sustainability gap by 0.7 percentage points.

In general, an increase in interest rates, and a corresponding increase in asset returns, lowers the estimates of the sustainability gap. An increase in in-

terest rates increases the cost of serving government debt, but at the same time increases the return on public assets. An additional but smaller effect is due to the same interest rate being used as a discount factor to calculate the present value of future payments. A decrease in the discount factor reduces the present value of future expenditures, which in turn increases the sustainability gap. As the net financial assets are positive (financial assets larger than public debt), the net effect of an increase in interest rates is an improvement in fiscal sustainability.

4.3. Long-run sustainability and debt

Fiscal sustainability can be defined as the ability of a government to maintain its fiscal policy, i.e. current spending, tax and other policies, over a long given period without threatening government solvency. The precise definition is that the government satisfies its intertemporal budget constraint, i.e. the projected present value of revenue should at least be able to cover the projected present value of expenditures and the initial net debt.

Fiscal sustainability is connected to the debt level by the related interest costs. While there is no consensus on the optimal level for the public debt-to-GDP ratio, there may be a limit on the share of income that taxpayers are willing to pay in interest payments. This limit varies between countries and may depend on the society and whether the public debt is owned by domestic or foreign institutions. A sustainable debt level should also leave room for possible economic downturns and associated temporary debt accumulation in future.

In the long run, the nominal interest rate on government debt is assumed to be higher than the rate of growth of nominal GDP. In this assumption, any debt ratio would start to increase if the difference between the interest rate and the growth rate were not compensated with an appropriate primary surplus. In fact, the sustainable long-run debt level depends on the interest rate, the growth rate and the primary balance. Also, a higher debt-to-GDP ratio requires a higher primary balance. On current assumptions, a debt-to-GDP ratio of 60% would require a positive primary balance of almost 0.9% of GDP.

The main idea of the long-run sustainability indicator S2 is to estimate the required permanent adjustment in the structural primary balance to ensure

long-term balance (in a present value sense) between revenues and expenditures given the initial debt.[9]

In the current sustainability calculations, the government revenue to GDP ratio is fixed at the level in 2021. A similar assumption holds for expenditures excluding age-related expenditure, i.e. pension, health care, long-term care, education and unemployment expenditure. The future evolution of age-related expenditures is based on population projection. The share of age-related expenditure to GDP is increasing in the 2020s and 2030s and again in the 2050s.
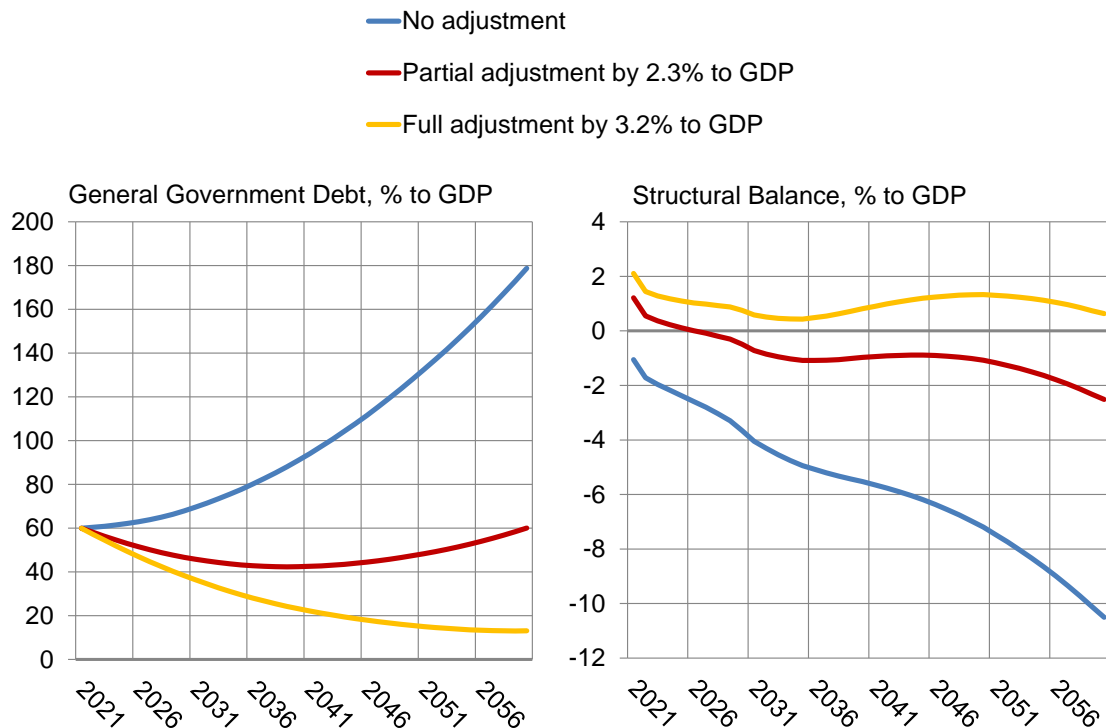
Using the assumptions of the Ministry of Finance, one can calculate that closing the sustainability gap by means of consolidation measures would require to obtain a structural balance of 2% relative to GDP by 2021. With this structural surplus the debt-to-GDP ratio would start to decline. As age-related expenditures will increase in future, the structural balance will deteriorate. After 2060 age-related expenditures are also expected to remain unchanged and the debt ratio and structural balance will be at levels such that the debt-to-GDP ratio will remain constant.

Without any adjustments the increase in age-related expenditures will eventually lead to higher debt ratios and deteriorated structural balances, i.e. to an unsustainable state of public finances. A partial adjustment could help to keep the debt-to-GDP ratio in current levels. For example, an adjustment in the structural primary balance by 2.1 percentage points before 2021 would make the 2060 debt-to-GDP ratio 59.9%, the same value that is forecast for 2021. However, the structural balance would be -0.7% of GDP in 2060. The related paths of the debt-to-GDP ratio are presented in Figure 4.3.1. These calculations omit the fact that large consolidation measures would decrease growth in the short run.

The scenario of full adjustment is the only scenario that results in a stable path for the general government net financial wealth. A partial adjustment will lead to higher debt, which eventually decreases financial wealth.

---

[9] It is assumed that there will be no further policy changes after the end of the medium-term forecast horizon, i.e. after 3 years. In short, the sustainability indicator S2 gives the present value of the required adjustments that a government leaves for the years after its term.

Figure 4.3.1: Projected paths for general government debt ratios and structural balances with different adjustments in the structural balance by 2021

Sources: Ministry of Finance Autumn 2017 forecast and calculations by the EPC. Calculations omit the short-run effects of consolidation on GDP growth.

Long-run growth and interest rate assumptions can be used to assess the sustainability of public finances. The sustainability gap indicator S2 gives the required permanent budget improvement required to ensure fiscal sustainability.

The paths of the debt-to-GDP ratio and structural balance, presented in Figure 4.3.1, are the results of technical calculations, as they assume that fiscal policy will not change in future. Clearly, if the economy is on an unsustainable path, policy changes would be needed at some point in time.

In its previous reports the Council has expressed the view that the target for the structural balance (MTO) should be based on the long-run sustainability of public finances and net wealth. This would mean a structural adjustment to close the gap, and a trajectory for the structural balance consistent with the sustainable path.

Obviously, the required structural balance increases with the debt-to-GDP ratio. While short-run projections indicate that the debt-to-GDP ratio is at a

stable level, current targets for the structural and nominal balances are not sufficient to ensure fiscal sustainability in the medium run.

4.4.   Fiscal risks

Possible deviations of fiscal outcomes from what was expected at the time of the budget or at the time of the forecasting date are defined by the International Monetary Fund (2008) as fiscal risks. To assure long-run sustainability, the fiscal risks should be managed in a consistent manner.

The medium- and long-run sustainability calculations disregard future business cycle fluctuations to focus on the structural aspects. However, business cycles will for sure cause deviations from these paths. Even when government finances are managed in a sustainable way, fiscal outcomes often differ from forecasts. The reasons behind such departures can be a deviation of economic growth from forecasts, exchange rate shocks, foreign demand shocks, natural disasters, calls on government guarantees, or unexpected legal claims on government entities. Often, these unforeseen events lead to an accumulation of public debt or to additional government obligations. Cumulatively, such shocks can lead to difficulties in refinancing and even to crises. Unexpected spending pressures and revenue losses often require adjustments to fiscal policy during the fiscal year.

Prevailing fiscal risks can be assessed using the stock-and-flow accounting framework for public finances. In this framework, flows represent the annual flows of government spending and receipts. These flows for 2017 are presented in Table 4.4.1 below. Using this set-up we can easily see that fiscal risks could arise in the form of a one-off or a persistent increase in expenditures or of a one-off or a persistent decrease in revenue. Both interest expenses and interest income are affected by a risk of interest rate movements. Interest income is also affected by exchange rate risks, as asset portfolios are distributed internationally although most government liabilities are denominated in euros.

Table 4.4.1: General government expenditure and revenue forecast for 2017

EUR billion						
Revenue			Expenditure			
Direct taxes	37.2		Consumption	51.4		
Other taxes	32.3		Capital expenditure	9.6		
Social sec. contrib.	27.4		Social security	43.1		
Other income	19.6		Other	14.7		
	116.5	-		118.8	=	Primary balance* -2.3
Interest revenue	1.9		Interest expenses	2.2		
Total	118.4	-	Total	121.0	=	Net lending -2.6

Sources: Ministry of Finance Autumn 2017 forecast and EPC calculations. *Net lending less interest expenditures and revenues.

The balance sheet risks can be considered events or changing trends that would increase debt liabilities, a balance sheet transaction where government increases its liabilities to finance a private sector entity, or a change in the existing value of assets or liabilities.

The main risks to general government finances are reported annually in the government's annual reports, see e.g. Prime Minister's Office (2017). In that report the discussion is based only on the values of assets and liabilities. A somewhat deeper evaluation of the risks faced by central government is presented in an annual risk report by the Ministry of Finance (Ministry of Finance 2017b). Despite these efforts, a measure for the fiscal risk faced by central or general government has not been presented. The main medium-run risks associated with flows of revenue and expenditures can be considered macro risks, i.e. risks that are associated with unexpected economic events. The normal macro risk to fiscal variables can be illustrated with econometric tools; one example is presented in Box 4.1.

Two important items are not reported in the stock-and-flow accounts above: general government real assets and contingent liabilities. Real assets consist mostly of land, buildings and infrastructure. As most of these assets are essential for the provision of public services, government faces the risk of replacing some of these assets after an unforeseen event. The contingent liabilities of central government are well documented and reported by the Ministry of Finance. The contingent liabilities consist of government guarantees for Finnvera and the Housing Fund of Finland. There has been a particularly strong rise in the volume of government guarantees for these two entities.

According to Eurostat data for 2015, Finland's general government guarantees to GDP ratio was 28.34%. Although international figures are hard to compare, these are among the highest in the EU. The risks involved with guarantees are buffered by the State Guarantee Fund, which currently seems to be of an appropriate size. The buffer fund is amassed from guarantee fees.

The value of government guarantees has increased over recent years. One reason can be the tight situation of public finances, which has caused the government to use guarantees as a form of subsidy to Finnish export industry. Figure 4.4.1 below shows the increase in central government guarantees. At the end of 2016 central government guarantees amounted EUR 45 billion or 21% of GDP. The data also include the guarantees given to the European Financial Stability Facility (EFSF) from 2012 onwards, which increase the guarantee stock by approximately EUR 6.4 billion. The quarterly data show that the growth in central government guarantees decelerated in 2017.

Figure 4.4.1: Central government guarantees have increased in the 2010s
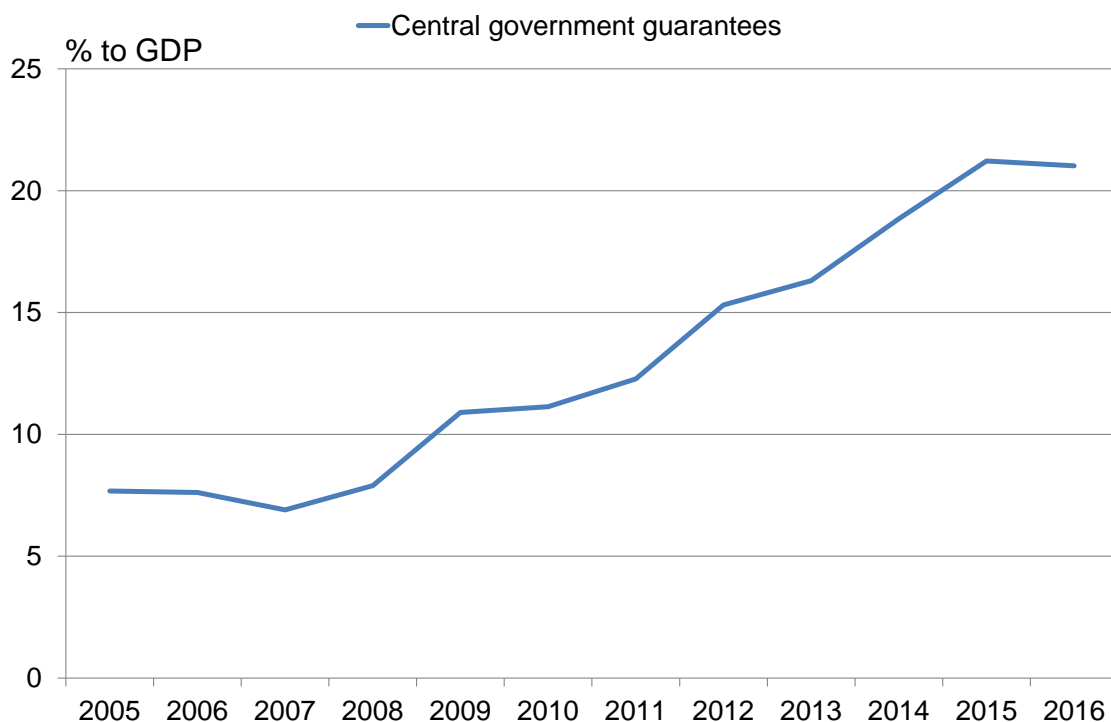
Sources: Statistics Finland and EPC calculations.

In his discussion paper, the Lindwall (2013) lists the main policy proposals for managing contingent liabilities. The first key objective is to promote neutrality: policy makers should be fully informed of the expected effects of con-

tingent liabilities and treat proposals consistently whether they are for direct budgetary appropriations, guarantees or loans. Secondly, as far as practicable all contingent liabilities should be disclosed. The third objective for contingent liabilities is to disclose implicit contingent liabilities and make them explicit, if possible, or pre-commit to not honouring an implicit liability. An international example of a contingent liability management framework is that developed in the Netherlands.

In the Finnish framework, contingent liabilities and guarantees are managed as budget-neutral, and while the risks of these are discussed it is not ensured that appropriate buffer funds are built up.

The risks involved with financial transactions can be at least partly covered through reinsurance schemes. There are, however, risks that the private sector would not be able to assume. While some of these risks are remote and extreme, most of the risks can be understood and managed ex ante. Risk management is necessary to keep the government's fiscal position sustainable and sound. As recessions and associated fiscal costs are almost inevitable, governments should aim to create fiscal leeway in normal times. Effective risk management by government would increase the public sector's resilience to shocks and eventually enhance the wellbeing of the population.

Box 4.1 Fiscal risks - a VAR-based approach

Economic forecasts are important in the planning process of fiscal policy. While traditional point forecasts give a view of the most probable path of future economic developments, a good understanding of the risks surrounding the forecast is important. As discussed in Chapter 2, the uncertainty of forecasts is rather large and increases as the forecast horizon extends. A *verbal* risk assessment of future economic developments is usually included in forecast texts. These assessments are based on expert views and attempt to give a picture of the main risks and their effects on the forecast path of the economy. While most macroeconomic forecasts are based on models, they also rely on assumptions and expert views on future economic developments. Good forecasts commonly also include a scenario describing possible economic outcomes if one or more of the background assumptions fail.

However, these forecasts are unable to describe the uncertainty of the pro-

jected path. In particular, the uncertainty of the future state of public finances should be discussed more comprehensively. This box presents a time-series approach to address the uncertainty of public finances. We build a simple Vector Auto Regressive (VAR) model for the Finnish economy and assume that key inputs to fiscal sustainability come from joint distributions and persist over time. With this set-up we are able to assess the probability of certain debt and deficit outcomes.

The evolution of the public debt stock over time can be described with a simple formula

$$D_t = (1+i_t)D_{t-1} - PS_t \qquad (0.1)$$

where D_t is the public debt at the end of year t, i_t is the government implicit interest rate and PS_t is the primary surplus in year t. The primary surplus is defined as total public sector revenue, R_t, less other expenditures, E_t. The sources of uncertainty in this set-up are the future effective interest rate and the uncertainty of government revenue and expenditures. In the forecast horizon of three years, growth in government expenditures, less interest rate payments, are restricted by spending limits while government revenues are linked to changes in the tax base. The effective interest rate on government debt depends on domestic economic developments and also on world interest rates.

The statistical uncertainty of the domestic economy can be assessed with an empirical application of the VAR method. Our simple set-up includes three variables: domestic real GDP growth, g_t, domestic inflation, π_t, measured by the GDP deflator and the government implicit interest rate, i_t, with external information on world interest rates in the form of the 3-month Euribor rate. The economic intuition behind this system is straightforward: the Finnish economy is affected by changes in European interest rates, while domestic conditions do not affect Euribor rates in the medium term.

The estimated VAR model is used to form a set of 200,000 simulated projections for the model economy for the years 2017-2019. The simulated paths are based on random draws from the distributions of the model's three error terms. These random draws are then combined with the estimated parameters to calculate the future paths of the model series using the actual data as the starting point and the Ministry of Finance's forecast for the 3-

month Euribor rate as external information. The resulting simulated paths for GDP growth and the GDP deflator are used to calculate nominal GDP. As noted above, general government revenues are assumed to depend on the growth of the domestic tax base. A simple estimation shows that a one percentage increase in nominal GDP has increased the revenue of general government other than tax revenue by .28 percentage points. This is assumed to hold also in the medium term. The tax ratio and general government expenditure, excl. interest rate payments, are assumed to follow the paths given in the Ministry of Finance's Autumn 2017 forecast.[10] These assumptions keep fiscal policy exogenous in our simulations.

Figure 1: Probability distributions of the government debt and deficit to GDP ratios in 2017-2019
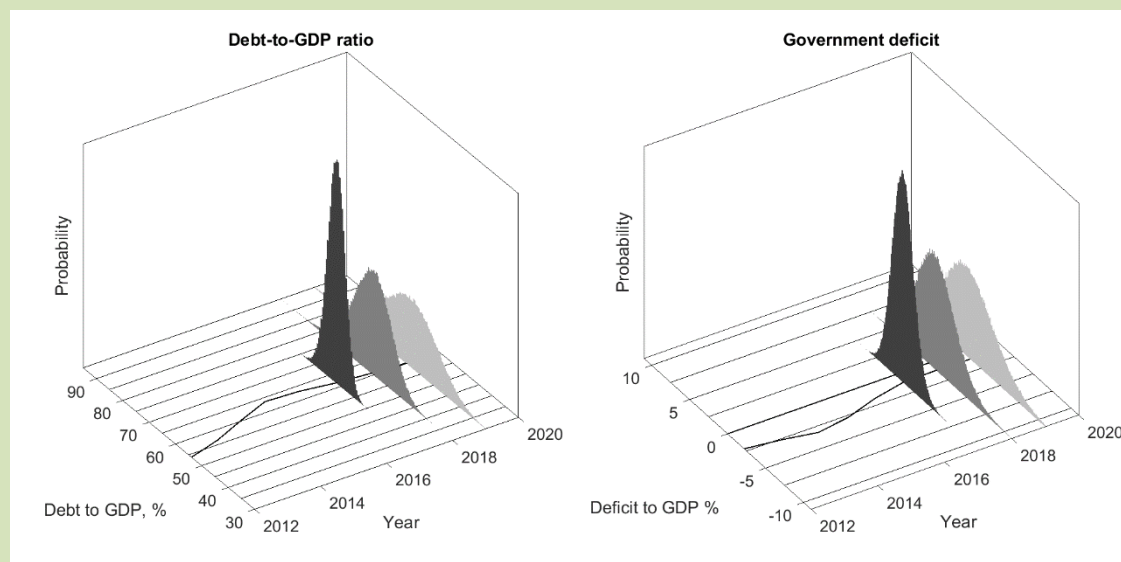
Sources: Statistics Finland and EPC calculations.

Our model forecasts 2.3%, 1.7% and 1.6% annual real GDP growth for the years 2017-2019, respectively. These growth rates are lower than actual forecasts, highlighting the fact that current growth is statistically exceptional. The probability distribution of the general government deficit to GDP and the debt to GDP ratios under exogenous fiscal policy are presented in Figure 1. The histograms of the simulated paths show how uncertainty increases with time. While the uncertainty of the mean forecast for the first

---

[10] This assumption is rather strict, as all savings on social security expenditures generated by a possible better economic situation are assumed to be spent on other expenditures. On the other hand, possible higher price levels do not affect the value of government expenditures.

year can be concluded to be quite small, the same cannot be said about the third year. The mean forecast for the debt-to-GDP ratio shows a small decline and the ratio will be below the 60% threshold in 2019 with 53% probability. The general government deficit also declines slowly. The 3% deficit threshold in the EU rules will be met with 90% probability in 2017 and with 75% probability in 2019. The probability of general government being in balance or in surplus in 2019 is 43%.

In this set-up the projected developments of the Finnish economy depend solely on the modelled time series and their interaction in the years 1980-2016. As all other information is abstracted away, the projected path cannot be considered a forecast. However, this set-up helps us to discuss fiscal risks in the medium term and assess the probability of the required additional consolidation in forthcoming years.

4.5.   Council views

Public finances suffer from a significant sustainability problem due to expenditure increases driven mainly by an ageing population. What is needed for a permanent improvement in the general government structural balance is in the order of 3% of GDP.

This problem can be addressed either by tax increases, expenditures cuts, or reforms to strengthen growth and employment (including a higher retirement age to match increasing longevity). Postponing the adjustment would increase the adjustment required and shift the burden on to future generations, and generally reduce the credibility of economic policy.

Government has committed to close down the long-run sustainability gap. While this commitment is in line with good fiscal governance, the short- and medium-term objectives should be set in such a way to contribute to solving the sustainability problem in the medium term. This is not the case currently, and there is a need for an explicit plan for how to ensure fiscal sustainability.

While the long-run sustainability calculations are based on various assumptions, their results are quite robust. The sustainability gap still exists and with current consolidation plans there is no present risk of excessive consolidation.

5.   Social and health care and fiscal sustainability

The largest single factor contributing to the sustainability gap in Finland's public finances is the projected growth in age-related expenditure due to an ageing population. The population share of over 65-year-olds is set to increase from 22 to 29 percent by 2060, with the share of over 85-year-olds increasing from 2.7 to 6.7 percent. Against this background, it is not surprising that the government is implementing a social and health care reform with a key aim of containing this expenditure growth.

This Chapter discusses two issues in particular related to projections of age-related expenses and the social and health care reform. First we inspect the relevance of the question of whether increased life expectancy increases or merely shifts forward costs of care for the population in terms of the sustainability gap calculations, also discussing non-demographic drivers as well. We then discuss the government proposal for social and health care reform from the perspective of fiscal savings.

To bring the discussion of these issues into perspective we start by describing how Finland fares in terms of social and health care expenditure and its projected growth, and discuss the potential reasons behind the growth of age-related expenditure. Many of the analyses in this Chapter relies on our own calculations using the SOME model (see Box 5.1), which is also used by the Ministry of Finance (MoF) to project growth in age-related expenditures, and the MoF's sustainability gap model.

The perspective in this Chapter is quite narrow, focusing for the most part on fiscal sustainability. This is by no means the whole picture. The expected increase in life expectancy, for example, appears in a negative light in such

an examination, even though it is desirable and associated with welfare and health improvements. The design of the social and health care reform also has important implications for equity and efficiency above and beyond any possible effects on the public budget, implications which we will comment on only briefly.

5.1.   Social and health care expenditures and their projected growth

With respect to overall spending levels as shares of GDP, Finland's health care expenditure is on the whole at an average or slightly-above-average level for a developed country. Figure 5.1.1 presents estimates for selected OECD countries. A similar picture emerges from alternative data sources[11] as well.

Figure 5.1.1: Healthcare spending as a share of GDP in selected OECD countries in 2016.Dashed line depicts average for the countries included (weighted by GDP)
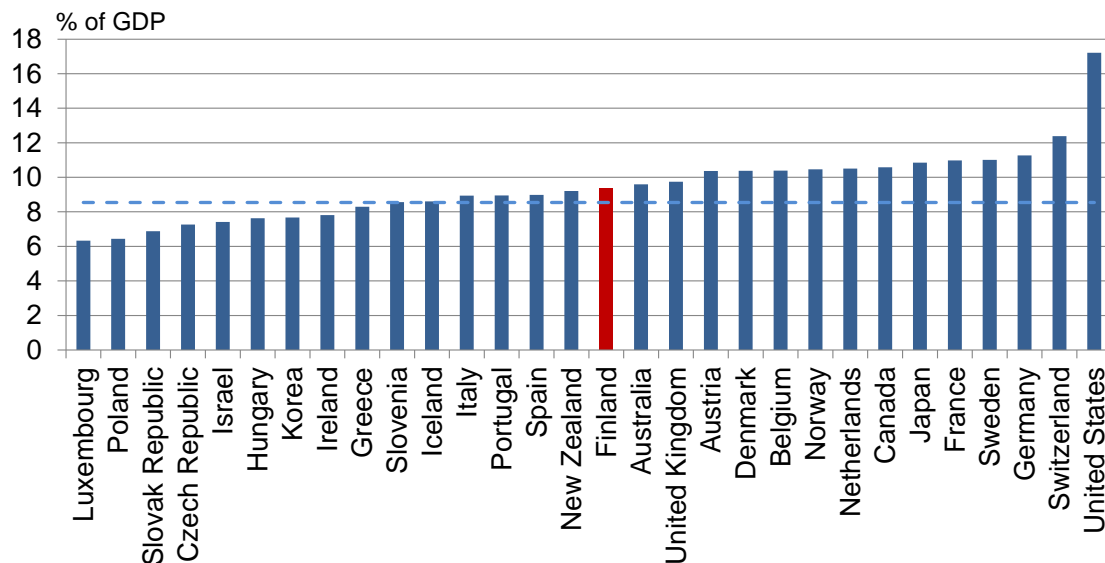

Source: OECD.

According to estimates from the Ageing Working Group (AWG) (European Commission 2015), the projected growth in the GDP share of age-related health and long-term care expenditures between 2013 and 2060 in Finland

---

[11]Other data sets we have examined are Eurostat's current health expenditure (ICHA11_HC) and the value added of human health and social work activities (NACE_R2).

is slightly above the EU average (see Figure 5.1.2). Age-related health care costs are however projected to grow less than the EU average. The projected expenditure growth in age-related long-term care, on the other hand, is somewhat high by international comparison. According to European Commission (2015) this is due to Finland's "steeper age cost profile at higher ages". Under the AWG scenario expenditure on age-related health and long-term care increases from 10.2% of GDP to 13% of GDP.

Figure 5.1.2: Projected growth in the GDP share of age-related health and long-term care expenditure 2013-2060. Dashed line depicts EU average (weighted by GDP)
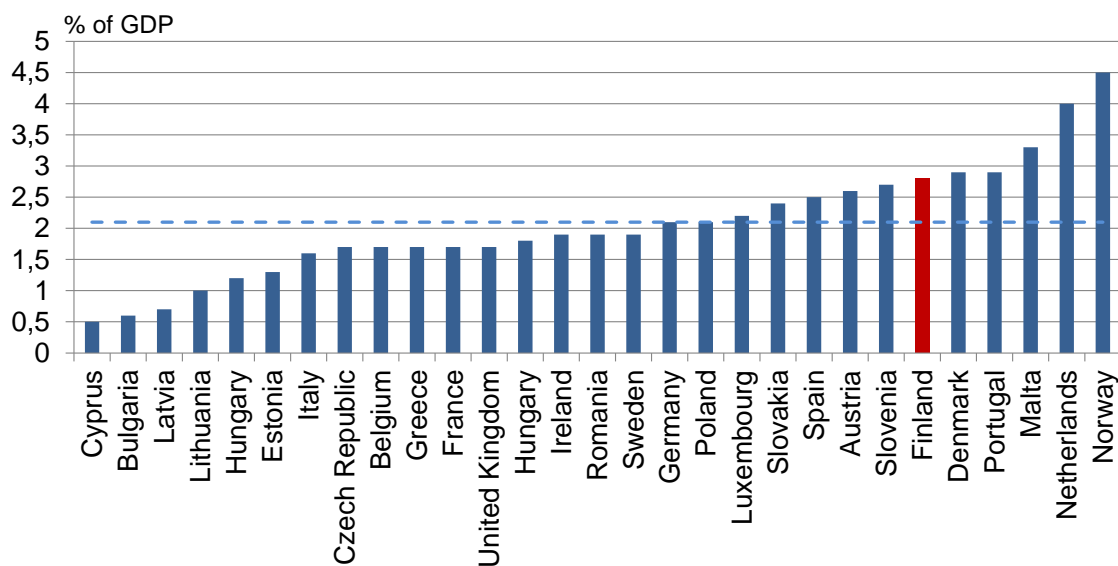
Source: European Commission (2015).

To examine the drivers of the projected growth in age-related social[12] and health care expenditure, we conduct a small exercise using the SOME model. Box 5.1 presents the essentials of the SOME model.

---

[12] To be precise, the SOME model models only long-term care, not all social services. In this Chapter we use the terms social care or social services and long-term care quite interchangeably, as we focus on expenditure pressures related to ageing. Other parts of social services (e.g. child welfare) are less age-dependent.

BOX 5.1 The SOME model

The SOME model projects public expenditures on social protection – social security and welfare services – using assumptions regarding future economic and demographic developments, and service use. The projected growth in age-related expenditures in the Ministry of Finance's sustainability gap calculations are derived from the SOME model. The SOME model itself was developed by the Ministry of Social Affairs and Health (see Ministry of Social Affairs and Health 2009 for a description of the model).

All the projections are presented with the base year set at 2021 and the end year at 2060, which is customary in the literature. The base year is set four years forward from the current year to remove the effects of the current business cycle, allowing the model to focus on more structural questions.

In interpreting the projections it should be borne in mind that the SOME model uses its own concept of age-related social and health care expenditure (or health care and long-term care expenditure, to be more precise). Thus the expenditure levels in the model do not correspond exactly to aggregate social and health care expenditure (as these include non-age-related items as well), the total expenditure at stake in the government's social and health care reform (as the SOME model also includes some of general government's age-related expenditure items, such as the pensioners' care allowance), or to projections in other models such as that of the Ageing Working Group. The SOME model differentiates between different services at such a detailed level (e.g. reimbursements by KELA for transport services, or somatic care in hospitals) that it would in principle be possible to identify those services that will be transferred to counties in the planned reform. This is, however, beyond the scope of this Chapter.

The SOME model also includes pensions, which we do not discuss in this Chapter.

In principle, aggregate expenditure can change due to demographic and non-demographic factors. Demographic factors refer to the fact that Finnish society will have more and more elderly people who will live longer than previous generations. Non-demographic factors include the population's lifestyle

choices, changes in demand for care due to income growth, and changes in technology, among other things.

The SOME model uses the population forecast of Statistics Finland, currently using the most recent, 2015 forecast. To test for the significance of demographic change, we fix population size and distribution by age in the model from 2020 forward and use this as a comparison point.

Non-demographic factors are captured by a single parameter in the model (defined for each type of care/service). In methodological descriptions (MoF 2017a, European Commission 2015) this parameter is termed "income elasticity", although as the MoF description acknowledges, this parameter captures more than the income elasticity of demand for care. This is an important distinction because income growth represents only a small part of all non-demographic factors, the most important of these being technological change (see e.g. Congressional Budget Office 2008)[13]. Overall, non-demographic drivers have been more important than demographic drivers in the past.

This parameter value is set to 1.048 in the baseline calibration of the model, meaning that as real income grows by 1%, social and health care expenditure will increase by 1.048% (MoF 2017). This has a tendency to slowly increase the GDP share of social and health care expenditure. This assumption follows the AWG calculations, where the corresponding parameter value is set to 1.1 in the base year and then converges to unity by 2060.[14] However in the Ageing Working Group report (European Commission 2015) this parameter strictly captures income elasticity only, and no other factors. Other non-demographic factors are included as "excess growth in health care expenditure" in one risk scenario with a value of 1.4 (and converging to unity by 2060). This means that as real GDP grows by 1%, technological change and other such factors push health care expenditure up by 1.4%. This effect comes in addition to any expenditure increases due to income growth.

When testing the significance of non-demographic drivers we fix this parameter value to unity.

---

[13] Although see also de la Maisonneuve and Oliveira Martins (2013), who find a larger role for income growth.

[14] Technical features of the SOME model do not allow this parameter to vary in time, which is why it is set at approximately the mean of the parameter path in the EU calculations

Table 5.1.1 presents the results of this decomposition exercise, with projected age-related social and health care expenditure as a share of GDP in 2060 under alternative assumptions. For a comparison, age-related expenditure is projected to be 8.6% of GDP in 2021 in the SOME model baseline. Expenditure is projected to increase to 11.1% of GDP by 2060, hence increasing by 2.5 percentage points over the interval. Both the baseline level and the change are different from the AWG/EC estimates discussed earlier because of methodological differences between the Finnish government's model and the AWG model.

The projected growth in expenditure on long-term care is entirely driven by demographic change. This is assumed in the baseline scenario of the SOME model. For health care expenditure growth demographic and non-demographic changes are approximately equally important.

Table 5.1.1: Age-related social and health care expenditure in 2060 under alternative scenarios

	Health care	Long-term care	Sum
Baseline	7.2%	3.9%	11.1%
No demographic change	6.7%	2.3%	9.0%
No non-demographic change	6.7%	3.9%	10.7%
Neither change	6.2%	2.3%	8.5%

Source: calculations by the Council

5.2. Increases in life expectancy and growth in age-related expenses in sustainability calculations

As stated above, one of the main reasons for the sustainability problem in public finances in Finland is the ageing population. On the one hand, this decreases the growth rate of per capita income and therefore tax revenue, as a smaller share of the population will be employed. On the other hand, this will increase pension, health and long-term care expenditure, as a larger share of the population is elderly and requires transfers and publicly funded care. The increase in age-related expenses is one component of the sustainability gap as estimated by the Ministry of Finance and the European Commission.

As all projections, these are subject to uncertainty. One of the key questions[15] is the role of healthy ageing, which may mute the effects of ageing on social and health care costs. More specifically, the question is whether cost of care is related to age per se, or rather to terminal health care and therefore nearness of death. This is of crucial importance for how costs increase with life expectancy. In the SOME model, this is captured by a parameter we can call the "age-shift parameter". The question of healthy ageing has been extensively studied, although translating the results of these studies into a specific parameter value in the SOME model is challenging.[16]

Increases in life expectancy – more healthy years, or just more years?

To illustrate the issue, consider the following numerical example (Table 5.2.1).[17] In the baseline scenario, a person dies at 55 years old, and requires some care during the last years of her life. The total cost of her care is 15. Now, suppose life expectancy rises and the person dies at 56. How does the total cost of care change?

Table 5.2.1: A numerical example illustrating the age-shift issue

Age	Baseline		Increase in life expectancy		
	Life expectancy (years left)	Cost of care	Life expectancy (years left)	Scenario 1: cost = f(nearness of death)	Scenario 2: cost = f(age)
50	5	0	6	0	0
51	4	1	5	0	1
52	3	2	4	1	2
53	2	3	3	2	3
54	1	4	2	3	4
55	0	5	1	4	5
56	0	0	0	5	6
Cost of care, total		15		15	21

In scenario 1 the cost of care is a function of nearness of death only. Whereas before the care for her 55th year cost 5, now the care for her 55th year costs

---

[15] The others include: i) the expected increase in life expectancy, ii) the assumptions (data) on prevalence rate, or service usage (e.g. how many 75-year-olds are in long-term care), iii) the unit cost of services (e.g. what is the cost of long-term care per patient).

[16] The seminal paper in the literature is Zweifel et al. (1999).

[17] For a graphic illustration, see de la Maisonneuve and Oliveira Martins (2013, Figure 5).

4, and the care for her 56th year costs 5. This fixes the cost of care of the final year. The total cost of care remains at 15.

In scenario 2 the cost of care is a function of age only. Before the increase in life expectancy, the cost of care for her 55th year was 5. Now it is still 5, but the total cost of care increases by the cost of her 56th year, which is 6. The total cost of care rises to 21.

Within the SOME model these scenarios are captured by what we can call the age-shift parameter. A parameter value of one corresponds to scenario 1, where costs are fully shifted forward by the increase in life expectancy, and increases in life expectancy have no effects on total health care costs at the individual level (overall health care costs as a share of GDP would nevertheless increase due to ageing, as the share of elderly individuals in the population would be higher). A parameter value of zero corresponds to scenario 2, where costs are a function of age only, and increases in life expectancy have a large effect on total health care costs. Naturally this parameter can also take any values between 0 and 1. The SOME model shifts costs only from age 50 forward, meaning that costs prior to this age are unaffected.

Such an age limit may be justified by the fact that some health care costs are not as directly related to either age or nearness of death, such as those relating to injuries from traffic accidents or hobbies. This means that as life expectancy increases, health care costs will rise simply because people get to live more years during which they may need health and social care.

The role of the age-shift parameter for the sustainability gap

The SOME model calculates social and health expenditure as a function of economic, demographic, and policy assumptions. The model is quite nuanced in that it calculates expenditure on approximately 100 separate items of social and health care, ranging from old age pensions to inpatient somatic care in hospitals. Expenditures are calculated by multiplying unit costs of care by prevalence rates. The age-shift parameter determines the effect of increased life expectancy on prevalence rates and is determined separately for each item. In the baseline calibration of the SOME model, the parameter only takes two values: 0 or 0.5, depending on the item.

To demonstrate the importance of this parameter for the sustainability gap calculations we simulate the growth in age-related expenses over 2021-2060 using the SOME model and the resulting sustainability gap for the

baseline and two alternative scenarios.[18] In the first, fiscally optimistic alternative scenario all age-shift parameter values that are 0.5 in the baseline specification are now set to one. In the second, fiscally pessimistic scenario all age-shift parameter values are set to zero. The results are displayed in Table 5.2.2 below. Expense growth is expressed in terms of the growth in GDP share and the sustainability gap is expressed in terms of base-year GDP.

Table 5.2.2. The growth in age-related expenses and the sustainability gap under alternative age-shift parameter values.

	Growth in age-related social and health care expenses 2021-2060 in the SOME model	Sustainability gap
Baseline	2.7	3.1
Age-shift: 1	1.5	2.2
Age-shift: 0	3.9	4.0

Source: calculations by the Council.

In all cases there will be growth in age-related expenses and a significant sustainability gap. Even with fully healthy ageing, the increasing elderly population and the income elasticity of health care expenditure produce some growth in the GDP share of expenditure. The magnitudes, however, are very dependent on the value of the age-shift elasticity parameter. Indeed, this parameter assumption is one key difference between the sustainability gap estimates of the Ministry of Finance and Etla, with the MoF making the more fiscally pessimistic assumption.[19]

Ministry of Social Affairs and Health (2009), which describes the SOME model, only discusses the effect of different parameter choices on the projections, but does not discuss why the specific value of 0.5 is chosen for the specific items of social and health care expenditure. This assumption is, however, similar to the assumption made in the EC calculations.

---

[18]Calculations are performed using the MoF's sustainability gap model with the autumn 2017 baseline scenario.

[19] On Etla's estimations see Lassila and Valkonen (2011). For discussion of differences in sustainability gap estimates see Klavus and Pääkkönen (2014). Etla's model incorporates the effects in increased longevity differently from the MoF model, and as such the difference cannot be represented by different parameter assumptions.

5.3. The effect of the social and health care reform on public expenditure and the sustainability gap

In its programme the government has committed to implementing policies that will close the sustainability gap. A large share of this burden falls on the government's social and health care reform. This section discusses the planned reform mainly from the point of view of fiscal sustainability. Fiscal savings are of course not the only objective of the reform, nor should they be. This focus does not mean that we the regard other goals as unimportant; the other main goals of the reform are improved access to health care and a reduction in health inequality. Nevertheless, a thorough discussion of the fiscal effects has significance from the point of view of these other goals as well: for example, given that the reform aims to achieve a large reduction in health care expenditures (see below), without a good idea of the mechanisms for achieving corresponding productivity gains, such demands might have important implications for the quality of health care. A priori, there appears to be a clear tension in the goals of simultaneously reducing costs and improving access to health care.

The main parts of the reform are (i) a regional reform, which will move responsibility for organizing publicly funded health care from individual municipalities (or federations of municipalities) to 18 newly formed counties (HE 15/2017); and (ii) the freedom of choice reform, which will expand customers' possibilities for choosing their health care provider in basic and to some extent specialized health care, and increase the role of private providers in publicly funded social and health care.[20]

Health care funding plan and the sustainability gap

All the aims of the social and health care reform are pursued within the limits of a public expenditure reduction target. The government proposal HE 15/2017 states that one goal of the social and health care reform is to reduce the sustainability gap by 3 billion euros. It is not clear how the government arrived at this exact target, but it is already mentioned in the

---

[20] The hospital network will also be reformed at the same time, with a tendency towards more consolidation due to e.g. requirements for minimum unit sizes (number of certain types of operations per unit per year). While these changes are also likely to be important for outcomes in health care markets, we will not discuss them in the current report.

government programme in which the government committed to closing the sustainability gap, which at that time was estimated to be 10 billion euros or 5% of GDP. This implies that the government sought to reduce the sustainability gap by 1.5 percentage points via the reform.

The government has also stated that the reform should reduce expenditures (relative to the baseline) by EUR 3 billion by 2030, or in its current implementation (HE 15/2017, Table 12) EUR 2.8 billion.

The government proposal only discusses developments in health care expenditure until 2030. However, the sustainability gap is a long-run indicator stating the permanent and immediate adjustment in the budget balance required for long-run fiscal stability. Any evaluation of the reform in terms of its effect on the sustainability gap must then make assumptions regarding expenditure developments beyond 2030.

One natural scenario is to assume that expenditures follow the government proposal even beyond 2030. The proposal bases government funding on the average realized expenditure of the past two years (the two most recent years for which statistics are available). This is then revised upwards annually using the change in the counties' funding index plus 0.5 percentage points (1 percentage point in 2020-2021). The counties' funding index is a weighted average of the growth in the wage index (with a weight of 45%), the consumer price index (40%) and the counties' employee contribution rates (15%). Using the assumptions underlying the SOME model and the MoF sustainability gap model, we can estimate the sustainability gap in this scenario. [21]

The proposed funding plan would reduce the sustainability gap by approximately 3 percentage points, bringing public finances into long-term sustainability. This corresponds to a reduction of over EUR 7 billion at 2021 levels (2021 being the base year for the sustainability gap model). Under the proposed funding plan, the annual increase in social and health care expenditure would only be 0.9% in real terms. As real GDP growth is projected to be around 1.5%, this yields a steady reduction in the GDP share of social and

---

[21] Consumer prices are assumed to grow at 2.0%, wages at 3.5% (1.5% real growth plus inflation), and no changes for employee payments are projected after 2030. Thus the counties' index is thus projected to grow 2.9% annually. With projected annual inflation of 2% this corresponds to a real growth rate of approximately 0.9%.

health care expenditure,[22] which seems very unlikely. As the counties' funding plan would significantly overshoot the original sustainability gap reduction target and the government documents emphasize developments only up to 2030, it seems likely that the clause on counties' funding is intended to be temporary and will be changed in 2030 to track current projected baseline growth rates. However, this is not explicitly brought forward in the government proposal.

For comparison and to illustrate further how different expenditure reduction plans translate into different effects on the sustainability gap we also evaluate two alternative scenarios to the government funding plan. In the first scenario, the proposed funding plan holds until 2029, after which the growth rate in the GDP share of social and health care expenditure follows the growth rate in the baseline. This captures the possibility that the reform will only affect expenditure levels, not their growth rates.

In the second scenario the funding plan holds until 2029, after which expenditure returns to its original baseline path. This can be seen as a scenario where governments only manage to bottle up demand temporarily.

Figure 5.3.1 presents the effect of different scenarios on the projected development of age-related expenditures until 2060. The baseline scenario depicts the SOME model baseline, showing a very strong increase over the next 20 years.

---

[22] The age-related expenditure in the SOME model and the expenditures transferred from municipalities to counties do not exactly correspond to each other. In the calculations we have estimated the implied expenditure reduction of the SOTE-reform as a share of GDP and assumed other age-related expenditures will grow at the SOME model baseline rate.

Figure 5.3.1: Age-related expenditure under alternative scenarios of social and health care expenditure
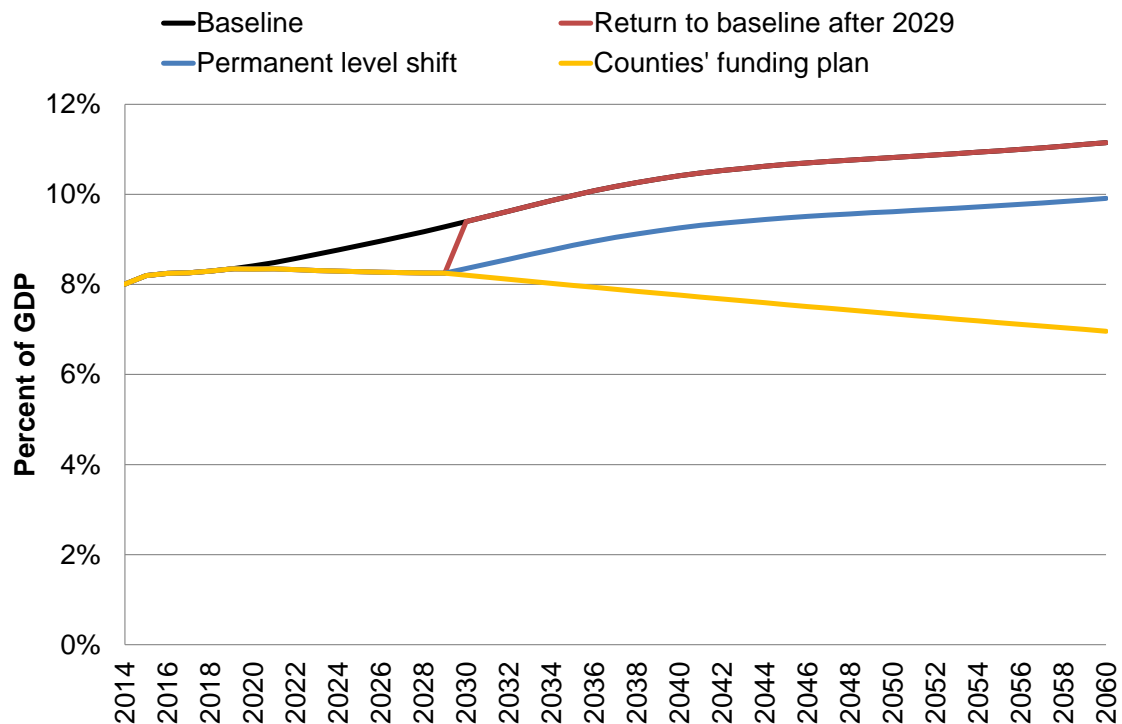
Source: Calculations by EPC.

In the scenario of a return to the baseline after 2029 the effect would be neg-ligible (the sustainability gap changes by less than 0.1 percentage points). This serves to emphasize that temporary expenditure adjustments have a very small effect on long-run fiscal sustainability. Assuming a more gradual return to the baseline path, say over 10 years, would not significantly alter this result. The scenario of a permanent level shift, on the other hand, would reduce the sustainability gap by approximately 1.2 percentage points, which is close to the original savings target.[23]

The fiscal targets of the reform are thus somewhat unclearly expressed, but the more severe problem is that the connection between the analyses of po-tential savings and the actual proposal is quite remote. The analyses only discuss how, in general, such savings could be achieved in Finnish social and health care, not how the current proposal would lead to such savings. Indeed the government bill HE 15/2017 (p. 219) states that "[P]art of the required

---

[23] This scenario falls slightly short because the planned expenditure reduction in 2029 is slightly less than the original intention of 3 billion euros, and because even a 3 billion euro adjustment in 2029 would not decrease the sustainability gap by that amount as the sustainability gap is ex-pressed in terms of an immediate adjustment

measures are entirely independent of the reform". The proposal for patient freedom of choice states that the bill creates preconditions for cost savings in the long run, but does not clarify how. In the next subsection, we turn to discuss this issue in more detail.

Provider incentives and health care expenditures

The incentives faced by health care providers and counties will be affected by the social and health care reform. Provider incentives will be affected in particular by the law for patient freedom of choice. These incentives and how providers react to them will be an important factor for the likely development of health care expenditures.

There will be two levels to freedom of choice in the new system. Within primary care, all citizens will enlist as customers in a social and health care center (either public or private) of their choice. For certain specialized procedures and long-term care, the unincorporated county enterprise (*maakunnan liikelaitos*) will issue vouchers (or in some cases personal budgets) to customers based on consultation with the patient's health care center; vouchers can be used to purchase private services.[24] A round of expert statements on the draft law ended on 15 December 2017, and the government has announced some subsequent changes. The original plan was to make vouchers mandatory for the services listed in the proposal. After facing criticism, the government has announced some revisions to these plans, so that issuing vouchers would not be mandatory for the counties in most cases.[25]

These new provisions appear to considerably expand freedom of choice in health care from the current situation, where the citizen can choose between

---

[24] Alternatively, the patient can decline the voucher, in which case the unincorporated county enterprise will provide the service either with its own production or via subcontracting.

[25] The requirement to issue a voucher would be mandatory for example in cases where the county itself is unable to provide the service in question within a pre-specified time limit. In most cases, issuing vouchers would be optional. The exact details of the rules regarding vouchers, as well as other changes to the draft law, will be specified within the coming months.

public health centers and (in agreement with the referring physician) the provider of non-emergency treatment. The provisions also expand the role of private providers in Finnish health care.

A crucial question for attaining the goals of the social and health care reform is whether freedom of choice and competition between providers will lead to cost savings. Social and health care centers cannot compete in prices, so they will compete in quality. As such, competition may decrease costs only indirectly and in the longer run, if providers will offer higher quality at the same price, enabling the government to fund the same level of quality at decreased compensation.[26] However, whether this will be achieved is uncertain.

Below, we discuss the incentives created by the proposed system in particular from the point of view of containing costs. How providers will react to these incentives is ultimately an empirical question. There is ample evidence on health care reforms and provider reactions to incentives in the international literature. A full assessment of the possible effects of the Finnish reform, or of relevant international evidence, is beyond the scope of this report. One needs to take care in drawing quick lessons from the freedom of choice reforms in other countries. Whether a certain type of measure will, say, increase productivity, will depend on the characteristics of the health care system in any given country (e.g. level of (in)efficiency, share of public and private providers prior to a reform, extent of competition, etc). A gradual, phased-out implementation of the reform including carefully designed experimentation would provide valuable evidence on the effects of different alternatives.

First, competition ideally provides good incentives for cost-efficiency. There are two possible caveats to this in the proposed system. The first is that health care centres will be required to offer a fairly wide range of services (which is on the other hand warranted by a concern for service integration in health care). This means that there might not be many providers in any given area, and it remains to be seen whether effective competition will develop. Further, and perhaps more fundamentally, ensuring that competition would result in favourable outcomes (regarding either costs or quality) in a

---

[26] Note that all references to decreases and increases are made relative to the baseline scenario, not to changes over time in a given scenario.

market characterized by informational imperfections, such as health care, will in many cases require careful regulation. For example, true quality (whether the right treatment is provided for the right condition) of many services in healthcare is to an important extent unobservable to the customer, who relies on the advice from the expert (doctor). In this type of a setting it is not a priori certain that competition will be effective in ensuring favourable outcomes (Arrow 1963, Dulleck and Kerschbamer 2006). Depending for example on the exact details of the system of compensation to providers, competition may lead to either under-provision (associated with low costs, at least in the short run) or over-provision (associated with high costs) of care.

Increased reliance on private provision is an important aspect of the reform. The government proposal acknowledges some risks associated with increased private provision and that competition will not automatically yield good outcomes in healthcare (HE 47/2017). It is somewhat unclear how the conclusion, that under the current proposal competition will yield efficiency improvements, has been reached While there is evidence of more effective management practices in private care (Angelis et al. 2017), for example, there is also evidence that private providers may be more likely to respond to financial incentives in undesirable ways (e.g. choosing treatments based on private profitability, and cream-skimming the most profitable customers) (e.g. Duggan 2000, Dafny 2005).[27] A more careful analysis of the pros and cons of public and private provision would be warranted.

Second, incentives to contain costs depend crucially on the compensation system for providers, and whether this system succeeds in aligning the incentives of the providers with those of the policy-maker. The health care centers' compensation will mainly be based on capitation fees. This is an attempt to control costs: if compensation was primarily based on services provided, there would be no incentives to control costs. There remains, however, the common-pool problem related to referrals. To attract new customers or to retain existing ones, the provider may have the incentive to lib-

---

[27] More generally, in a classic contribution, Hart et al. (1997) warn against private providers' incentives to cut quality in a market where quality is imperfectly observable. On the other hand, there is also extensive discussion of incentives for overprovision in the health economics literature. Pita Barros and Siciliani (2012) provide an overview of research (up to 2012) comparing the performance of private and public health care providers. A careful review of this evidence is beyond the scope of the current report.

erally grant referrals to specialized care.[28] The cost will then be borne by the county. More generally, a capitation fee based system generates a particular incentive to shift costs to other parties where possible. This incentive is likely amplified if a service provider in primary care can use vouchers to channel customers to their own services in (publicly funded) specialized care. In this sense, the two layers of freedom of choice – direct choice of a health care centre in primary care combined with vouchers for private services in specialized care – may be a particularly unattractive combination.[29]

Third, some particular features of the compensation system warrant closer attention. In the new system, all citizens are required to register at a health care centre. There have been fears that this will lead to automatic expenditure increases, as health care centres will receive the capitation fee for all customers, e.g. also for customers who receive occupational care and therefore are likely to have very little need for services provided by the health care centre. This seems ultimately to be a matter of designing the compensation system in such a way that it reflects average costs per patient, and takes patient characteristics sufficiently into account. In principle, for example, the capitation fee should be lower for individuals entitled to occupational health care. Data limitations might imply however, that this issue is not trivially resolved. Overall, the role of occupational health care has not been thoroughly discussed in the context of the reform, even though it is a major part of the Finnish health care system and has important interactions with publicly funded basic and specialized health care.

Finally, if a patient has not actively chosen a health care centre within two years, he will be automatically registered as a customer of the nearest healthcare centre. Literature on behavioural economics suggests that such default options are often important determinants of choice. This is likely to reinforce the incentive for providers to locate in densely populated and prosperous areas, amplifying risks associated with over-provision to these customer groups. It may also create an additional mechanism for increased

---

[28] Even if all treatments are not necessary or cost-effective, they may create an impression of active and good quality care for the patient.

[29] To alleviate these adverse incentives, the unincorporated county enterprise would act as a gate-keeper, and check all referrals to voucher-based services, that is, vouchers are officially issued by the county. The draft law aims to make the gate-keeping procedure as light as possible, and in practice the system will likely rely on the expertise of the service provider in any individual case. At the time of writing, the exact status of these provisions is unclear, as the voucher system is under revision.

private provision, to the extent that private providers have more flexibility in choosing locations.

Overall, facilitating informed choice and the need to monitor providers requires investments in information technology and information provision. Attempts to ensure a level playing field between private and public providers add another layer of complexity to regulation. The complexity of the required regulation is already evident in the current draft of the law, and costs of extensive regulation need to be weighed against any potential savings from the introduction of competition.

The incentives of the counties are also crucial for the outcome of the reform, as counties have some discretion over key features of the new system. These include designing some elements of the compensation system of providers, defining the range of services offered, and the actual production of services through the public social and health care center and the unincorporated county enterprise. These incentives depend, among other things, on the question of the right to taxation.

The current proposal's lack of taxation rights can be justified for example with the notion of vertical tax externalities. If the general government, the county, and municipalities all collected revenue from labor income, the county's decision to increase tax rates would reduce the revenue of the other administrative levels, assuming that individuals would reduce their labor supply in response to tax increases. Horizontal tax externalities between counties on the other hand point towards the possibility of harmful fiscal competition.

There are, however, also arguments for counties' own taxation. Taxation rights would make the counties' budget constraint harder, as the cost of budgetary overruns would be borne by the counties' own citizens (at least to a greater extent than without taxation rights). The lack of taxation rights also reduces the incentives to organize care more efficiently, as successful reductions in total expenditure might be met by reductions in appropriations in the following years. Effectively this means that however the reform will make productivity increases possible, realizing this potential will depend on the general government. The general government can of course force mandated cost reductions on counties, but such mandated reductions without a clear idea of the mechanisms through which the corresponding productivity

increases will be achieved, can have negative consequences for health care quality.

Finally it should be noted that some of the objectives of the reform work actively against any expenditure reductions. Currently waiting lists are used as a method for allocating care, and reducing waiting times is one of the key objectives of the reform. This is equivalent to making the system more demand driven, which tends to increase total costs. In this sense, the different objectives of the reform are in direct conflict with each other. Reconciling the conflicting objectives would require efficiency improvements beyond the 3 billion savings target.

5.4.   Council views

The effects of non-demographic factors and increases in life expectancy on social and health care expenditures should receive more attention in sustainability gap calculations, and the current assumptions should be further examined and justified. It is not sufficient to merely refer to and follow choices made in European Commission's calculations. EC calculations themselves are not sufficiently documented, and the estimates applied to the EU as a whole may not be the best estimates for Finland. It is unsatisfactory that such a crucial aspect for public finances has not been more thoroughly analyzed, and it reduces the credibility of the MoF sustainability analyses. In addition to robustness analyses using different parametrizations, the baseline values should be better justified.

The government's plans for closing the sustainability gap rely heavily on the social and health care reform. The simultaneous aims of large cost reductions and a more demand-driven system with improved access to health care are at odds with each other. The government proposal does not adequately pinpoint the mechanisms by which the planned expenditure reductions can be achieved, without leading to negative effects on health care quality.

Further, some key elements of the proposed freedom of choice reform in health care are more likely to increase than decrease expenditure. The proposed system features a risk of overprovision to certain population groups

and common pool problems imply that providers face incentives to shift costs from primary to special health care, or from the county to the national level. Also, the role of occupational health care in the new system needs to be discussed and resolved.

The Council also finds it highly problematic that the consequences of a considerable and abrupt increase in the reliance on private service providers in a publicly funded health care system have not been adequately analyzed

Overall, the success of the initiative depends on whether regulation succeeds in aligning the objectives of healthcare providers with the goals of the reform. Outcomes regarding costs, quality and equality of access all depend on the compensation system for providers. The costs of extensive and complex regulation and information systems contribute to further increases in expenditures.

6.   Education and skills

In many ways the Finnish education system has been a success story and has been viewed as a model that other countries should follow. Long-term investments in education have paid off and by several measures Finland in the 1990s was the most skilled nation in the world. For example, in 1990, the fraction of youth studying up to tertiary level was the highest of the OECD countries. The performance of ninth graders in international comparisons, particularly in the OECD PISA tests, have also attracted attention and made Finland an example that many others envy.

Recent trends are more alarming. While Finnish young people still perform well in international comparisons, their test scores have declined both absolutely and in comparison to other countries. At the same time, growth in the fraction of young people continuing to the tertiary level education has stalled while in many comparable countries higher education systems are still expanding. Trends at the lower end of educational achievement are equally problematic. Sixteen per cent of 25-year-olds have completed no education beyond compulsory school. A striking 40% of this group are not in employment, education or training (NEET) at age 25 (Karhunen 2017).

The government has responded to the challenges arising from the changes in demand for education with several policy reactions, of which the reform of the vocational education system is probably the most important. Beginning in 2018, vocational education will be to a much greater extent based on practical training in firms. At the same time the number of separate programmes will be reduced, competencies will be demonstrated irrespectively of how they are acquired, and the funding of vocational schools will become based increasingly on output.

Compared to the reforms in vocational education, the changes in general education have been less drastic. Pre-school at age 6 became compulsory in 2015, but as most children took part in some form of pre-school already before the reform, this change has probably had a limited impact on participation rates or the type of education that the children receive. A reduction in day care fees implemented in January 2018 may turn out to have a more significant effect on participation rates.

Under the current legislation universities are autonomous, i.e. administratively separate from the general government. In actuality this autonomy is limited by statutes of the University law and other legislation, the performance agreements between the universities and the Ministry of Education, and the governmental funding system by which universities receive a large share of their funding. Therefore, changes in the funding formula, goals for the number of graduates, and agreements concerning, for example, admission systems, are a key part of government higher education policies.

In this chapter we will evaluate the government's education policies. We will start with an overview of the challenges faced by the educational system, in particular related to changes in the demand for skills and the recent performance of the Finnish education system in the light of these changes. We will then focus on some key policy changes and the potential impact of these policies. At the end we will present some policy suggestions based on the analysis.

In addition to this summary report, we have commissioned several background reports that we draw on. Aleksi Kalenius of the Finnish delegation to the OECD describes the changes in the education level of the Finnish labour force and compares these changes to other OECD countries. Allan Seuri and Roope Uusitalo of the Council together with Hanna Virtanen of ETLA examine the potential impacts of extending compulsory education to age 18 based on Finnish data, earlier empirical research and experiences from other countries. Ludger Woessmann of CESifo and the University of Munich discusses the impacts of vocational education drawing on the results of his research with Eric Hanushek and on his expertise of the German apprenticeship system. Finally, Allan Seuri of the Council secretariat and Hannu Vartiainen of the University of Helsinki evaluate the effects of the university funding system. This background report is used both in this chapter and in the following chapter on innovation policies.

6.1.   Long-term trends in education and skills

Education level

The Finnish higher education system expanded rapidly up to 1990. At that point the fraction of Finns in the age group between 25 and 34 years with a tertiary degree was the highest among the OECD countries. This expansion continued in the 1990s by increasing admissions to universities and by upgrading various vocational colleges – already classified as tertiary education – to polytechnics or universities of applied sciences. These polytechnics were fully operational by 2000 and by then produced more tertiary degrees than the old universities.

An exceptional development in Finland is that the share of 25-34-year-olds with tertiary education has barely grown after 2000, remaining at around 40% of the cohort (Figure 6.1.1). At the same time expansion of tertiary education systems has continued in most other OECD countries. Hence the relative ranking of Finland in terms of the share of those with tertiary education has fallen significantly.

Figure 6.1.1: 25-34-year-olds with tertiary education in 2000 and 2016
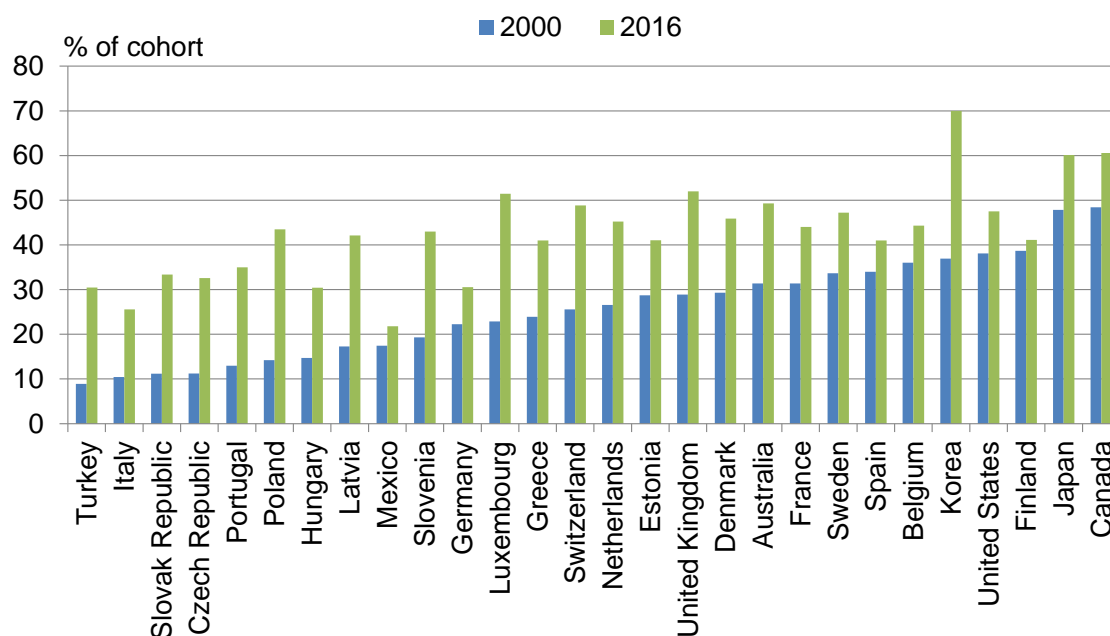
Source: OECD Education at a Glance 2017, Table A.12. Sorted by share of persons with tertiary education in 2000.

Cross-country comparisons of education level are difficult as the systems differ in many ways. In Finland, almost all tertiary graduates in younger co-

horts have completed either polytechnic or university education. In many other countries short-cycle tertiary programmes are still common. Therefore, a comparison of the fraction of the cohort that has completed at least Bachelor's level (which in Finland contains university and polytechnic education) ranks the Finnish education level much higher. (Kivinen and Hedman, 2017) Focusing on a slightly older age group also "improves" the ranking of the Finnish education level in an international comparison as Finnish university graduates are, on average, older than in most OECD countries and typically have not finished their education by age 25.

Comparisons over time are almost equally difficult. The creation of polytechnics (which are classified as Bachelor's level education) from vocational colleges (which were mainly classified as short-cycle tertiary education) dramatically increased the education level if this change is interpreted as a true upgrading of education. On the other hand, the fraction with tertiary education was roughly unchanged, suggesting no significant change in the education level. The correct interpretation is probably somewhere in between. Polytechnics have three large fields: business administration, engineering and nursing. In engineering and nursing, the education level remained relatively similar to the pre-reform system. In business administration the length of programmes increased.

However, the end of the expansion of the tertiary education system is not limited to vocational colleges and polytechnics, nor can it be explained by measurement and classification problems that make comparisons over time difficult (see Kalenius 2018). Growth in the number of new students in universities also ended around the year 2000. Over the 15-year period from 1985 to 2000, the number of new students in Finnish universities increased by 65%. In another 15-year period from 2000 to 2015 the increase was only 1.5%. From a peak in 2002 to the last observation year in 2015, the number of new students in Finnish universities has declined by 6%.

Existing statistics on the number of new students double-count students who were enrolled at another university at the time of entry. On the other hand, they omit students who change programmes within the same university. Hence, based on published statistics, it is difficult to say whether the decline in the number of new university students is due to a decrease in university admission rates or to an increasing fraction of admitted students already having started in an another university programme earlier or already having a university degree.

In Figure 6.1.2, we report net and gross entry volumes based on micro data. Net figures are calculated by deducting from the number of new students entrants who, at the time of entry, had been previously enrolled at universities. The gross numbers add to new entrants students who change field or programme within a university. As these changes take place mainly through the normal admission system, these students should be included in the gross entry figures.

Figure 6.1.2: New Students in Finnish universities by year of entry
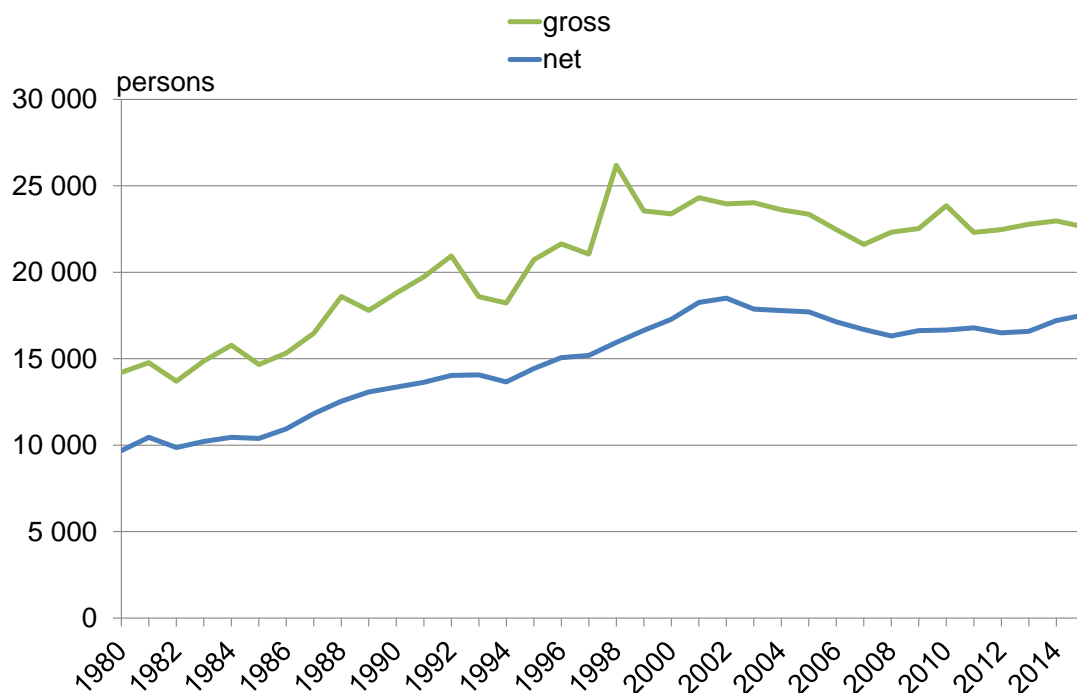
Source: Statistics Finland University enrolments register. The register records the number of newly enrolled students. The net figures are calculated by deducting students who have previously enrolled in a university programme at some point after 1975. The gross numbers include all new entrants and students who change programme within a university.

Data on new entrants clearly show that a long-term trend of increasing admission rates ended around the year 2000. As there is a reduction in the number of new entrants both in the gross and in the net series this is not explained by multiple entry. The main explanation for the reduction in the number of new students is a reduction of gross admission rates after the year 2000.

In Figure 6.1.3 we report the number of new university students by main field. The figure shows that the decline in the number of new students was largest in the technology and ICT sectors. These are also fields that grew

rapidly at the end of the 1990s. The number of new students in the humanities and the arts has also declined significantly. Enrolment in other fields is roughly unchanged.

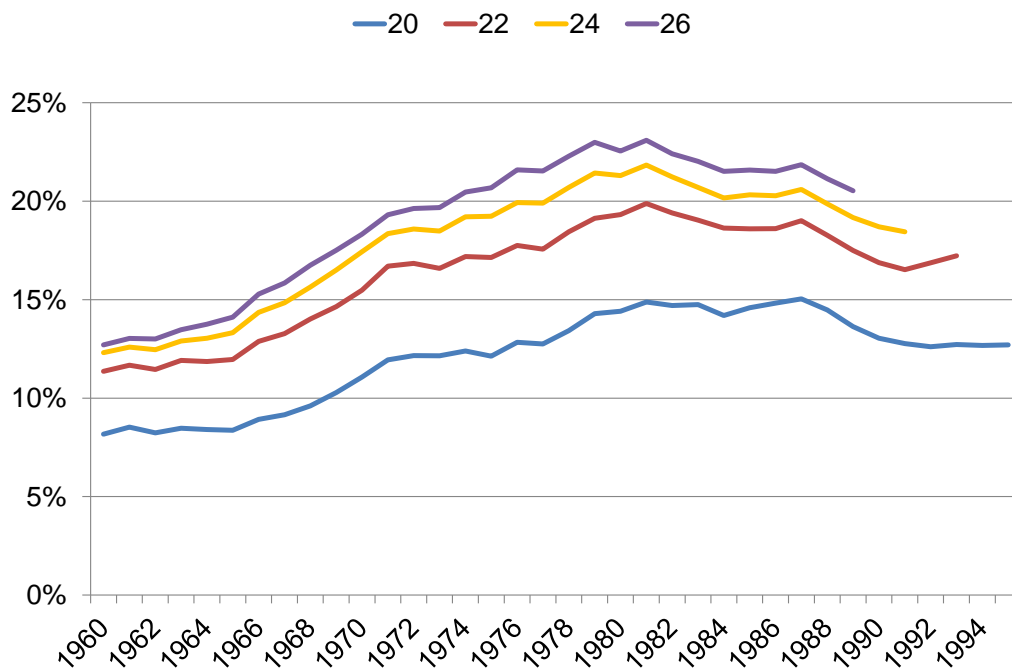Figure 6.1.3: New students in Finnish universities by field
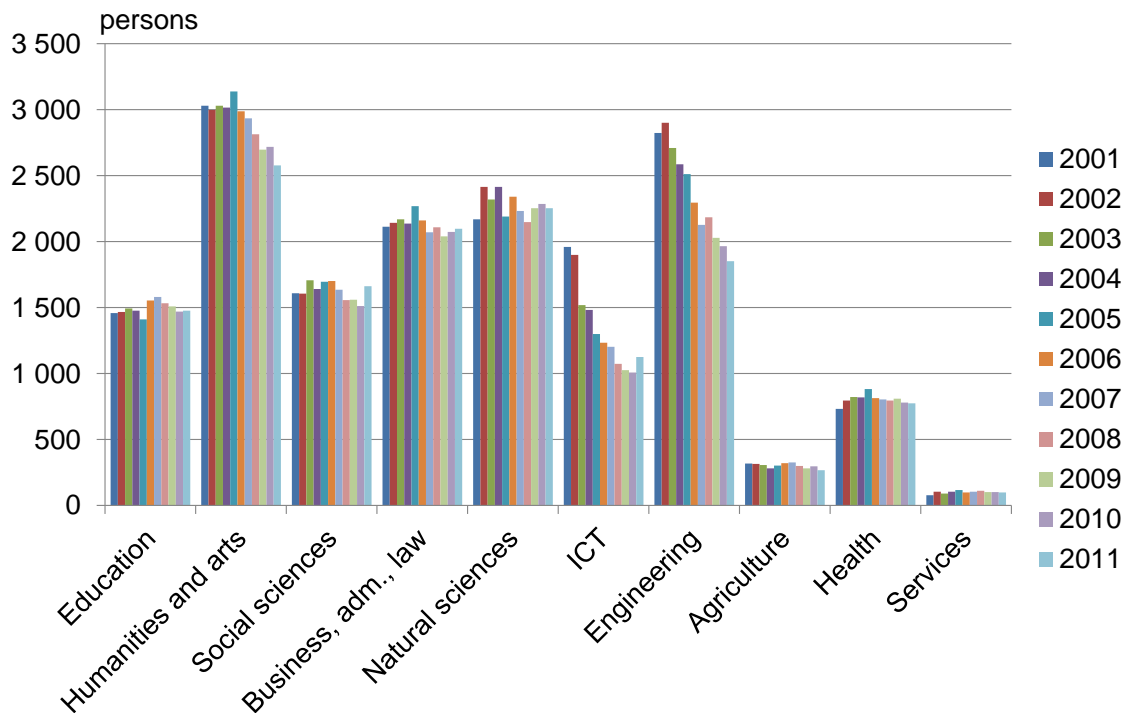
Micro data on enrolment also makes it possible to calculate the share of each birth cohort enrolled at a university. To make this as comparable as possible over time, we report in Figure 6.1.4 the fraction of a cohort enrolled at a university at some point by age 20, 22, 24 and 26. According to these results the fraction enrolling at universities was highest among those born in 1981 and has then substantially declined. Eventually, this decrease in enrollment rates will reduce the number of university graduates, and the first signs of this are already visible.[30]

---

[30] In Figures 6.1.3 and 6.1.4 we exclude polytechnics because they were established only in the 1990s and long-term series are not available. In the years since 2000 the patterns are similar when the polytechnics are included. The number of new students in higher education decreases even when the polytechnics are included and the fraction of a cohort having attending either university or polytechnic by a given age decreases starting from cohorts born in the early 1980s.

Figure 6.1.4: Fraction of birth cohort enrolled at universities at least once by age 20, 22, 24 and 26

A similar picture of stagnating growth in education levels emerges in secondary education. Figure 6.1.5 plots development in the share of 25-year-olds with no degree beyond compulsory school. This share declined in the 1990s but started to increase again after the year 2000. This increase can in part be explained by an increase in immigration and lower levels of education among immigrants. However, the share of 25-year-olds without secondary education grew between 2000 and 2010 also among persons born in Finland. After 2010 this share has declined, particularly among men. In 2015, 16% of 25-year-olds had completed no education after comprehensive school.

Figure 6.1.5: Share of 25-year-olds with no education beyond compulsory schooling
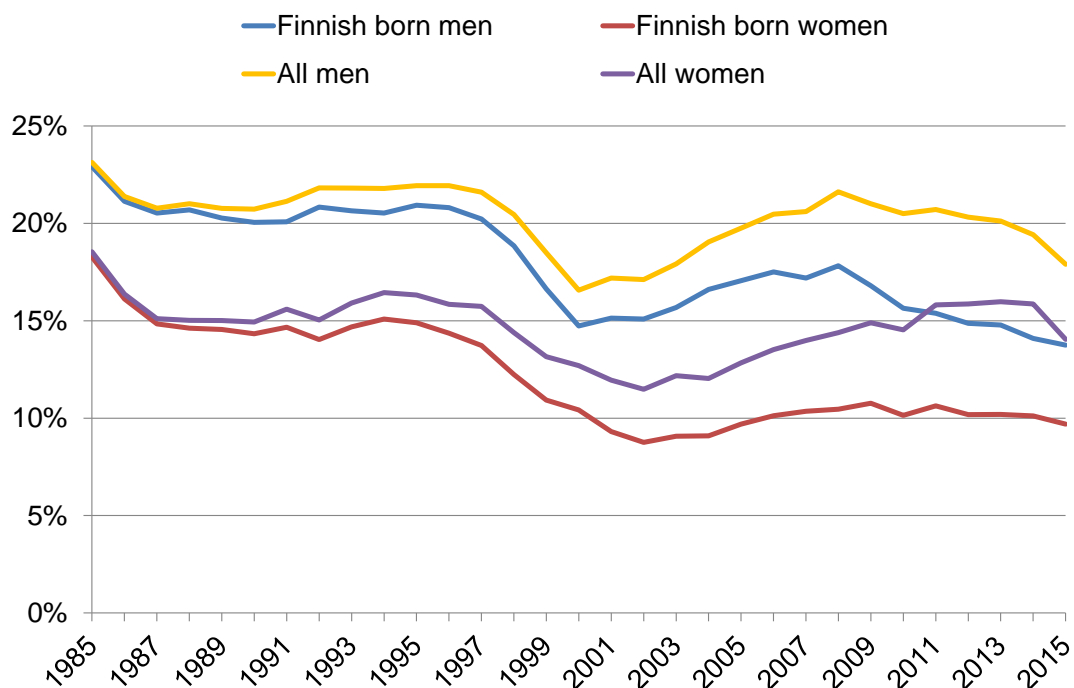
Source: Calculations based on the education registers of Statistics Finland by Hannu Karhunen.

Skills

Education is not about obtaining degrees, but about developing useful skills. Measuring skills and comparing them across time or across groups is not as straightforward as counting degrees. An evaluation of the development of skills over time requires tests that are comparable over time and across countries. The only feasible option is to use international achievement comparisons, which typically evaluate the performance of school-age children. The results of the OECD PISA test have received most attention, but there are also other international testing programmes that are much older than PISA.

The exceptionally good performance of Finnish ninth graders in the OECD PISA test is well known. Almost equally well known is the recent decline in the PISA scores. Finnish students were top performers in the first three PISA tests implemented in 2000, 2003 and 2006. Finnish students are still among the top performers in the OECD countries, but in the three last rounds of 2009, 2012 and 2015 the scores have been in constant decline.

The PISA programme only started in 2000. To provide a longer perspective, we use data compiled by Altinok et al. (2017), and present trends in international comparisons starting from 1965. These data have been harmonized so that the test scores are, at least in principle, comparable both over time and across countries. Such a comparison cannot be done for all countries, but it was possible to find comparable data for the same time periods for France, Germany, Israel, Japan, the Netherlands and the USA. Figure 6.1.6 shows the scores of Finnish students and the average score in the countries mentioned.

In the period from 1965 to 2000 Finnish students caught up with students in the comparison countries and by 2000 scored higher than students in these countries. The recent decline in the test scores has been deeper in Finland than in the comparison countries.

Figure 6.1.6: Secondary pupils' harmonized test scores in Finland and comparison countries
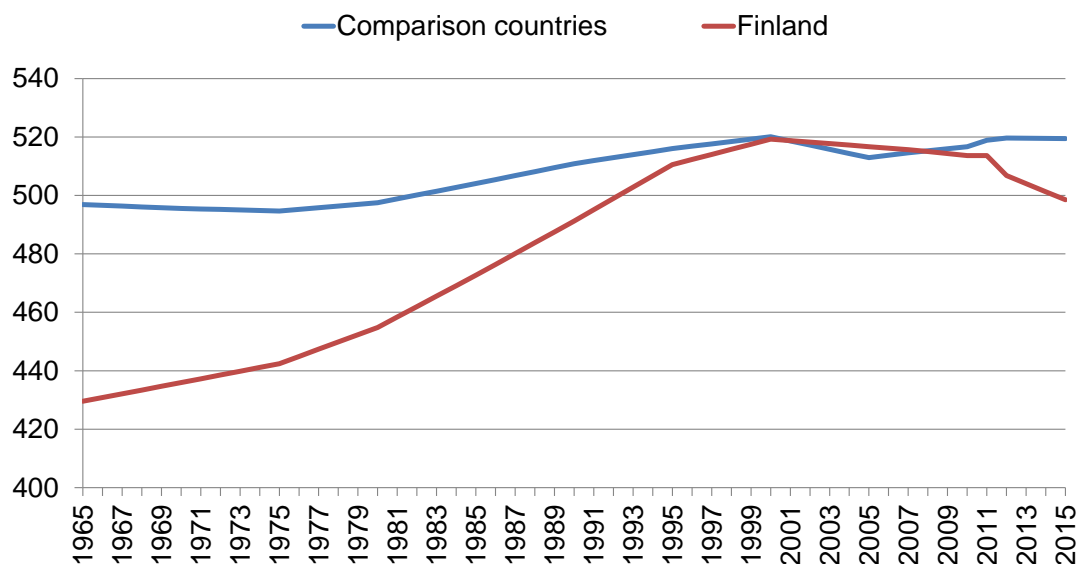

Source: Altinok et al. (2017). The comparison countries are developed countries with observations for the same years as for Finland: France, Germany, Israel, Japan, Netherlands and USA. Indices are based on TIMMS, PISA, PIRLS, precursors to TIMMS and PIRLS, and the Monitoring Learning Achievement project by UNESCO and UNICEF. The figure uses linear interpolation between the years for which data are available.

As a complementary perspective, Figure 6.1.7 presents the development of the Finnish army test scores (PKOE 1) over time in visuospatial reasoning, verbal ability and numeric ability.[31] The army test scores clearly demon-

---

[31] Since the 1950s all conscripts have been tested with an ability test at the beginning of their military service. Since 1982 these test scores have been available in electronic form. Our data are based

strate a strong improvement and then a decline in the verbal and maths skills of young Finnish men starting from the cohorts born in the late 1970s who were in military service at the end of the 1990s. Similar trends in verbal and maths skills have been reported in other Nordic countries that have large samples of military test data available (Sundet et al. 2004; Teasdale et al. 2005). So far no convincing evidence has been presented for the reasons for this reversal in skill trends.

Figure 6.1.7: Trends in army test scores
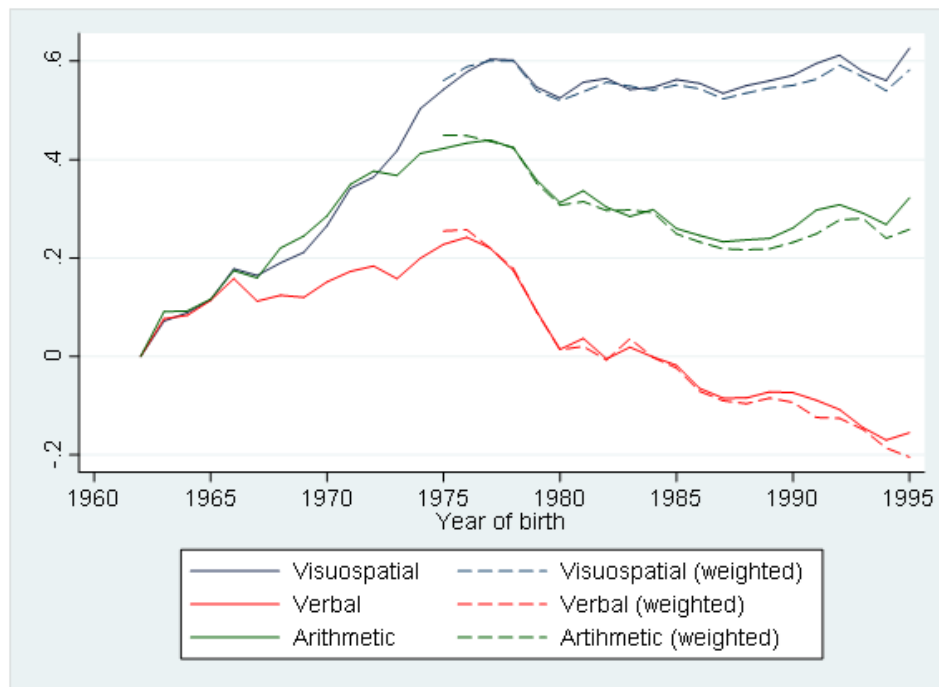
The original test scores have been normalized so that their mean is zero with a standard deviation of one in the oldest cohort. Source: Calculations by Juho Jokinen, access granted in AM19166.

The test score data cover all Finnish conscripts, which currently amounts to about 70% of the male cohort. This share has declined over time, which could affect comparability across years. To account for potential changes in selectivity, the series reported in Figure 6.1.7. have been adjusted by re-

on the population of conscripts but exclude those performing civil service, and regular army personnel. The data have been linked to other register data at Statistics Finland, which allows the observed trends to be corrected for changes in selectivity. The military test scores are highly correlated with final grades at comprehensive school and are strong predictors of later earnings, both providing evidence of the external validity of the test and lessening concerns about intentionally obtaining low scores to avoid being ordered to perform longer service or officer training. More information on the test and on the trends in the scores including the personality test battery (PKOE2) in the army test is given in a recent study by Jokela et al (2017).

weighting the data using final grades in comprehensive school so that the sample becomes representative of each male cohort in terms of their performance in comprehensive school (For details and other selectivity adjustments, see Jokela et al 2017). However, the trends in the reweighted test scores closely resemble the trends in the original series. Hence changes in selectivity into military service do not explain the observed trends. It is also unlikely that the trends could be explained by changes in motivation as motivation should have a roughly equal effect on all tests. However, the scores in the visuospatial reasoning test, which most closely resembles a standard IQ test, do not decline over time. Our interpretation, therefore, is that the decline in verbal and maths skills is real, but given a lack of solid evidence, we can only speculate on the reasons why this might have happened.

6.2.　Returns to education

Education is a highly profitable investment in terms of employment opportunities and earnings. Figure 6.2.1, which is based on the Structure of Earnings Statistics by Statistics Finland, reports monthly earnings by education and age for full-time workers in 2016. According to these data, an increase in education is systematically related to higher earnings at each age. The only exception is that the earnings of secondary school graduates are almost identical to those with only compulsory schooling. Note, however, that these data refer to full-time workers. Secondary schooling still increases employment rates, particularly in younger age groups.

Another noteworthy observation is the large wage gap between Master's and Bachelor's level education. In younger cohorts, the latter group consists mainly of polytechnics graduates. Apparently, traditional university education still has a large market value compared to polytechnic education. In fact, the wage difference between university and polytechnic graduates is much larger than the difference between polytechnic graduates and those with secondary education.

Figure 6.2.1: Average monthly wages by age and education in 2016
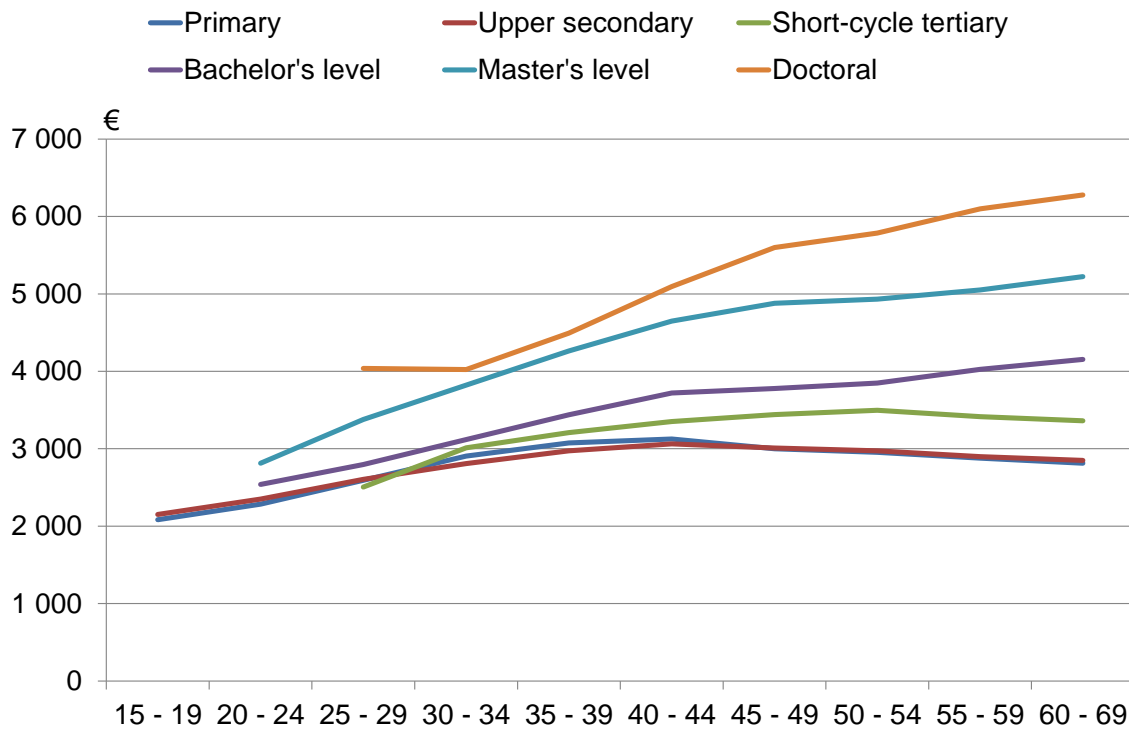
Source: Statistics Finland, Wage Structure Statistics.

The monetary return to education has increased in most countries over the past 30 years. In Finland the effect of education on earnings has been relatively stable, but if anything has still grown since 2000. In Figure 6.2.2 we report the return to education based on a simple regression model where (the logarithm of) earnings is explained by years of education using cross-section data. In the model earnings are measured by annual taxable earnings. To avoid confusing changes in employment with changes in wages, and in order to avoid problems with zero earnings, data were used for workers who had been employed for 12 months during the year. In the figure we report the coefficients of years of schooling, controlling only for age and gender. The results can be interpreted as the proportional increase in earnings related to (but not necessarily caused by) one additional year of schooling.

As shown in Figure 6.2.2, one additional year of schooling is associated with about 7% higher earnings. The figure also shows that the return to education measured in this way has increased for women and remained rather stable for men. It should be noted that these returns are measured in a cross-section and therefore measure the real return to investment. A 7% real return is high compared to alternative investment opportunities. Another way of demonstrating profitability is to calculate the effect of educa-

tion on (discounted) lifetime earnings. Using such an approach, Koerselman and Uusitalo (2014) show that university-educated men earn more than 500,000 euros more during their careers than those with vocational education. For women, the lifetime return to university education is around 400,000 euros.

Figure 6.2.2: Returns to education in Finland
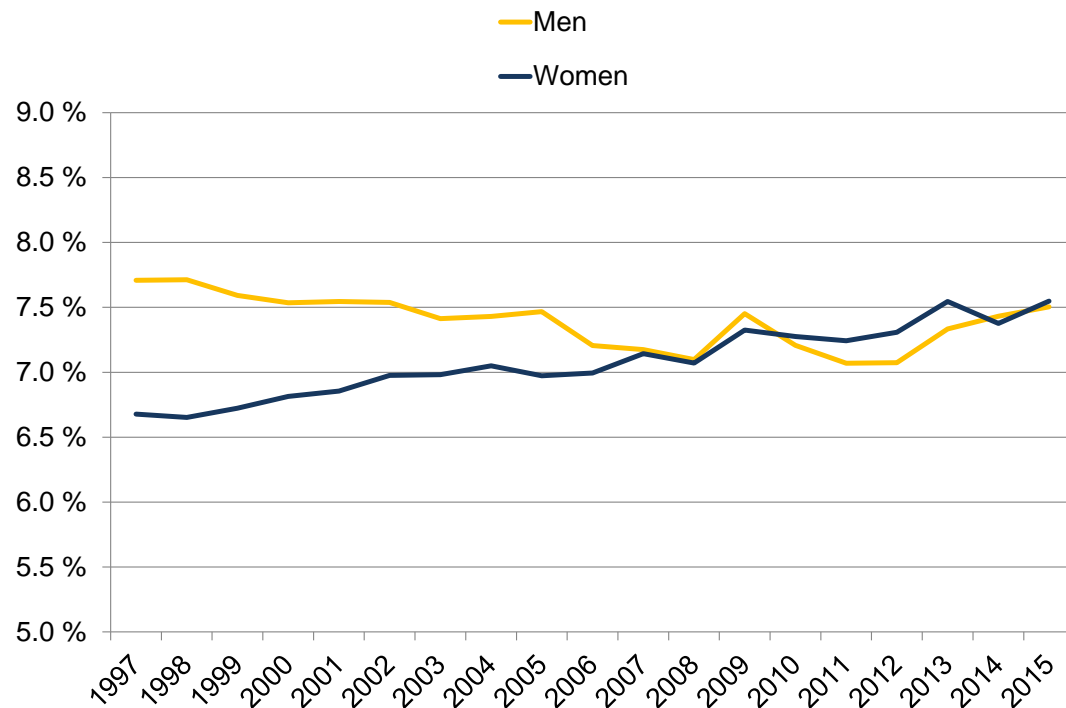
Source: Council's calculations based on micro-data from the Employment Statistics of Statistics Finland.

Some caveats are worth mentioning related to return to education calculations. First, the relation between earnings and education may not reflect a causal relationship. As long as education is not randomly assigned, those with more education differ systematically from those with less education. Second, the private return to education may be larger or smaller than the social return to education. If education is publicly funded, the social return to education is a more relevant criterion for investment than the private returns reported in Figure 6.2.2. On the other hand, when discussing the effects of public policies on individuals' incentives to obtain an education, it is the private returns that matter.

Identifying the causal effect of education has been at the top of the research agenda from the early 1990s onwards. Random experiments in education are generally unfeasible and therefore researchers have utilized so-called

natural experiments to evaluate the returns to education. Most commonly these utilize changes in compulsory schooling that affect the entire cohort and therefore enable the effects of education to be evaluated without bias caused by selectivity. In general, the results indicate that groups forced to obtain more education experience earnings gains that are equal or even higher in magnitude than the earnings differences in observational data (Harmon and Walker 1995; Angrist and Krueger 1991; Card 1999).

Measuring the social return to education has proved to be a more difficult question. If education has spillover effects so that employees do not capture the full benefits of their education, the social return may exceed the private return. In simplistic calculations published, for example, in the OECD's Education at Glance, the social and private returns are compared by reporting pre-tax and post-tax returns to education and by accounting for the costs of education. Clearly, these calculations still omit benefits that may arise due to productivity growth, health improvements or, for example, a better functioning democracy.

On the other hand, if returns to education include a non-productive signalling component, social returns will be lower than private returns. It is possible that education simply improves the relative position of more educated workers in a way that may be harmful for less educated workers competing for the same jobs. Even though the signalling model was invented in the 1970s, and its developer Michael Spence won a Nobel prize in Economics in 2001, convincing empirical work on the magnitude of signalling effects is scarce. A Finnish study by Hämäläinen and Uusitalo (2008) found that wage differences are due to both signalling and productivity components.

6.3. Resources invested in education and their impacts

Like all public policies, education policy also involves financial decisions. Good intentions become practical policies only after sufficient resources are invested. In this section we first review the trends in investments in education and then discuss some more detailed policy decisions.

Figure 6.3.1 presents the development of public education expenditure based on Statistics Finland's Government Finance Statistics. The overall trend is clear: public education expenditure has been decreasing as a share

of public expenditure. At the same time it should be noted that the size of school-age cohorts has decreased. Real expenditure on education per school-age cohort member increased up to 2010 but has declined since. This decline in expenditure has reduced per-cohort-member expenditure to the level that it was between 2003 and 2009.

Figure 6.3.1: Public education expenditure
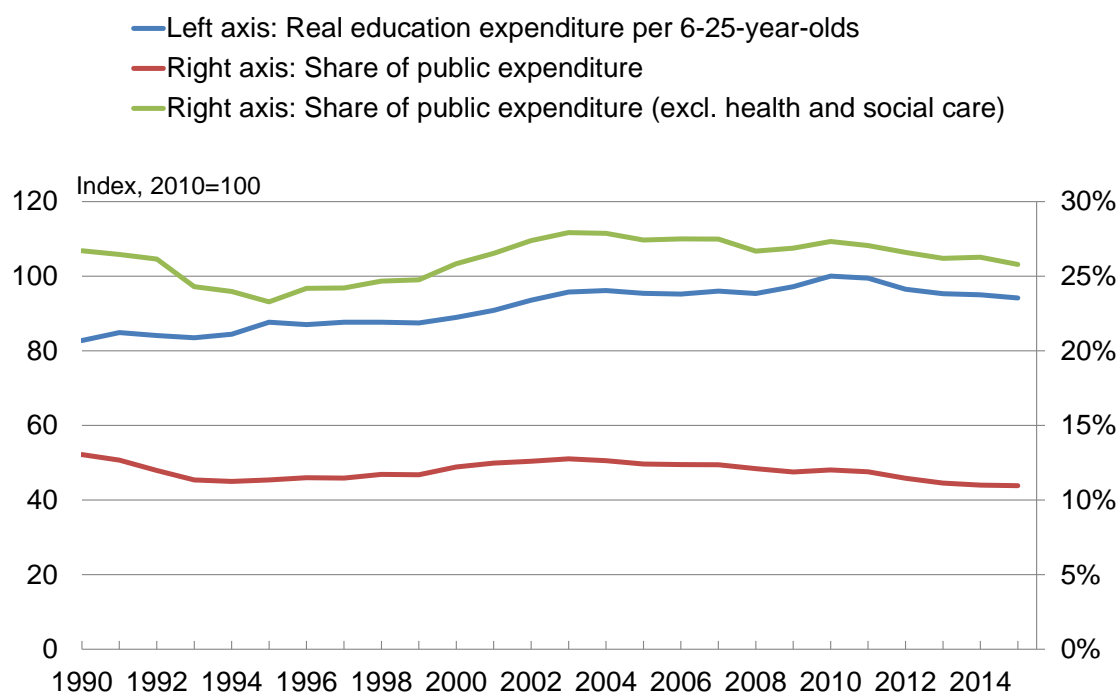
Source: Statistics Finland (Government Finance, Population). Real education expenditure deflated using public consumption deflator.

Figure 6.3.1 only extends to 2015. To evaluate the current government's stance in spending on education, Table 6.3.1 relies on budget data for 2015-2018 to estimate public education expenditure by level of education, in millions of current euros. The figures presented should be treated as approximations, as the structure of the budget does not allow for exact identification of education expenditure, and the final expenditure depends on decisions made by local governments.[32]

Two things stand out. First, by 2018 overall education expenditure has been cut by about 2% from 2015. Second, the burden of the budget cuts falls

---

[32] Figures based on government budgets, with computational costs included for items covered by state subsidies for municipalities. Students' financial support is not included in the figures.

mostly on secondary education. The table does not differentiate between vocational and general upper secondary education, but the cuts to upper secondary education fall mostly on the former.

Table 6.3.1: Education expenditure in current million euros

	2015	2016	2017	2018
Comprehensive	5 804	6 020	6 039	6 032
Upper secondary	2 766	2 653	2 374	2 406
Tertiary	2 308	2 216	2 193	2 205
Other	27	24	19	19
Total	10 905	10 913	10 624	10 661

Source: Calculations by the Council based on government budgets.

6.4. Specific policies related to expenditures

Class sizes and positive discrimination

Some of the resources in Table 6.3.1 directed at comprehensive schools are reserved for special purposes, such as reducing class sizes or increasing educational equality. This section discusses what we know about the effectiveness of such targeted funding. We begin with a survey on the effect of class size on student achievement, which is one of the most debated issues in the economics of education. After this we briefly discuss the research on funding directed at disadvantaged students.

Figure 6.4.1 presents general government appropriations for reducing class sizes and increasing educational inequality for 2009–2018.[33] There is significant volatility in the level of funding, with the most recent budget doubling the appropriations from the previous year.

---

[33] These items are currently on the same budget line and are therefore hard to separate. The budgetary structure of the funds has changed over the years. Class size reduction grants and educational equality grants were separate items prior to 2016. See Ministry of Education and Culture (2017b) for more details.

Figure 6.4.1: General government grants for reducing class sizes and improving educational equality


EUR, millions
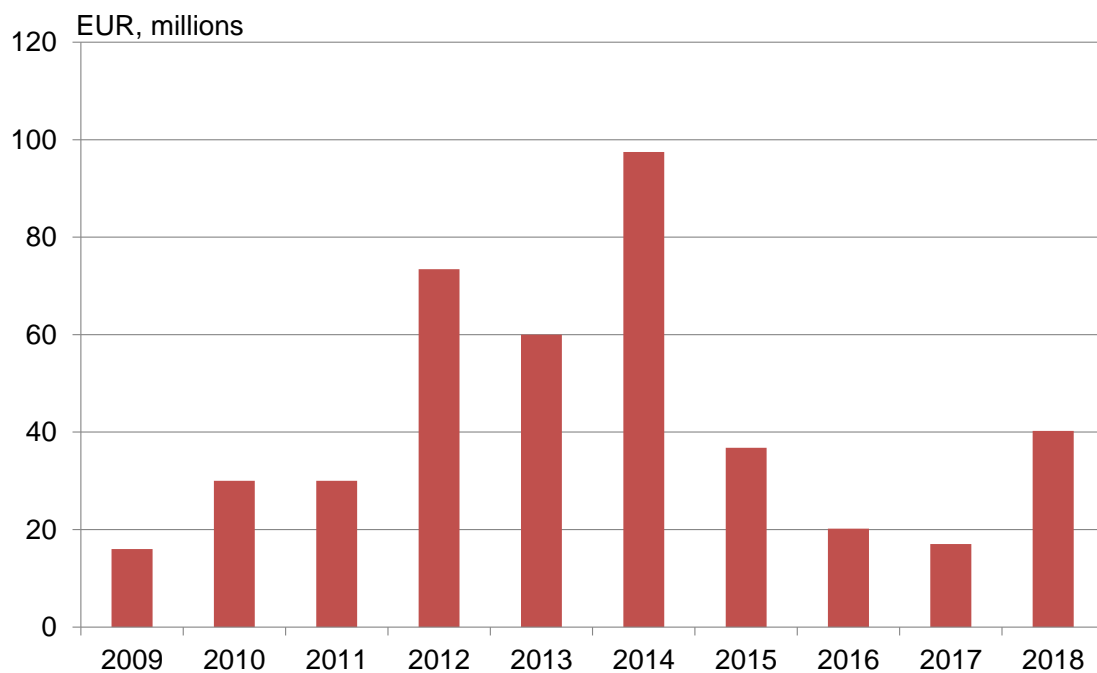
Sources: Ministry of Education and Culture (2017b) and Council's calculations.

A smaller class size may lessen disruptions and increase teacher-student contacts as each student can have a greater share of the teacher's attention. At the same time, reducing class sizes is one of the most expensive education policies. Teachers' salaries are the largest cost item in schools, and reducing class sizes increases expenditure as long as the teaching load per teacher is kept constant.

In 2009 the Ministry of Education and Culture began to provide earmarked grants to municipalities to reduce class sizes and, in particular, to reduce the number of classes with more than 25 students. As shown in Figure 6.4.2, the average class size decreased between 2008 and 2013. The government ended the class-size reduction policy in 2015 (some funds are still directed towards reducing class sizes, but only for classes with students receiving intensified or special support). There are already some indications that class sizes have started increasing in grades 1 to 6 after 2015. In the upper grades 7 to 9, average class size continued to decline between 2013 and 2016 even though the grants were no longer awarded. Naturally class size also depends on other factors and it is not clear that the changes in average class size are due to changes in government grants. Saarimaa et al. (2016) and Ahomäki (2018) find no significant differences in changes in class size between mu-

nicipalities that did or did not receive the grants. To a large extent this is probably due to almost all applications having been accepted and the small variation in per-student grants across municipalities.

Figure 6.4.2: Average class size in comprehensive school
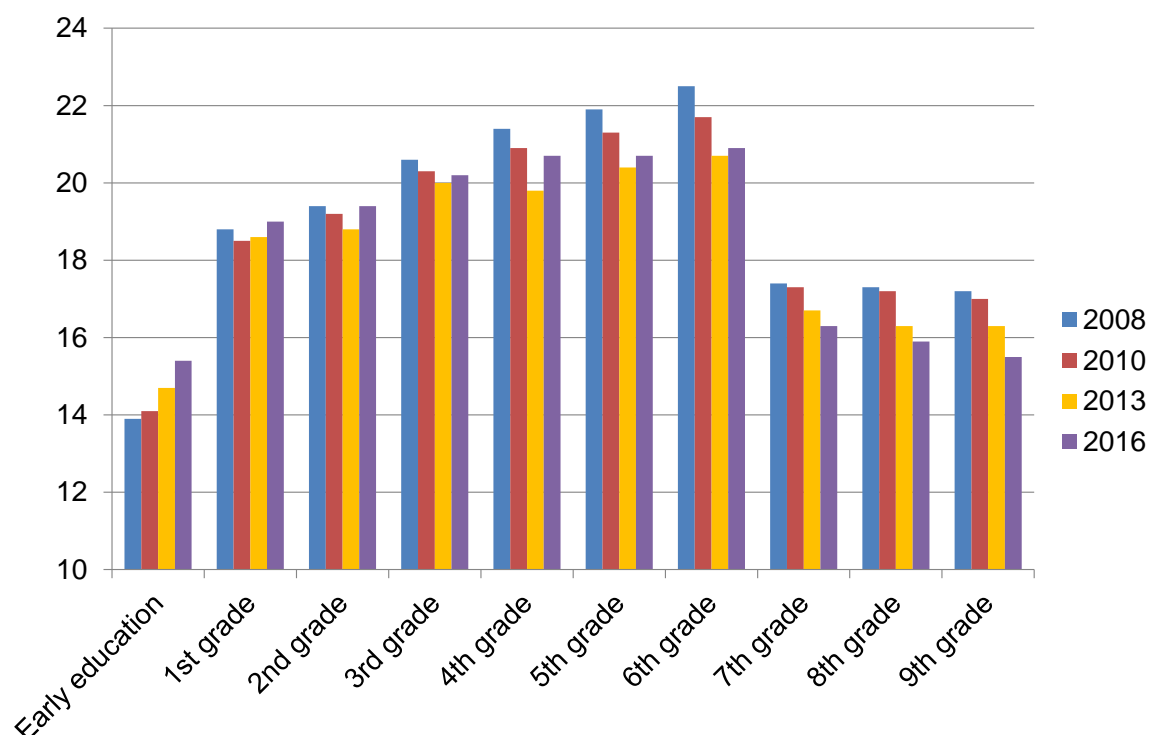
The effects of class size are difficult to evaluate because class size is correlated with student characteristics. Students in need of special attention are typically placed in smaller classes and classes tend to be smaller in small rural schools. These mechanisms create a positive correlation between class size and student outcomes even if the true effect of class size is negative.

Simple correlations between class size and student achievement[34] therefore produce a misleading impression of the effect of class size on students. A reliable evaluation of the effect of class size requires variation in class size that is unrelated to student outcomes. Ideally, the effects can be studied in a randomized experiment (eg. Krueger 1999). In the absence of such experiments economists have evaluated the effects of class size based on discrete rules

---

[34] In their recent book, Kupiainen et al. (2016) discuss issues related to the difficulty in estimating the effects of class size but their empirical estimates are still based on simple (and misleading) correlations between class size and student achievement.

related the maximum class size. If the maximum class size is 30 and the school has 30 students, the class size is 30. If the school happens to have 31 students and the rule is binding, the class is split into two classes with an average class size of 15.5.

Studies exploiting exogenous variation generated by such discrete rules (e.g. Angrist and Levy, 1999; Fredriksson et al., 2012) have generally found a significant negative effect of class size on student outcomes. In Finland, such studies have been impossible as binding rules for class size have not existed for decades. In addition, students may be allocated to schools in a way that fills up all classes, i.e. enrolment is endogenous.

Earmarked grants to reduce the number of large classes with more than 25 students could create similar exogenous variation in class size to the binding rules exploited by Angrist and Levy (1999). Saarimaa et al. (2016) used this strategy to estimate the effect of class size on final grades in comprehensive school. According to their results smaller classes have a positive effect on student achievement.

This analysis is problematic in many ways. No information on outcomes is available until the end of comprehensive school, whereas students will have attended classes of various sizes during their nine years in school. Grades are also subjective evaluations by the teacher and there is no guarantee that the grading standards are comparable across schools or that grading standards are not affected by the average "quality" of the students evaluated. Nonetheless, this is the first Finnish study that has a realistic chance of detecting true causal effects of class size, and it does find positive effects. This finding is in line with the general view in studies in other counties. Although this evidence does not yet establish that the policy is a cost-effective way of improving student learning, it does suggest that reducing class sizes has positive effects on student achievement.

The other major part of the targeted funding is funding for improving educational equality. This is equivalent to positive discrimination, i.e. funding or other resources targeted specifically at vulnerable groups. The evidence on positive discrimination funding is less clear than that for reducing class size, which is perhaps to be expected as positive discrimination funding comes in different forms with possibly varying effects.

Lavy and Schlosser (2005) find positive effects for an Israeli programme targeted at underperforming high school students, while De Haan (2017) finds positive effects for Dutch pupils with learning or behavioural difficulties. Bénabou et al. (2009) find no effects for a French programme targeting disadvantaged areas. Leuven et al. (2007) even find negative effects for a programme granting additional funding for computers and software for schools with a large share of disadvantaged minority pupils.

In a recent contribution, Silliman (2017) finds remarkably strong positive effects of positive discrimination funding in Helsinki schools, especially for students with an immigrant background. Although it is only one study, the results are encouraging and suggest that such targeted funding may be very beneficial.

Reduction in day care fees

One of the policy targets of the government is to increase participation rates in early childhood education. To implement this policy, the government has decided to lower day care fees from Jan 1 2018. The reform will change the income limits determining the fees and radically lower the fees for families with at least two children in day care. According to the calculations in the government proposal, 6700 families will have their day care fees reduced to zero. The income limit for the top rate is also increased so that fewer families will pay full fees. The reduction is largest for families that have at least two children in day care as the fee for the second child is lowered to 50% of the fee for the first child in day care.

According to the government proposal (HE 115/2017), the main reason for reforming day care fees is to improve work incentives. Income-contingent fees increase effective marginal tax rates and may in part explain low labour force participation rates among women with small children in Finland. An additional reason that the government has emphasized more recently (e.g. OKM 19.9. 2017) is that early childhood education may have beneficial effects on children as it supports learning and the development of both cognitive and social skills and prevents social exclusion. The government proposal also notes that early childhood education supports the integration of immigrant children and is particularly beneficial for children in the most vulnerable situations.

In a recent publication titled Roadmap on the development of early childhood education for 2017–2030, Karila, Kosonen and Järvenkallas (2017) provide a good summary of studies on the impacts of early childhood education on development of children's cognitive and social skills. According to the studies cited in the report, particularly children living in poverty and in other disadvantaged situations and children in immigrant families may benefit from participating in formal early childhood education. Promoting access to preschool is an equalizing intervention but its effect in reducing social background inequalities should not be overstated (Cebolla-Boado, Radl and Salazar 2017). Family economic and social resources have a significant influence on children's learning skills. There is also large variation in results across different studies and some find no or only limited benefits. For example, Lundin, Mörk and Öckert (2008) find that lowering the day care fees in 2002 in Sweden had no effect on enrolment. The authors interpret their findings that differ from the majority of earlier studies as dependent of the institutional setting stating that "In countries with a well-developed and highly subsidized child care system, further reductions in the price of child care have small effects on both female and male labour supply".

In Figure 6.4.3 below we plot the changes to day care fees by family income. As the figure illustrates, the reduction in day care fees is largest at relatively low incomes (about EUR 1500/month/person or EUR 3000/month/family) in families with two adults. As the fee depends on total family income, the effect on single-parent families is quite different, with the maximum reduction in day care fees at much higher incomes of EUR around 5000/month. The fees for the poorest families with incomes below EUR 2000/month are not reduced as these families were already exempt from day care fees under the old fee schedule.

Figure 6.4.3: Change in day care fee by family income
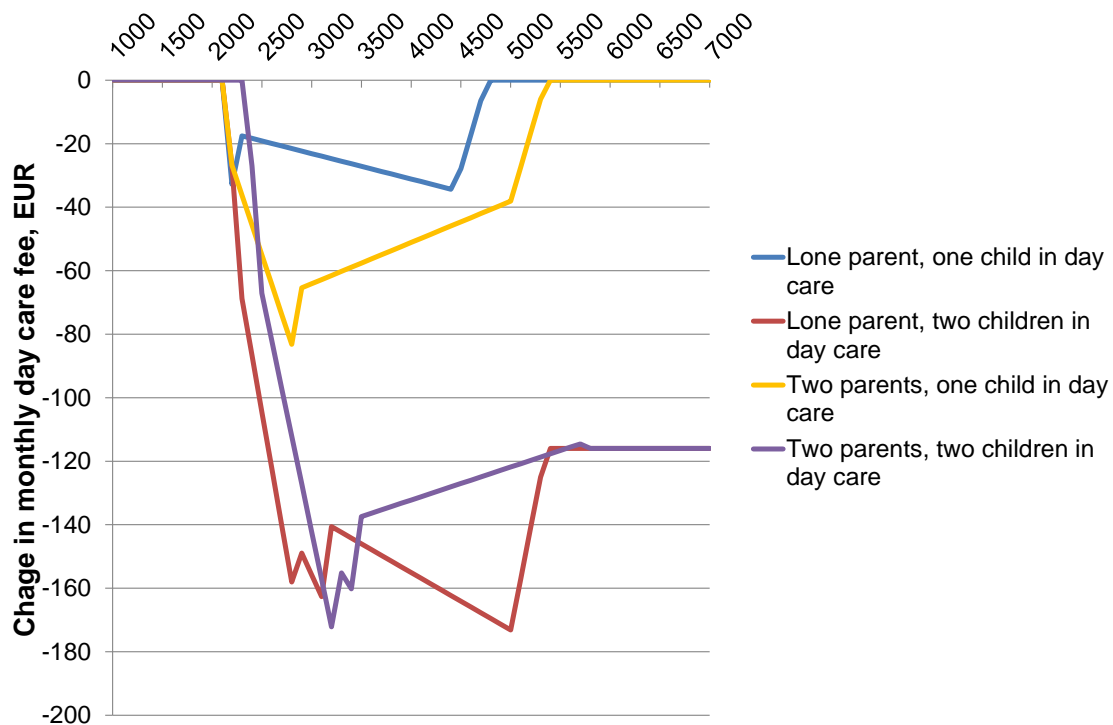
Finland has strikingly low participation rates in early childhood education in the age group of children less than three years of age compared to other Nordic countries. The participation rate is also low in the age group of children over three years of age by European comparison, particularly in low-income families. This may be largely due to lack of work incentives.

The reform is likely to reduce "incentive traps", i.e. situations where an increase in earned income has a minimal effect on disposable income as an increase in income leads to higher taxes, lower housing support and higher day care fees. These incentive traps are most common in single-parent families. According to the government proposal, improved incentives due to a reduction in day care fees could increase employment by 4200 new jobs.[35]

---

[35] In their Roadmap on the development of early education, Karila, Kosonen and Järvenkallas (2017) estimate that the reduction in day-care fees as described in the government proposal will only increase employment by about 400 persons, an estimate that is about one tenth of the government estimates.

To disentangle the reasons behind the differences in estimates, the Council requested both Karila et. al and the Ministry of Finance to submit their program codes for inspection. According to Council's assessment (details available upon request) Karila et al. convert the labour supply elasticites

However, the proposed changes are unlikely to improve the situation of the most vulnerable children as the incentives to participate remain unchanged for low-income parents. Day care fees are already zero for the poorest families. The Council notes that the initial goals of improving incentives to participate in the labour market are more likely to materialize than the later goals of helping the most vulnerable children.

University funding system

The university steering system has been transformed over recent decades. Whereas before universities were governmental departments with close political guidance, they are nowadays administratively separate entities with considerable autonomy. This organizational change has been accompanied by changes in the way they receive funding from the government, with the system having gradually shifted from minute, incremental expenditure-based funding to a system mainly based on an output-dependent block grant. This transformation is by no means unique to Finland, although in Finland it has gone further than in most other countries. In a background report, Allan Seuri and Hannu Vartiainen evaluate this system and its incentives using theoretical and empirical analysis. The authors also conducted interviews with all university rectors, whose role in university governance has increased with recent reforms.

The development of indicators for educational and research output is consistent with the notion that the university funding system has positive productivity effects. Quality-weighted research output has increased, as has the share of students achieving at least 55 credits during the year, both of which are indicators based on which funding is allocated. As always, causal effects are of course difficult to ascertain. However, despite some positive productivity gains some aspects of the system require close attention.

and the changes in incentives into changes in employment in a way that is not consistent with the elasticity estimates they use. On the other hand, the MoF estimates account for changes in incentives for both parents making an unrealistic assumption that both parents react to the reduction in daycare fees.

Correcting the procedure in Karila et. al results into estimates of employment effects that are around 2000, i.e roughly equal to the MoF estimates if only one of the parents reacts to the changes in incentives due to changes in day-care prices. Naturally also this number involves substantial uncertainty and crucially depends on the elasticity estimates used in these calculations.

The Council thanks Tuomas Kosonen of the Labor Institute of Economic Research and Jukka Mattila of Ministry of Finance for their co-operation in resolving this issue.

First, the current guidance system employs fairly high-powered incentives to advance targets for education and research. It has been long known in economics that such incentive systems may result in perverse effects if the incentives cannot cover all the relevant aspects of the process. Although the current system seems broadly balanced, constant vigilance is required. For education policy one danger is that the seemingly neutral funding model treats subject fields differently and encourages universities to reallocate resources in a way that does not correspond to demands in the labour market.

As mentioned above, one of the output indicators used to allocate funding is the share of students achieving 55 credits each year. This indicator has improved since (and to some extent even prior to) its inclusion in the funding model in 2013. While prudent use of public funds and fiscal externalities support incentivizing universities to take this variable into account, it also gives incentives for universities to shift resources from one field to another. Figure 6.4.4 presents the development of this indicator over 2005-2016 for educational sciences and ICT. There is a significant level difference between the two fields. Although funding is not granted to fields but universities, universities have often implemented versions of the general funding model for allocating funds internally. This suggests that the inclusion of this indicator favours educational sciences over ICT within the Finnish university sector, which of course is not the intended aim of the indicator and is not part of any larger education or research strategy of the government.

Figure 6.4.4: Share of students achieving at least 55 credits
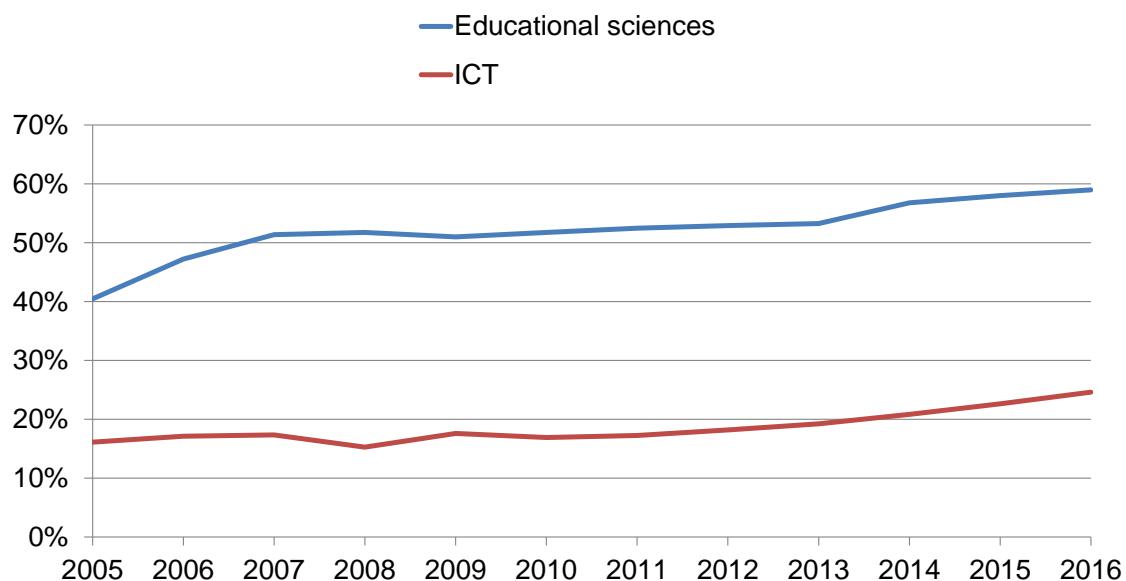
Source: Vipunen-database of the Ministry of Education and Culture.

122

Second, incomplete incentives and coordination problems still leave room for discretionary guidance and funding. Although the importance of the funding model in university guidance has increased, other policy instruments are still required and they sometimes have to be used even at the expense of university autonomy. The university admission system is an example of a case where each university's entry requirements pose externalities on other universities and optimality require governmental control. We will discuss the admission system in more detail in the next section on recent educational reforms.

Third, the current system's educational indicators emphasize quantity. The only quality-relevant aspects are student feedback (5% of the block grant) and graduate employment (2%). The relation between student evaluation of teaching and learning seems to be very modest (Uttl et al., 2017).

Overall universities have multiple, often conflicting societal aims. Despite its problems, the current funding system strikes a reasonably good balance between different aims (See the aforementioned background report for some suggestions for improvement). From an educational policy standpoint at least, the more pertinent problem is not so much the structure of the funding but the aggregate level of funding.

6.5.   Reforms of the education system

Vocational education

Vocational education will undergo a major reform in 2018. In the future, vocational education will to a greater extent be based on learning at workplaces. Demonstrating specific competencies will become more flexible and less dependent on the way that these competencies have been acquired. It will also be possible to demonstrate competencies for smaller parts of a programme. Each student will have an individual study plan and admissions will be possible throughout the year. The number of separate programmes will be reduced and degrees will become broader in future. In future funding will be based less on enrolment and to a greater extent on output, mainly the number of qualifications completed.

Vocational schools have become a more popular choice among young people applying for secondary education. Currently 42% of persons completing comprehensive school enrol immediately in vocational education (a 5 per-

centage point increase from 37% in 2000). Vocational schools also have an important role as a provider of adult education. More than half of students in vocational education are currently over 20 years old.

The reform of vocational education has several potentially beneficial aspects. Acquiring practical skills may be easier in practical training at firms than in a classroom. More practical education may also improve motivation and decrease drop-out rates that are still high, although declining (See Figure 6.5.1 below). The possibility of demonstrating competencies in smaller packages will possibly also be helpful so that those who fail to complete the entire three year programme will still leave school with some qualifications demonstrated. Also, funding that is to a greater extent based on completed qualifications may create stronger incentives for schools to support the process towards graduation.

Figure 6.5.1: Drop-outs in secondary schools by year of entry
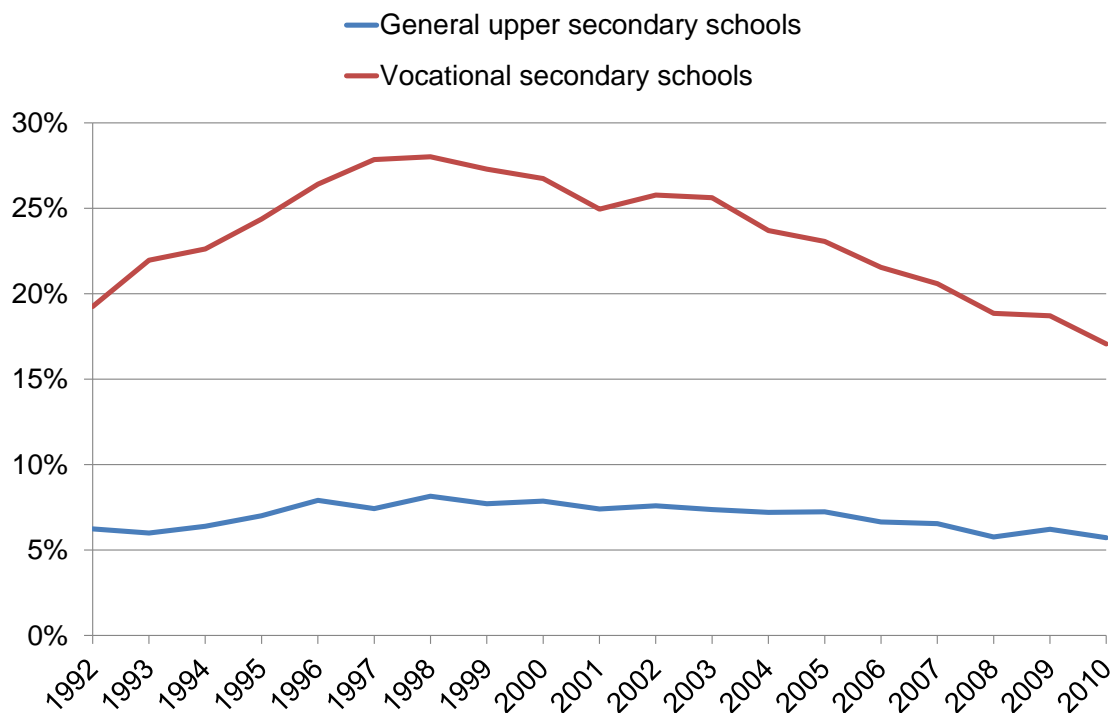
Dropping out is defined as having completed no secondary-level degrees within five years from entry into secondary school. The data are restricted to first-time entrants aged under 18 at the time of entry. Source: Calculations by Hannu Karhunen based on the Register of Degrees and Examinations and the Joint Application Register, both by Statistics Finland.

A potentially problematic feature of the reform is that making training more practical may lessen the weight of general skills in vocational education.

However, general skills, such as language proficiency, math, reading comprehension, ICT skills and information-gathering skills are necessary for students who plan to continue their studies at polytechnic or university after completing secondary-level vocational education. The same general skills could also be in high demand in the future when changes in working life will require re-training. Training in firms may also facilitate the school-to-work transition, but could lead to additional skill obsolescence as soon as a worker has to change employer.

There is some evidence that practical training increases employability early in a career but that those with more general training perform better later in their careers. This effect is stronger in countries where vocational training is based on apprenticeships (Hanushek et al. 2017).

In his background report Ludger Woessmann (2017) updates these calculations using data from the PIAAC. Similar calculations have been performed by the Council using Finnish data (Figure 6.5.2. More details in the background report by Ollikainen 2017). Both indicate that the employment rates of vocational graduates are high early in their careers but decline to a level below those with general training among older age groups. This relationship may be due to several possible mechanisms but nevertheless raises concerns about making vocational education too specific and emphasizes the need for general skills in adapting to changes in the labour market.

Figure 6.5.2: Employment rates in 2014 for general and vocational upper secondary education by age
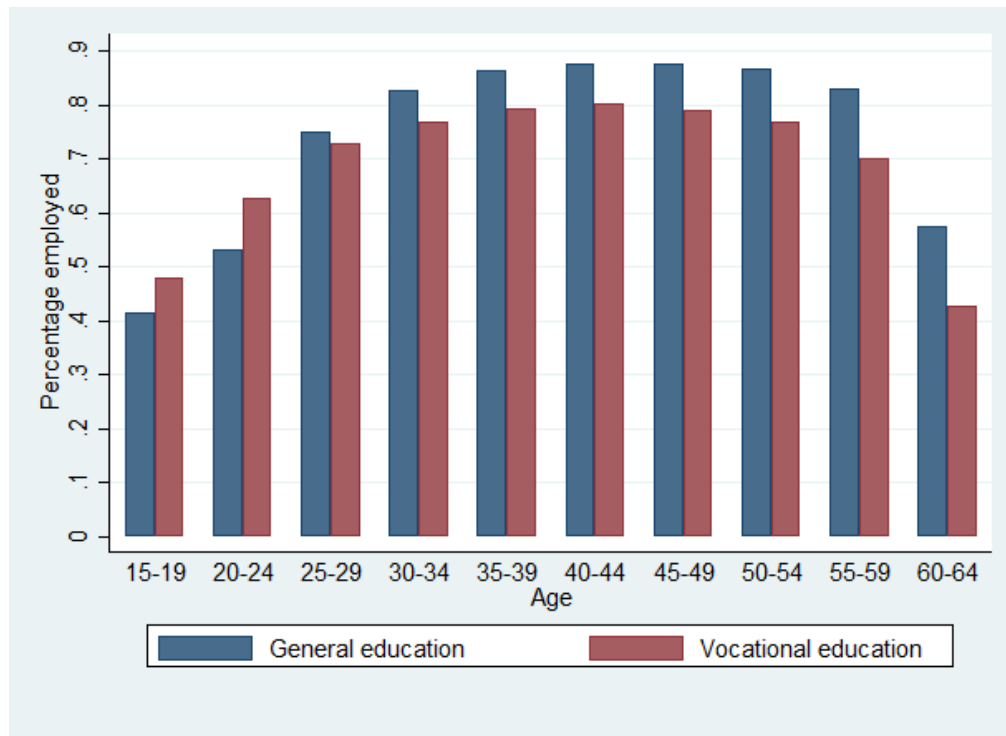
Source: Statistics Finland administrative register data.

Admission systems

The admission systems to tertiary education in Finland differ from admission practices in most countries. Even though senior high school ends with a "high stakes" matriculation examination that is strictly comparable across schools, most universities and polytechnics still rely heavily on entrance exams in their admissions (Table 6.5.1). These entrance exams require intensive preparation and commonly entry requires several attempts at the test. As a result, only 25% of high school graduates manage to continue their studies in higher education immediately after secondary school (Statistics Finland 2017). Postponement of entry naturally postpones university graduation, and Finnish university graduates are among the oldest in the world. The median age at the time of completion a Master's degree is currently 29.

Table 6.5.1: Entry paths into tertiary education, 2016

	Universities	Applied universities
Secondary education examination results	15.2%	0.4%
Entry examination	48.7%	31.2%
A combination of the two	33.6%	68.4%

Source: Ministry of Education and Culture (2017a).

Universities and polytechnics have already agreed to modify their selection procedures so that selection by matriculation examination results will be the main entry path into tertiary education by 2020. In the interim period of 2018–2019 institutions will reform their selection procedures so that "they will not require long-term preparation".

It is unclear how moving from a system relying on entrance exams to a system based mainly on the matriculation examination will change the pool of admitted students. While it is relatively easy to simulate which applicants would be admitted to university under different admission systems using the current applicants, it is much more difficult to predict how application behaviour will change after the reform. And it is even harder to judge whether the "right" students get admitted under either system.

A system with an entrance examination has been criticized for creating inequalities. High demand for education compared to the supply of slots generates tough competition and has created a market for private tutoring. As these preparation courses for entrance exams are costly and not available everywhere, inequality may increase.

However, selecting the "right" students or generating inequality may not be the main problems in a system based on entry exams. Another key issue is the efficiency of the admission system. Matching applicant preferences with school entry requirements is a complicated allocation problem that has been studied extensively (e.g. Gale and Shapley, 1962; Abdulkadiroglu and Sönmez, 2003; Pathak, 2011). Some key insights in these studies are that an ideal system should encourage truthful revelation of preferences in contrast to strategic behaviour and that the applicants should be encouraged to list several options in order of true preferences.

An ideal admission system allocates students so that their preferences are satisfied in the best possible way, given the capacity constraints. This implies that some students get allocated also to their second- or third-most preferred options. The problem with entry exams is that they limit choices.

Even if applicants can list several options in their applications for tertiary education, the need to prepare for entry exams effectively limits serious applications to one or two. The system also encourages strategic behaviour and applications based on the admission prospects even if they are not the applicant's most preferred choices.[36]

A reformed admission system might admit more first-time applicants. Currently students who are enrolled in a programme different from their preferred option compete with first-time applicants. First-time applicants receive preferential treatment and get additional points in admission process, but if the system becomes to a larger extent based on matriculation examinations rather than time-consuming entrance exams, the odds of first-time applicants are likely to improve further.

Universities should develop flexible ways for students who wish to switch between programmes or complement their studies with selected parts from other programmes rather than forcing these students to re-apply for admission in the regular admission system. In practice, this could involve creating separate modules of various lengths that could be offered to students in other programmes. Separate admissions to Bachelor's and Master's programs in the spirit of the Bologna process, could also increase flexibility.

Compulsory school leaving age

One reform missing from the government agenda is an increase in the minimum school leaving age. A proposal to increase school leaving age by one year was discussed widely in 2014. However, this discussion mainly focused on the costs of extending compulsory schooling. No estimates of the potential benefits existed at the time.

In several European countries, as well as in almost half of the US states, participation in some form of education and training beyond age 16 is compulsory. In many countries, the compulsory school leaving age increased only a few years ago and such reforms are too recent for there to be credible estimates of their effects. In their background report, Seuri, Uusitalo and Virtanen review in detail the existing evidence on the effectiveness of these policies and provide calculations on the potential effects of extending compulsory education to age 18 in Finland. According to these calculations,

---

[36] Pekkarinen and Sarvimäki (2016) discuss these issues in more detail in their policy brief.

keeping students at school at ages 16 and 17 would increase secondary school graduation rates, increase employment rates and substantially reduce the fraction outside employment, education and training. While the calculations are in many ways uncertain, they do point to potentially large benefits from such a reform. Also, the alternative costs are low, since young people under 18 who are not in school rarely participate in the labour market.

6.6.　　Council views

The government has a clear, well-founded and widely accepted goal of providing the entire cohort with at least secondary education. Given high rates of non-participation in the labour market among those with no more than compulsory education, progress towards this goal should be a top priority in education policy.

While the goal is widely accepted, no agreement exists on how to reach it. One measure missing from the government agenda is an extension of compulsory education. However, extending compulsory education would be one of the most straightforward ways of reducing numbers leaving school without secondary education and would increase the employment prospects of this group. The Council therefore proposes that the government seriously considers options for extending compulsory education.

The expansion of tertiary education in Finland ended around the year 2000. Such a development is quite exceptional internationally. At the same time, the returns to education in terms of employability and earnings remain high. The Council views increasing the number of students in tertiary education as a key policy challenge.

This view is shared by the governments' Vision 2030 paper on higher education and research, which sets a policy goal for tertiary education attainment rate of 50% among 25-34-year-olds, almost 10 percentage points above the current level. Vision 2030 does not, however, clarify how this will be achieved.

Reforms that could prevent dropping out, increase completion rates and speed up the pace of studies could be helpful in terms of attaining these goals. Reforms to make complementing a university education without hav-

ing to re-apply and compete for slots intended for the first-time applicants might also be helpful. However, it is unlikely that this goal could be reached without increasing admission rates.

The Council endorses several specific policy reforms in education. Lowering day-care fees may increase participation in early education. The vocational education reform will make vocational education more practical and, it is be hoped, more useful and motivating for students. Reforming the admission system stands a good chance of making the system more effective and reducing the years spent queuing for tertiary education.

However, there are some critical aspects in these education policies. The main purpose of lowering of fees in early education was to improve incentives to work and thereby increase employment. The policy may well succeed in that but it is unlikely to increase participation rates in the most vulnerable groups, who face no changes in incentives as they are paying zero fees already. Making vocational education more practical carries the risk of putting less weight on developing general skills that are necessary if vocational school graduates intend to pursue further studies in polytechnics or universities and skills that may be in high demand since changes in working life will require retraining in the future. Increasing the efficiency of the university admission system would certainly be necessary, but the main instrument by which the government can affect education levels is the degree targets set in negotiations with universities. Without an increase in these targets, and funding associated with the targets, government is unlikely to reach the goals it has set in its Vision 2030 for higher education.

7.   Innovation policy

Since the beginning of the industrial era, technical progress has been the main driver of economic growth. Increases in productivity depend on the one hand on adapting technologies developed elsewhere and on the other hand on one's own research and development. In the early 2000s Finnish industry increased its research and development activity rapidly and in 2010 Finnish R&D expenditure as a share of GDP was among the highest in the world. However, between 2012 and 2016 R&D expenditure declined and at the same time public funding for R&D has also been decreasing.

In this chapter we discuss Finnish innovation policy. After discussing recent developments in the framework of Finnish innovation funding, we assess Finnish innovation policy and discuss its effects on R&D activity.

The Council's work on this chapter has been supported by several background reports. Tuomas Takalo (Bank of Finland and VATT Institute for Economic Research) and Otto Toivanen (Aalto University and KU Leuven) provide a summary of economic research on innovations, a review of Finnish innovation policies, and an econometric evaluation of R&D subsidies and tax credits in Finland. Ilpo Kauppinen and Olli Ropponen from VATT review the research on taxation and location decisions of innovating firms and individuals with a descriptive analysis on emigration flows from Finland. The background report by Seuri and Vartiainen on university funding, which was referred to in the previous chapter, is also used in this chapter.

7.1.   Recent developments

The last quarter of the 20th century saw Finland transform itself into a knowledge-based economy. Productivity grew steadily, and the ratio of R&D expenditure to GDP more than tripled from 1975 to 2000 (see Figure 7.1.1).

Figure 7.1.1: R&D and total productivity
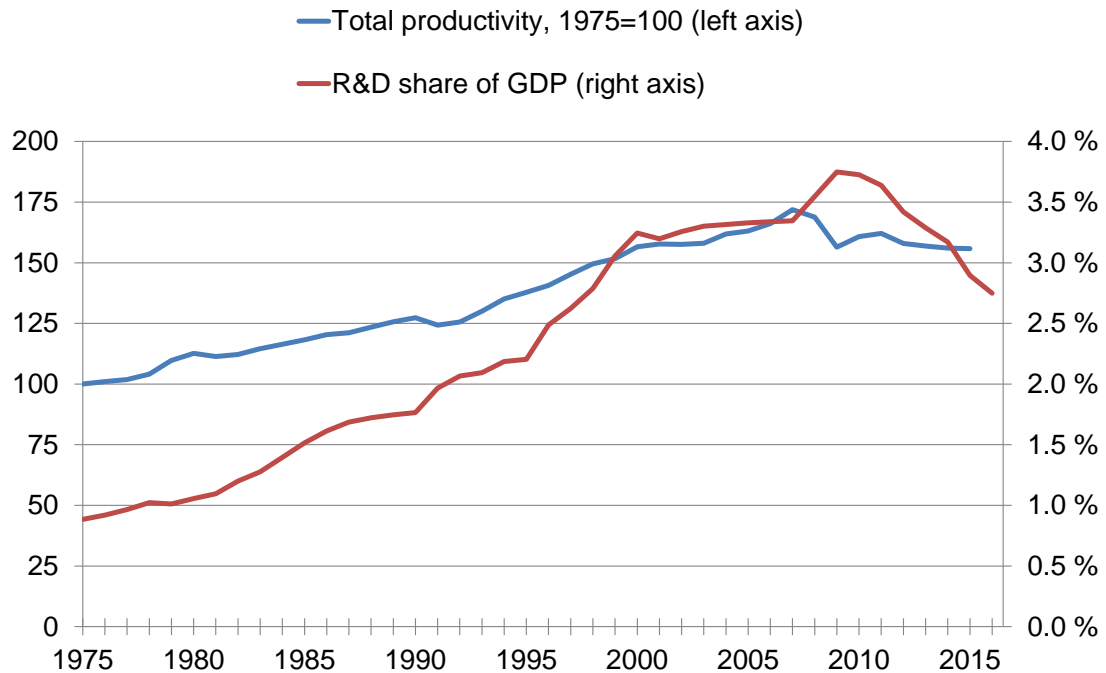
Source: Statistics Finland.

Throughout this period, public funding for research and development (R&D) also continued to grow, but now this trend has reversed. Real public R&D funding peaked in 2010 and has declined every year since (see Figure 7.1.2). As a share of general government expenditure it peaked already in 1999, with a more pronounced decline beginning in 2012. The current government has continued this recent trend, with the trend in R&D&I (R&D and innovation) funding reflecting the overall consolidation of public finances. According to Statistics Finland's *Development of central government's total expenditure and funding of R&D activities* statistic, real government R&D funding fell by more than 10 per cent between 2015 and 2017.[37]

---

[37] Figure 1 only includes research and development (R&D) funding, as this is what Statistics Finland collects. Below, when discussing Tekes' funding, we also include innovation funding, as this is the key part of both Tekes' activities and the theme of this chapter.

Figure 7.1.2: Public funding for R&D
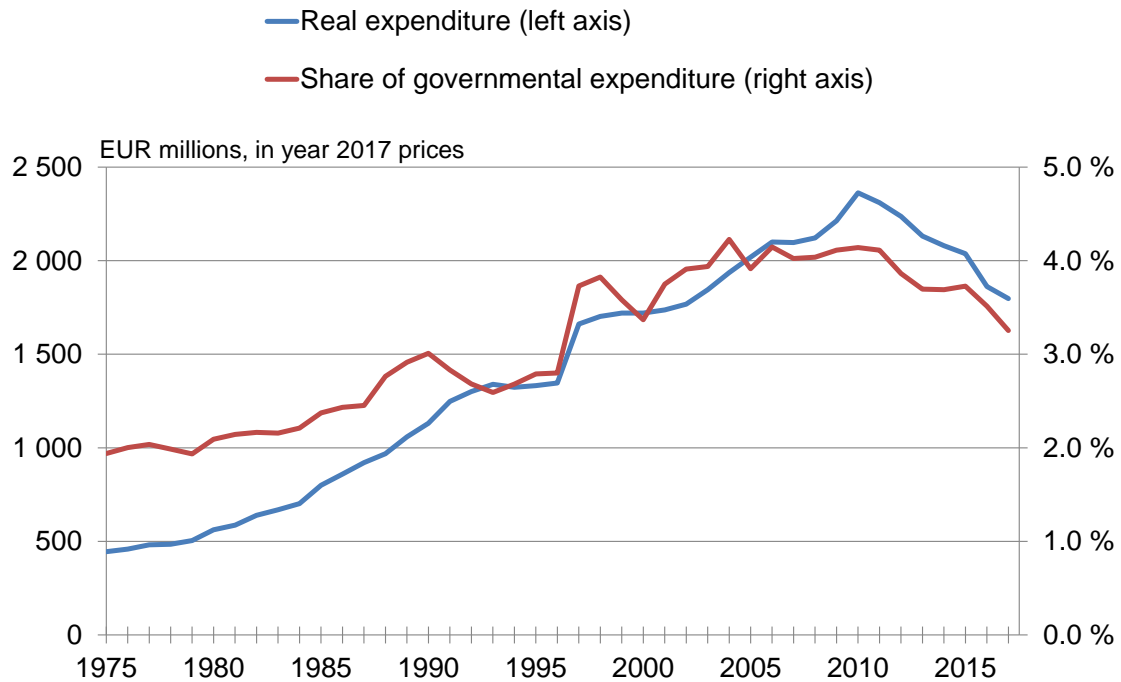
Source: Statistics Finland.

Although the national innovation system has many actors,[38] direct government funding for R&D&I is mostly mediated via Tekes, the Academy of Finland, the universities, and public research organizations. We next briefly discuss each of these in turn. The period of analysis varies somewhat because of differences in the data sources. Finally, we discuss important policy developments in other areas of innovation policy, such as venture capital markets.
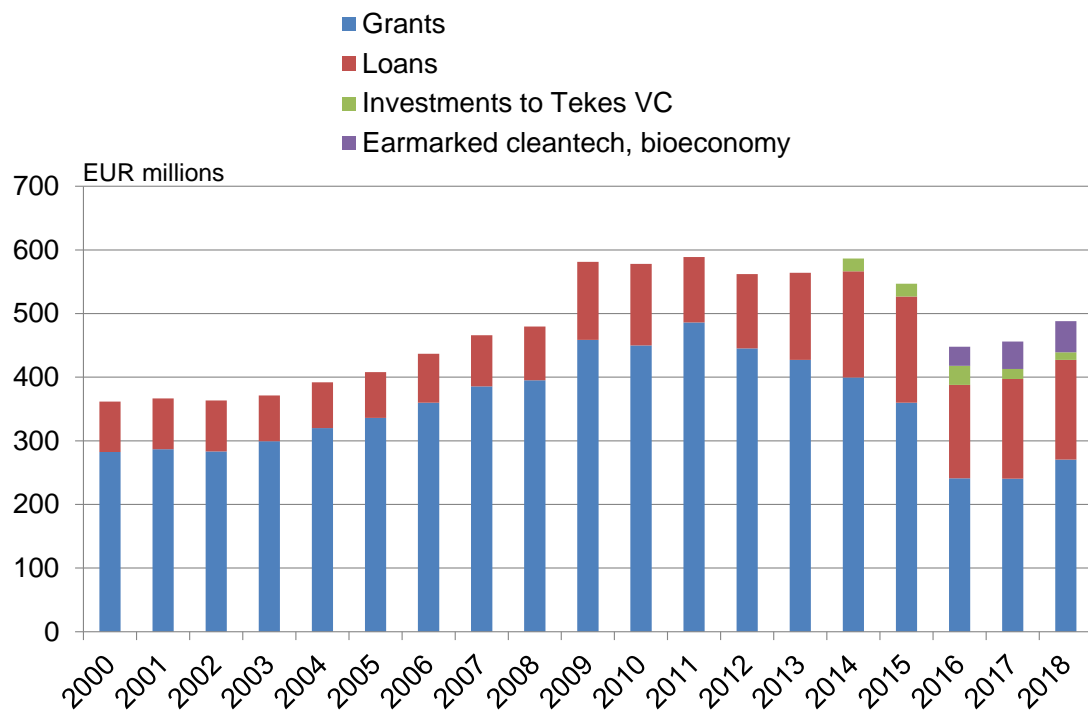
Tekes

Tekes is arguably the most important innovation policy organization in Finland. It provides grants and loans for applied research projects, both in the public and private sector. Additionally, 2014 saw the founding of Tekes Venture Capital, whose portfolio includes fund investments and direct investments.[39]

---

[38]Murray et al. (2009) argue that the Finnish funding system for growth entrepreneurship is too fragmented, and in the same report Veugelers et al. (2009) draw the same conclusion for higher education and public research.

[39] For more details on Tekes, see the background report by Takalo and Toivanen (2018).

In its first budget for 2016, the current government decreased Tekes' funding quite significantly. Although the budgets for 2017 and 2018 have seen small increases, the organization has still lost a tenth of its funding under the current government. Additionally, the policy tool mix between grants and loans has shifted towards the latter. Governmental guidance of Tekes' funding has also marginally increased due to new funds being earmarked for cleantech and biotech.

Figure 7.1.3: Governmental funding of Tekes

Sources: Tekes, government budget proposal and own calculations.

Universities

Universities receive funding from various sources, and use these funds for multiple purposes, such as research, education, and certain special tasks (e.g. the National Library).

Figure 7.1.4 depicts university funding for 2010-2018. Although some items are not included here,[40] the broad picture is quite clear. The current gov-

---

[40] Three items are worth noting here. First, the budgetary item 29.40.20 *Joint costs of the tertiary sector* has increased significantly over recent years. This item is excluded, however, because the increase is almost wholly due to funding towards education, for example to cover the costs of an increased number of students. Second, the profiling fund of the Academy of Finland, approximately

ernment has cut basic funding, which may have a negative impact on university R&D, as around one third of the basic funding that universities receive directly from the government budget goes into research. This share naturally also depends on the universities' own decisions, and varies by year. In addition to this basic funding, universities also receive public funds for research activities from the EU, Tekes and the Academy of Finland.

Figure 7.1.4: University basic funding 2010-2018, including the so-called pharmacy item (2010-2015)
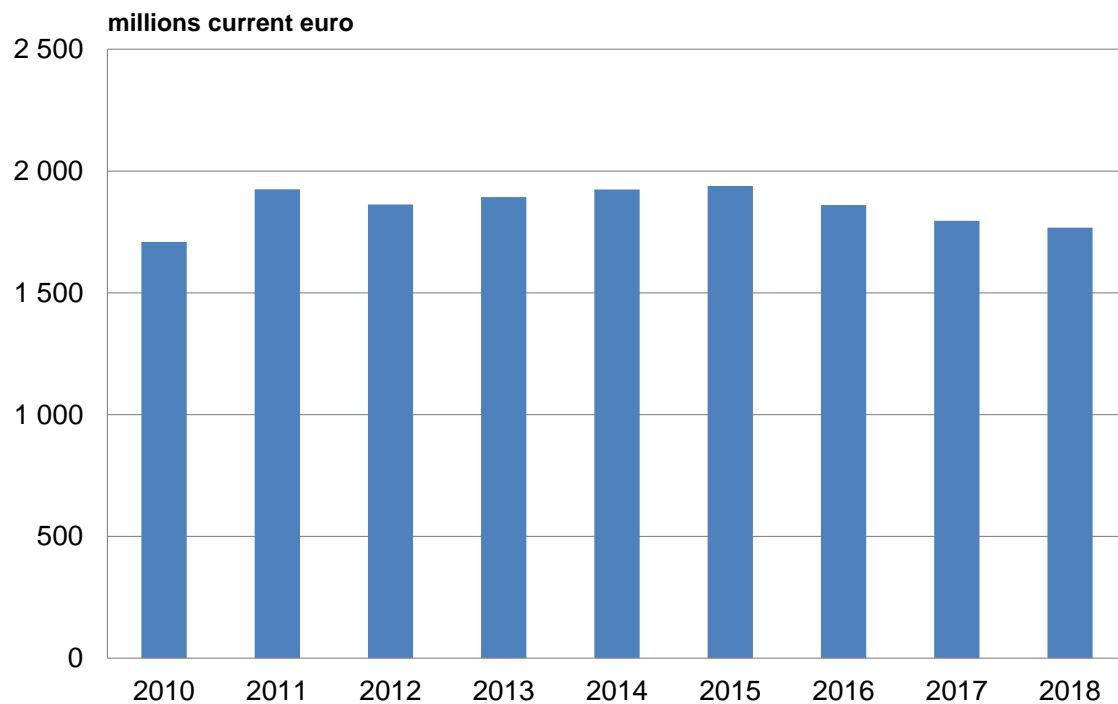
Source: EPC calculations using government budgets.

Academy of Finland

The Academy of Finland allocates grants for basic research. Figure 7.1.5 presents the evolution of government funding for the Academy for 2012–2017.

EUR 50 million annually in 2015-2018, is not included. Although this is earmarked for universities, this sum is already included in the figures for the Academy of Finland presented below. Third, capitalizations are not included. The universities were capitalized by EUR 257 million in 2010, EUR 308 million in 2011, and EUR 188,000 in 2013. For the 2017 budget, EUR 150 million and for the 2018 budget EUR 46 million were set aside for capitalization, but these are dependent on private sector donations, and it is not yet certain what the actual capitalizations will be. In any case, if we were to calculate the flow value of capitalization using, for example, a 4% annual real return, this would amount to at most EUR 8 million, which does not change the broad picture. For more information on university funding see the background report by Seuri and Vartiainen (2018).

2015 saw the launch of two large funding programmes: strategic funding and university profiling. The former is connected to the reform of public research organizations and is discussed below. The latter is a tool to provide incentives for universities to outline research areas they want to emphasize, and areas they want to de-emphasize. Largely due to these two programmes, government funding for the Academy has increased. They have also meant that the government's role in setting the agenda for the Academy's funding has become stronger.

Figure 7.1.5: Government funding for the Academy of Finland
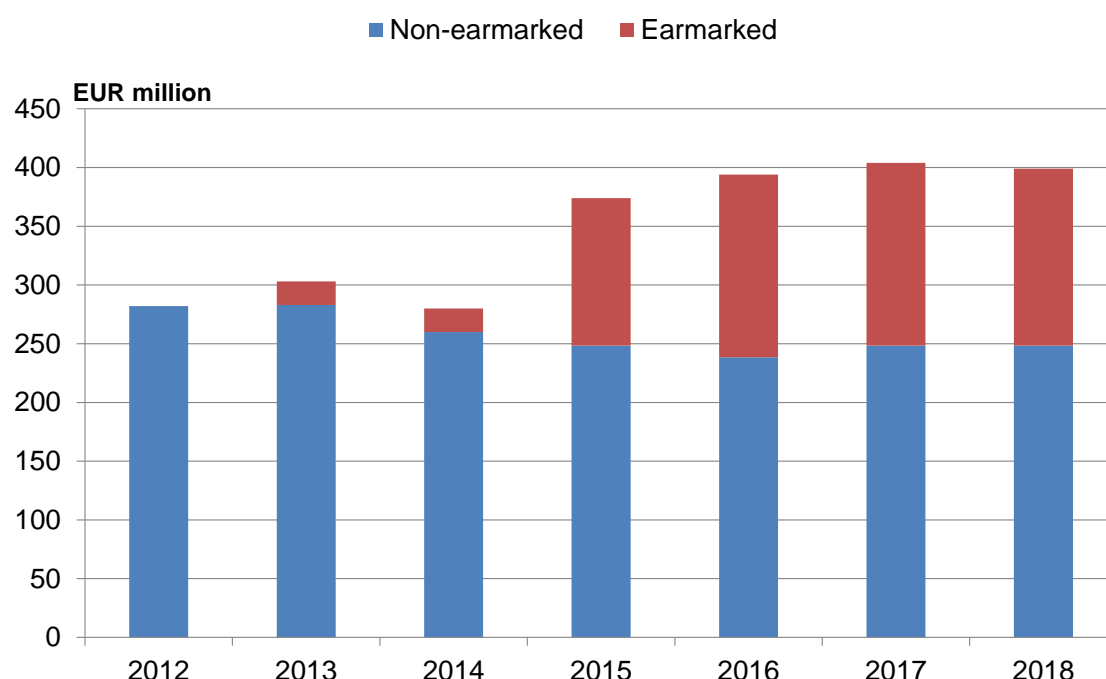
Source: Academy of Finland. Earmarked funds refer to specific funding programmes outlined by the government. The most important of these are strategic funding and funding for university profiling. Non-earmarked funds is the difference between total funding and earmarked funding.

Public research organizations

There are currently 12 public research institutes operating under different ministries. The direct budget funding[41] for these institutions in 2017 was EUR 195.2 million. The largest recipients of the funds are VTT Technical Re-

---

[41] When discussing public research organizations' budgets we use data from Statistics Finland's "Government R&D Funding in the State Budget". This data includes only the organization's R&D expenditure and does not cover all their expenditure.

search Centre of Finland (EUR 73.5 million), the Luke Natural Resources Institute (EUR 48 million) and the National Institute for Health and Welfare (THL) (EUR 22.2 million).

Direct funding for public research organizations has been cut drastically since 2012. Although public research organizations are also subject to general cuts to government expenditure[42], most of this reduction is due to a reform initiated by the previous government. We discuss this reform in the next subsection.

Figure 7.1.6: Funding for public research organizations
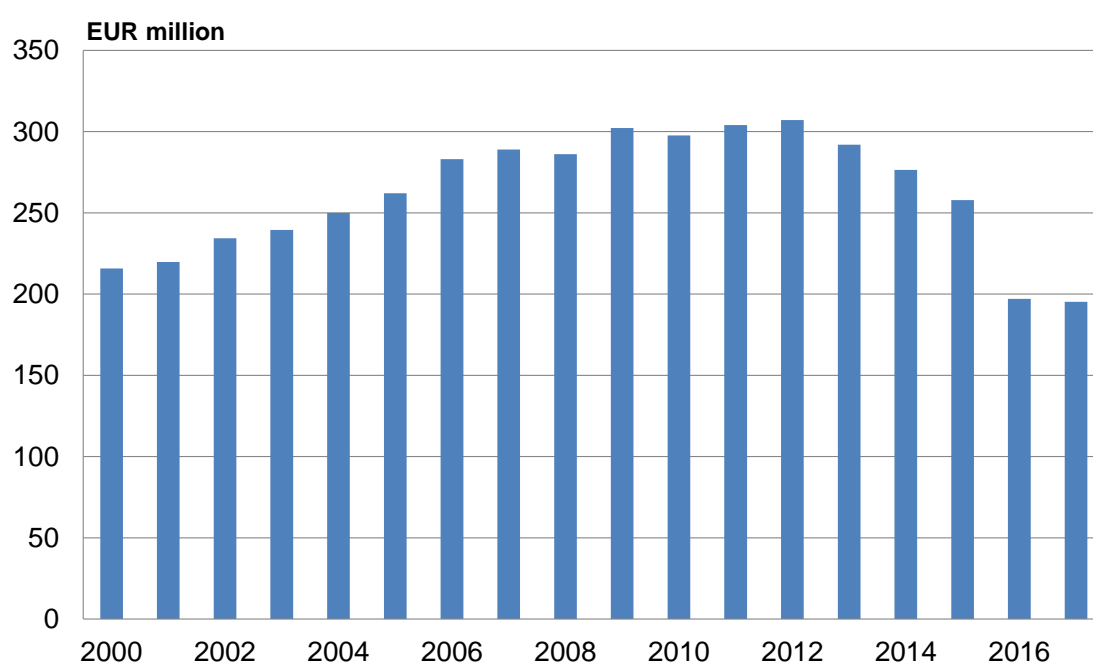
Private equity investments

In addition to direct budget funding, grants and loans, the public sector also uses private equity investments as a tool for innovation policies. Table 7.1.7

---

[42] These include cost reductions associated with the competitiveness pact and savings in operating expenditures.

lists government budget appropriations for private equity investment for 2009-2016.[43]

Table 7.1.7: Appropriations to private equity investments in general government budgets 2009-2018 (Figures in millions current euro)

Year	Tesi	Finnvera	Tekes	Capital loans to Finnvera[44]
2009	150	30	0	80
2010	20	0	0	30
2011	0	0	0	0
2012	30	0	0	0
2013	0	10	0	10
2014	80	5	20	5
2015	105	5	20	5
2016	30	5	20	5
2017	29,5	0	20	5
2018	35	0	11.8	0

Sources: National Audit Office (2016b), government budgets and own calculations.

While Tesi (*Suomen Teollisuussijoitus OY*) is generally seen as part of the Finnish innovation policy environment, it does not so much fund innovations directly, but seeks to develop private equity markets and promote growth more generally. Tekes, discussed above, also has a private equity arm Tekes Venture Capital, which was set up in 2014. Finally, Finnvera is an export credit agency, which prior to the establishment of Tekes VC was the main organization for promoting innovation through private equity investments.

Although the government's role in private equity markets increased with the financial crisis across Europe and in Finland as well, it is noteworthy that government appropriations for private equity increased from 2009-2013 to 2014-2018. The rationale for this funding is not very clear, a point emphasized also by the National Audit Office (2016b).[45]

---

[43] The other key players are Sitra, which is a parliamentary fund and invests from its own funds and does not receive appropriations, and VTT Ventures, which is part of VTT Technical Research Centre of Finland and invests in firms to commercialize their inventions.

[44] Capital loans are the government lending to Finnvera at zero interest rate for a long duration (e.g. 20 years) to be used for equity investments. Any losses on the equity investments are written off from the loan.

[45] National Audit Office (2016b) concludes the following (own translation): "Based on the inspection any additional government appropriations would require as justification a comprehensive

7.2. Principles for innovation policy in a small open economy

It is easy to appreciate the importance of innovations. Innovations spur technological change, which in turn drives economic growth. This fact alone is not, however, a sufficient reason for the government to provide support for innovative activities. What is required is some form of market failure, due to externalities or information asymmetries, for example.

In general, the rationale for innovation policies is strong, with two principal market failures. First, innovators will typically not be able to appropriate all the returns from their work. Innovations are often ideas, which spread freely. Intellectual property protection in its many forms delays this spread of knowledge in order to increase the private returns to research, but it is limited in both scope and duration. When one firm innovates, another firm can possibly imitate perhaps with some lag, increasing both profits and consumer surplus. The term "knowledge spillovers" captures this mechanism.

Second, informational asymmetries in financial markets are especially problematic for R&D funding. One solution to informational asymmetries is that firms typically have to post collateral to obtain funding. Innovative firms, especially the young ones, are typically labor-intensive with little assets, except the business idea itself, to post as collateral.

Quantifying the importance of knowledge spillovers and informational asymmetries is difficult, as is ascertaining the effect of policy in solving them.[46] For public support for private R&D to "work", i.e. increase welfare, it is not sufficient to establish that the public support increases private R&D. Even additionality, whereby every euro of public support increases private R&D by more than one euro, does not capture externalities and as such may not be an accurate measure of the efficiency of a support program (Takalo, Tanayama and Toivanen 2013). In arguing that public support for private R&D solves financial market imperfections it is not sufficient to establish that there are regions, sectors, or firms which have limited private sector

account of firms' financing needs, the functionality of private equity markets and their possible shortcomings specified. The possible distortionary effects of governmental private equity should be looked into, as well as other available policy tools to develop private equity markets."

[46] See the background report of Takalo and Toivanen (2018) for evidence on the effects of public support for R&D, and innovation policies in general.

funding opportunities, as not all firms should be funded and public funding may crowd out private funding.

These challenges make gauging the optimal level of R&D support very difficult. The background report of Takalo and Toivanen presents one such effort, but as the authors emphasize, their results should be treated with caution. What we can state with more certainty are some general principles for R&D policy based on both theoretical and empirical work. Throughout this section we will keep in mind the fact that Finland is a small open economy, and a strong welfare state. This institutional background has influence on how R&D should be supported here.

The knowledge spillovers mentioned above, and their welfare effects do not limit themselves inside a country's borders. A Finnish pharmaceutical company developing a new drug will help another company to build on this innovation. This other company and its customers may reside outside Finland. For a small country like Finland, this is more likely to be the case than for a larger country, such as the United States or Germany. Thus if we do not see domestic R&D support as an altruistic policy for supporting foreign companies and consumers, this means that the externalities-argument for supporting private R&D is more limited in Finland than it is in larger countries (or in any closed-economy model).

When considering the argument from financial market failure, market size is likely to improve market completeness, and as such a small country may have cause for worry. An additional concern is that the relatively low wealth inequality in Finland may impede entrepreneurs' access to credit (Lindh and Olsson 1996).

A small open economy is dependent on the rest of the world. Productivity growth in Finnish companies is determined more by how well they absorb technologies developed elsewhere than how well they generate new innovations themselves. International trade is important. Even though the policy discussion often emphasizes the importance of exports, evidence suggests that imports may be an even more important channel of technology diffusion (Keller 2010). Foreign direct investments are also a channel by which technology is transferred into domestic firms.

Some general principles apply for both small and large countries.

First, innovations are often a result of a purposeful R&D activity by educated professionals. This suggests that education, especially higher education, has an innovation policy aspect to it. While evidence remains somewhat scarce, Toivanen and Väänänen (2016) do find that the expansion of the polytechnic system in Finland increased patenting. This suggests that at least engineering education is conducive to innovations.

Second, the rationale for R&D support is stronger in basic research than it is in applied research. This is because of appropriability on the one hand and specificity on the other. Appropriability describes how easy it is to commercially capture all the benefits of an invention. For example a new mathematical proof may be very useful for many applications, but as such it is difficult to commercialize. Basic research is also more general. Applied research is more specific, meaning that other firms and industries will find it harder to build on its results.

Third, although evidence is mainly suggestive, it seems that producing innovations is associated with positive scale effects. Although the mechanisms are not clear, at least knowledge spillovers are to some extent localized. As such it is very likely that urbanization promotes innovations.

Fourth, although the rationale for government intervention and public support for R&D is generally recognized, there is some disagreement on what the proper role of the government actually is. Should politicians restrict themselves to deciding on the general level of R&D support and let the markets (in case of R&D tax incentives) or civil servants (in case of non-earmarked funding for Tekes and Academy of Finland) choose which firms and sectors receive funding, or should politicians play a more active role in directing the funds? There are ample anecdotes for and against both approaches, but no conclusive evidence.

Fifth, complementarities between policies should be recognized. Any policy supporting R&D will only push up wages of R&D personnel if their supply is inelastic. As the supply of higher education is quite tightly controlled by the government, this is a potential problem. The Council's recommendation of expanding higher education would in this sense also make public support for R&D more beneficial.

7.3.   Innovation policies in Finland

This section makes some comments on different innovation policies in Finland, commenting on both the current government's actions and some pre-existing policy choices. We will first discuss the potential tradeoff between short-run cost competitiveness and long-run productivity growth. Then the increased governmental discretion over R&D funding is commented on. We then make brief statements on targeted prizes[47] and private equity investments as innovation policy tools before discussing the role of universities. Finally, we comment on the implications of taxation for innovative activity.

Overall the current government has focused on balancing the budget and improving short-run cost competitiveness. The Council agrees with these goals, but the structure of the consolidation may not have been optimal for maintaining competitiveness and economic growth in the longer run. As noted in section 7.1 and the previous chapter on education policy, the government has reduced expenditure on education and R&D support. This is likely to retard productivity growth in the future.

In our 2015 report we criticized the government for relying on expenditure consolidation alone in balancing the budget, through adopting a strict rule that the tax/GDP ratio will not increase during the government's term. Regarding the structure of the expenditure consolidation, even though the government has reduced overall expenditure on education and R&D support, it has not reduced and has even increased many subsidies for energy-intensive industry and agriculture. While subsidies for energy-intensive industry may have positive short-run effects on cost competitiveness[48], they target large incumbent firms and as such are likely to have a negative effect on innovations (Acemoglu et al. 2013).

Direct R&D support

Cuts to R&D subsidies have likely reduced R&D activity, as indicated by the background report Takalo and Toivanen (2018). The rationale for these types of subsidies is however less clear in a small open economy such as Finland than in larger countries, as the positive spillover effects to a large extent accrue to foreign firms and consumers. Evaluating the significance of

---

[47] Targeted prizes reward inventors for solutions to prespecified problems.

[48] Although this is somewhat in doubt: see Harju et al. (2016) and the references therein.

these spillover effects, and therefore also the overall welfare effects of changes in the level of R&D subsidies, is subject to high uncertainty.

In addition to the level of subsidies, there have been changes to the structure of funding. Governmental discretion over the allocation of R&D funding has slightly increased. Part of this is due to the current government's general approach of implementing cuts to basic funding and then implementing smaller, temporary key projects. For Tekes this has meant decreased authorizations for R&D grants, but some additional funding specifically for cleantech and bioeconomy. Some changes have been of a more permanent nature, such as the previous government's decision to transfer 50 million euros from the universities to the Academy of Finland to be used to advance the profiling development within the university sector.[49]

While these reforms have their benefits, they do not come without a cost. More targeted funding, exemplified by the programs for university profiling and strategic research, often tend to increase the share of competitive funding in higher education R&D, which is already quite high relative to other Nordic countries (Wendt et al. 2015) and which entails significant hidden costs (Kultti et al. 2015).

In addition, political choices on the direction of R&D are not necessarily well targeted in terms of correcting market failures. Although it is plausible that public support for R&D in general corrects for some market failures, it is not very clear why market failures in bioeconomy R&D, for example, are especially critical.[50]

If designed well, more specific targeting of R&D funding in certain circumstances can be beneficial. The previous subsection discussed the small country perspective in innovation policy and noted that much of the externalities of R&D may well flow abroad. While R&D subsidies are likely to have been successful in increasing R&D activity, their effects on welfare are less clear cut. In their background report Takalo & Toivanen note that targeted prizes are an underused tool in innovation policy which would allow a larger share of these externalities to be captured domestically. To quote Takalo & Toi-

---

[49] University capitalizations, on the other hand, increase university autonomy. These are, however, quite small compared to the measures discussed in this paragraph.

[50] If the market failure in this particular question is climate change, it seems likely that advancing the commercial use of Finnish forests is not the optimal corrective policy.

vanen, "[F]or example, there are numerous diseases that are more prevalent mostly in Finland. Posting a correctly designed prize would be a fairly straightforward way to create incentives to come up with new treatments for such diseases."

A possibly overused policy tool for R&D support, on the other hand, is private equity investments. It is not clear why the level of appropriations for private equity investments remains elevated despite improving economic conditions which presumably alleviate credit constraints. The Council agrees with the assessment of the National Audit Office (2016b) and views that the targets of public private equity investments should be clarified and the existence of market failure in private equity markets should be more thoroughly assessed.

Finally, Finland is among a minority of developed countries that do not have R&D tax incentives. In 2013-2014 there was in place a temporary scheme under which companies could fully deduct 15 000 to 400 000 euros of R&D wage costs from their income. However, the design of the program did not enable a credible evaluation of its effects.

In their background report Takalo and Toivanen (2018) evaluate an R&D tax incentive program and a direct subsidy program (Tekes) using a structural econometric model. The model uses data on the firms that have applied for R&D support from Tekes, and information on the applications themselves. To understand this data they build a model that under certain assumptions allows evaluating the effects of different policies on R&D activity, profits, R&D externalities, and welfare. They compare the R&D tax incentive program and the subsidy program against each other, and against a laissez-faire policy counterfactual with no R&D support.

According to the results, both policies succeed in increasing R&D investments relative to laissez-faire, while also increasing firm profits. Subsidies generate (marginally) more positive externalities, which is consistent with the idea that Tekes is able to direct R&D funding to more socially optimal uses than a broad-based tax credit. On the other hand subsidies impose application costs on the firms, costs which represent resources which have alternative uses. Overall, the R&D tax credit policy has more positive welfare effects than the subsidy policy within the model. However, the difference between either of the two policies and the laissez-faire regime is negligible. Although both schemes do generate positive externalities, they also require

raising tax revenue which is socially costly. Overall it seems that externalities, identified from Tekes' decisions, are relatively small in Finland.

Some of the model's assumptions are somewhat restrictive, and as such it is not the final word on R&D support policy in Finland. It does nonetheless help illustrate some of the key tradeoffs of the policies in question, and some important principles of evaluation such as the fact that even a policy that increases R&D investments may be welfare-reducing.

Public research organizations

The programme of Prime Minister Katainen's government included a reform of public research institutes with three major changes. First, the institutes' budgets, as well as those of Tekes and Academy of Finland, were cut and the funds were directed mainly to a new programme of Strategic Research, which is administered by the Academy of Finland but the themes of which are set by the government. A smaller sum was directed to the Prime Minister's office for commissioning reports to support policymaking. (Prime Minister's Office 2013)

In total 70 million euros was assigned for the new Strategic Research programme, of which 10 million is due from the Academy of Finland, 8 million from Tekes, and the rest from the public research institutes according to their (budgetary) size. 13 million euros was assigned for the Prime Minister's office, and this was allocated wholly from public research institutes' budgets. In total 66 million euros was to be cut from public research institutes budgets, which is a significant fraction of their budget financing.[51] Later, however, the 70 million allocated to the Strategic Research programme was reduced to 57 million euros as a savings measure.

Another change was that some institutes were merged together, and others merged into universities. Third, the reform sought to increase coordination of different ministries' research commissions.

In 2011 the National Research and Innovation Council requested a proposal for a reform, which a group of experts then delivered in 2012 (Lankinen, Hagström-Näsi and Korkman 2012). Before this, Huttunen (2004) had deliv-

---

[51] All figures correspond to 2017 and are derived from the appendix of Prime Minister's Office (2013).

ered a report on similar themes. The reform broadly followed the suggestions outlined in the 2012 report.

This reform is currently being evaluated by the National Audit Office and a project commissioned by the Prime Minister's Office. We restrict ourselves here to make a note of some of the most important reallocations of the reform.

The reform considerably cut budget funding for public research organizations. By 2017 the cuts amount to 65.5 million euros, of which 52 million euros was directed to Strategic Research Funding (the rest going to the Prime Minister's office). To put this in perspective, realized budget funding for public research organizations in 2017 was 195 million euros (see Figure 7.1.6).

The reform reallocated funds between public research organizations and other research institutions, and between public research organizations themselves. We will examine these reallocations using the Strategic Research Funding decisions for the first three rounds (2015–2017) and the organizations' direct budget funding in 2014 and 2017. We do not examine the smaller part of the reform, the Prime Minister's Office's funding, as information on the allocation of this funding by organization has not been compiled.

The broad picture is that the reform reallocated funds from public research organizations to universities, with domestic universities receiving over 60% of all Strategic Research Funding. Public research organizations received a quarter of the funding. Other recipients include Kela, non-governmental research institutes (e.g. Etla), and foreign universities.

The reform also reallocated funds between public research organizations, with Luke (Natural Resources Institute Finland) and VTT (VTT Technical Research Centre of Finland) losing out the most. Relative winners of the reform are VATT Institute for Economic Research and SYKE (Finnish Environment Institute), which have actually increased their funding in the reform, at least based on the first three funding rounds (see Figure 7.3.1.).

Such a reallocation may have been beneficial, but it also could have been achieved by directly transferring funds from one organization to another without the need for a new funding vehicle. The benefits of the reform thus

depend on how beneficial the co-operation between different fields and organizations conditioned by Strategic funding are.

Figure 7.3.1: Funding for public research organizations in 2014 and 2017
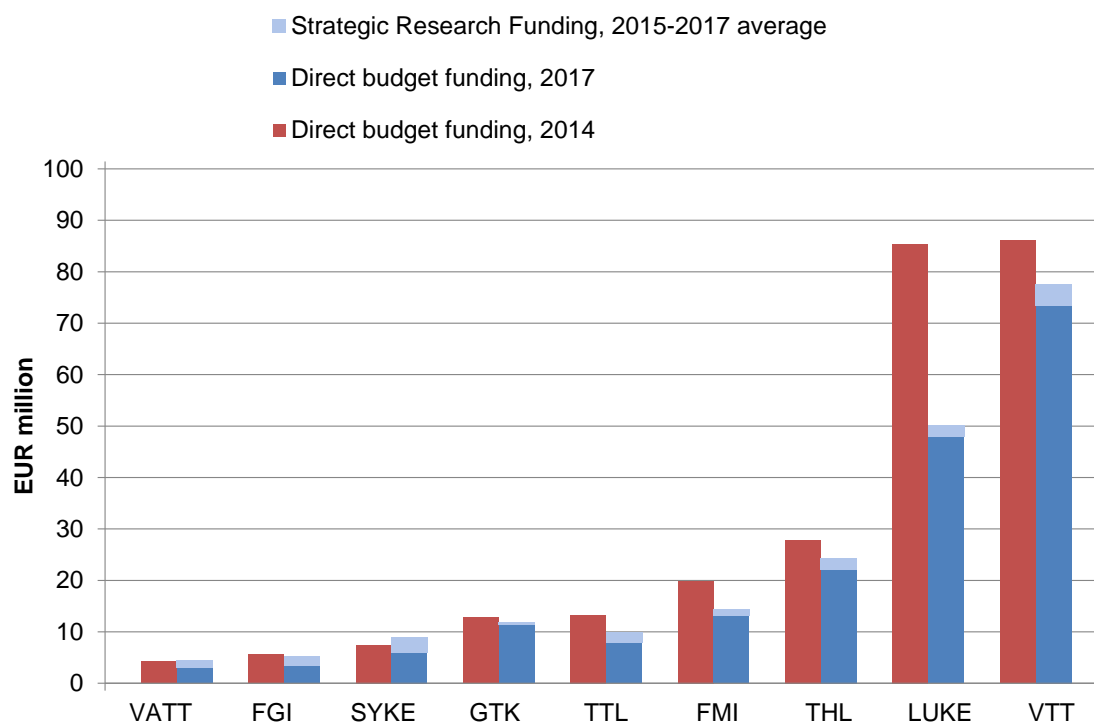
Sources: budget funding: Statistics Finland; Strategic Research Funding: Academy of Finland and own calculations. VATT is VATT Institute for Economic Research, SYKE is Finnish Environment Institute, GTK is Geological Survey Finland, TTL is Finnish Institute for Occupational Health, FGI is Finnish Geospatial Research Institute, FMI is Finnish Meteorological Institute, THL is National Institute for Health and Welfare, Luke is Natural Resources Institute Finland and VTT is VTT Technical Research Centre of Finland. These institutions cover over 95% of government budget funding for public research organizations and 100% of STN resources of public research organizations.

In all, the reform has followed the broad trend of increasing the role of competitive funding in R&D resourcing. Even prior to the reform the share of external funding in public research organizations (excluding VTT, which has always had considerable external funding) has risen from 25% in 2003 to 33% in 2011, with the most recent observation for 2014 giving a value of 42%.

Universities

Universities are an important part of Finland's innovation policy network, producing research, educating the labor force and disseminating knowledge into the society. Both outside evaluations and government proposals have

called for stronger profiling as a key solution to raising the quality of Finnish universities (e.g. Veugelers et al. 2009). While it is not always crystal clear what is meant by profiling, it typically refers to increasing the size of research units. This is achieved by the universities reallocating funds between units towards its key areas of specialization, or by increases in targeted funding (cf. the Academy of Finland funding scheme to promote profiling of universities). The Council broadly agrees with the need for larger sizes of research units within the Finnish university sector.[52]

A key problem is that current profiling development is slow to nonexistent. The background report by Seuri and Vartiainen (2018) indicates that the funding model, which is arguably the most important steering mechanism for universities, is likely to do little to advance profiling. While the current funding framework rewards for quality in research and education, which the Council agrees is desirable, it is not entirely neutral with respect to different fields. This means that it is not always beneficial for the universities to specialize according to their comparative advantage. Rather, the funding system may create incentives for all universities to prioritize largely the same fields. Furthermore, the Ministry of Education and Culture sets the university and field specific degree quotas, which act as a limit on universities' autonomy. Overall, the government should not expect the current steering model to significantly contribute to specialization within the university sector, and it should take further action to promote this goal.

The discussion on university profiling is typically very research-centered. Another important task of universities is to provide higher education. While high-quality research tends to support high-quality education and vice versa, the argument for profiling is stronger for research than it is for education. Research suggests that individuals are sensitive to location and distance when transferring from secondary to tertiary education (see e.g. Suhonen 2014). Within this context stronger profiling in education would result in poorer matches between universities and students.

A natural solution to this dilemma is to allow stronger profiling in research while maintaining broad selections of degree programmes, at least at the bachelor's level. This requires allowing universities to outsource their teach-

---

[52] See the background report Seuri and Vartiainen (2018) for a discussion of agglomeration effects in university research with some research references.

ing to other universities. The draft for the so-called Tampere3-law includes some measures of this kind, increasing possibilities for co-operation in education. The Council sees this as a positive reform, enabling universities to focus on their core research agendas while maintaining a broader selection of degree programmes.

Taxation

Tax policy can have effects on innovation by affecting the incentive to engage in innovative activity, and for innovators (be it individuals or firms) to locate in Finland. The international movement of highly educated individuals (and therefore with relatively high potential for innovation) is often discussed in this context.

Recent Danish evidence shows that migrants from countries with relatively low income inequality are positively selected, i.e. such emigrants have relatively high education and income (Borjas et al. 2017). Based on descriptive analysis provided in the background report by Kauppinen and Ropponen (2018), a similar pattern also seems to hold in Finland. Both the extent of migration and the selection pattern of Finnish migrants appear to be comparable to other European countries. A more comprehensive analysis would we warranted to determine whether the extent and pattern of migration should be a cause for concern for economic performance. As noted in the background report, it would be important to identify those occupations and industries that have the most outward mobility, and to study more closely whether this should be considered harmful or beneficial for the Finnish economy. Potential beneficial effects stem for example from the fact that there are also considerable numbers of Finnish citizens migrating to Finland from abroad, so skilled migration can be beneficial for the Finnish economy e.g. if emigrants return to work in Finland with new skills and extended networks.

Furthermore, and quite importantly from a policy perspective, it is not clear to what extent migration decisions are affected by tax considerations. Even when migration is correlated with income (or an individual's potential earnings in different countries), one cannot deduce that taxation is a key determinant of migration. There may be other factors that are correlated with income (such as job opportunities abroad) that are important in driving migration decisions. Good-quality empirical evidence on the effects of taxation

on migration is scarce and relates to special groups (Kleven et al. 2013, Kleven et al. 2014 and Akcigit et al. 2016).

Based on Danish evidence (Kleven et al. 2014), the current Finnish policy of having a reduced top tax rate for foreign experts is likely to be a good idea. There is a lack of good-quality estimates of the migration elasticities for top earners more generally, but the elasticities are likely to be small. Akcigit et al. (2016) find that the elasticity for domestic top inventors is very small (0.03), while foreign inventors are much more responsive to changes in taxation (with a migration elasticity of 1). In sum, there appears to be no clear reason at present to fine-tune overall tax policy based on concerns about emigration, but rather to target foreign experts with favourable tax treatment. More research on the causal effects of taxation on migration decisions is warranted, however.

Kauppinen and Ropponen (2018) also present a review of the empirical evidence on how firms respond to tax incentives, both regarding location choices and the level of investment. The effects of the large cuts to corporate taxation implemented in the 2010s in Finland have not been evaluated, however, and are subject to debate. Even if further tax reductions were to boost innovations, they are also likely to be costly measures in terms of tax revenue. The current level of company taxation is quite competitive in Finland by international comparison.[53]

Finally, the same welfare caveats apply to taxes as an innovation policy tool as to direct R&D subsidies. Even if lower taxation induces high-skilled individuals to immigrate and innovating firms to re-location to Finland, it may only produce limited local spillovers through changes in technology. Any effects on tax revenue as such have little to do with innovations and should be thought of as a separate question concerning public finances.

---

[53] We discussed recent cuts to corporate taxation in our 2014 report.

7.4.   Council views

The current government has cut funding to higher education and R&D. While these budget cuts have contributed to consolidating public finances, they may have adverse effects on productivity in the long run.

Cuts to R&D subsidies are likely to have reduced R&D activity. However, the rationale for these types of subsidies is weaker in a small open economy such as Finland than in larger countries, as the positive spillover effects to a large extent accrue to foreign firms and consumers. Evaluating the significance of these spillover effects, and therefore also the overall welfare effects of R&D subsidies, is subject to high uncertainty. For similar reasons, the justification for strict property rights legislation is also relatively weak in a small open economy. This calls for a reconsideration of current Finnish property rights legislation, which is relatively strong by international comparison.

The new strategic research funding programme has resulted in a considerable reallocation of funds between different public research institutes, and between research institutes and universities. This programme, together with the funding programme to promote university profiling and sector-specific programmes by Tekes, contains an element of increased governmental guidance of research funding. The high application costs associated with large-scale competitive funding programmes have to be properly weighed against the expected benefits.

The Council agrees with the aim of increasing the sizes of research units in the university sector through a trend towards stronger profiling of research activities. The government should not rely on the university funding system to achieve this goal. The funding system incentivizes individual universities to increase their productivity, and there are indications that this has had the desired effect. However, such high-powered incentives may also produce undesired effects, for example an unbalanced development between different fields of research. On the whole, structural change within the university sector requires coordination and discretionary measures. Differentiation in educational responsibilities and research foci may ease some of the trade-offs in this structural change.

International migration affects the availability of highly skilled labour and therefore the innovative potential of a country. The extent and pattern of

emigration from Finland appears comparable to other European countries. Like other countries with relatively low income inequality, emigrants from Finland tend to be positively selected, i.e. they have relatively high income and education. It is unclear to what extent migration decisions are affected by differences in taxation across countries, as good-quality empirical evidence is very limited. There appears to be no clear reason at present to fine-tune overall tax policy based on concerns about emigration, but rather to target foreign experts with favourable tax treatment.

References

Arrow, K.J. (1963): Uncertainty and the Welfare Economics of Medical Care, The American Economic Review, 53(5), 941-973.

Abdulkadiroglu, A., and Sönmez, T. (2003): School choice: A mechanism design approach.The American Economic Review, 93(3), 729-747.

Acemoglu, D., Akcigit, U., Bloom, N. and Kerr, W. (2013): Innovation, reallocation and growth. NBER Working Paper Series 18993.

Akcigit, U., Baslandze, S. and Stantcheva, S. (2016): Taxation and the International Mobility of Inventors, American Economic Review 106(10): 2930-81

Ahomäki, I. (2018): Ryhmäkokoavustusten vaikutus opetusryhmien kokoon. Käsikirjoitus, Jyväskylän yliopiston kauppakorkeakoulu.

Altinok, N., Angrist, N. & Patrinos, H. (2017): An updated global dataset on education quality, version 1.0.

Angelis, J., Glenngård, A.H. and Jordahl, H. (2017): Management practices and the quality of primary care. IFN Working Paper No. 1174.

Angrist, J. and Krueger, A. (1991): Does compulsory school attendance affect schooling and earnings? The Quarterly Journal of Economics 106.4: 979-1014.

Angrist J., and Lavy, V. (1999): Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement, Quarterly Journal of Economics, vol. 114, 533- 575.

Appelqvist, J., Tikanmäki H., Reipas, K., Sankala, M. and Sihvonen, H., (2017): Statutory pensions in Finland: long-term projections 2016, Finnish Centre for Pensions, Reports 2/2017

Bargain, O. and Callan, T. (2010): "Analysing the effects of tax-benefit reforms on income distribution: a decomposition approach" The Journal of Economic Inequality, vol. 8, issue 1

Bénabou, R., Kramarz, F. and Prost, C. (2009): The French zones d'education prioritaire: Much ado about nothing? Economics of Education Review, 28(3):345–356.

Card, D. (1999): The Causal Effect of Education on Earnings in O. Ashenfelter, D. Card Handbook of Labour Economics.

Cebolla-Boado, H., Radl, J. and Salazar, L. (2017): Preschool education as the great equalizer? A cross-country study into the sources of inequality in reading competence. Acta Sociologica Vol 61(1), 41-60.

Congressional Budget Office (2008): Technological change and the growth of health care spending. A CBO Paper, January 2008.

Dafny, L. (2005): Games hospitals play: Entry deterrence in hospital procedure markets. Journal of Economics and Management Strategy, 14(5), 513-542.

Dulleck, U. and Kerschbamer, R. (2006): On Doctors, Mechanics, and Computer Specialists: The Economics of Credence Goods. Journal of Economic Literature, 44(1): 5-42.

Duggan, M.G. (2000): Hospital ownership and public medical spending. Quarterly Journal of Economics, 115(4), 1343-1373.

Economic Policy Council (2016): Economic Policy Council Report 2015.

European Commission (2015): The 2015 Ageing Report – Economic and budgetary projections for the 28 EU Member States (2013-2060), European Economy 3/2015

European Commission (2016): Fiscal sustainability report 2015, European Economy Institutional Paper 018/2016

Finnish National Agency for Education (2017): Opettajat ja rehtorit Suomessa 2016. Raportit ja selvitykset 2017:2.

Gale, D., and Shapley, L. S. (1962): College admissions and the stability of marriage. The American Mathematical Monthly, 69(1), 9-15.

De Haan, M. (2017): The effect of additional funds for low-ability pupils: A non-parametric bounds analysis. The Economic Journal, 127(599):177–198.

Hanushek, E. A., Schwerdt, G., Woessmann, L., and Zhang, L. (2017): General Education, Vocational Education, and Labor-Market Outcomes over the Lifecycle. Journal of Human Resources, 52(1), 48-87.

Harju, J., Hokkanen, T., Laukkanen, M., Ollikka, K. and Tamminen, S. (2016): Vuoden 2011 energiaverouudistuksen arviointia. Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja 61/2016.

Harmon, C. and Walker, I. (1995): Estimates of the economic return to schooling for the United Kingdom. The American Economic Review 85.5: 1278-1286.

Hart, O., Shleifer, A. and Vishny, R. W. (1997): The Proper Scope of Government: Theory and an Application to Prisons. Quarterly Journal of Economics 112 (4): 1127-1161.

Heckman, J. J. (2011): The Economics of Inequality: The Value of Early Childhood Education. American Educator, 35(1), 31.

Huovari, J. Jauhiainen, S. and Kekäläinen, A. (2017): Assessment of the EC cyclical adjustment methodology for Finland – impact on budget balances, PTT Working Papers 191

Huttunen, J. (2004): Valtion sektoritutkimusjärjestelmän rakenteellinen ja toiminnallinen kehittäminen. Selvitysmiesraportti.

Hämäläinen, U. and Uusitalo, R. (2008): Signalling or human capital: Evidence from the Finnish polytechnic school reform, Scandinavian Journal of Economics 110(4), 755-775.

International Monetary Fund. (2008): Fiscal risks – sources, disclosurce, and management. Prepared by the Fiscal affairs department, approved by Teresa Ter-Minassian. Dated May 21, 2008. Accessed 22.1.2018 at https://www.imf.org/external/np/pp/eng/2008/052108.pdf

Jokela, M., Pekkarinen, T., Sarvimäki, M., Terviö, M., and Uusitalo, R. (2017): Secular rise in economically valuable personality traits. Proceedings of the National Academy of Sciences, 201609994.

Kalenius, A. (2018): Koulutustason kehitys Suomessa. Report to the Economic Policy Council.

Karila, K; Kosonen, T. and Järvenkallas, S. (2017): Roadmap on the development of early childhood education for 2017–2030. Publications of the Ministry of Education and Culture, Finland 2017:30.

Karhunen, H. (2017): Nuoret eivät pärjää ilman oikeanlaista koulutusta, Tieto & Trendit 7.3.2017, Statistics Finland.

Kauppinen, I. and Ropponen, O. (2018): Taxation, migration and location of innovative activity. Report to the Economic Policy Council.

Keller, W. (2010): International trade, foreign direct investment, and technology spillovers. In Bronwyn Hall and Nathan Rosenberg (Eds.): Handbook of the Economics of Innovation, Volume 2.

Kivinen, O. and Hedman, J. (2017): Suomen korkeakoulutus on yhä korkeaa kansain-välistä tasoa Tieto & Trendit 20.12. 2017, Statistics Finland.

Klavus, J. and Pääkkönen, J. (2014): Miksi kestävyysvajelaskelmat eroavat toisistaan? Hoito- ja hoivamenoista tehtyjen oletusten vaikutus tuloksiin. VATT Valmisteluraportit 20.

Kleven, H. J., Landais, C. and Saez, E. (2013): Taxation and International Migration of Superstars: Evidence from the European Football Market, American Economic Review 103 (5): 1892–1924

Kleven, H. J., Landais, C., Saez, E. and Schultz, E. (2014): Migration and Wage Effects of Taxing Top Earners: Evidence of the Foreigners' Tax Scheme in Denmark, Quarterly Journal of Economics 129: 333–78

Krueger, A. (1999): Experimental estimates of education production functions, The Quarterly Journal of Economics 114.2 497-532.

Kultti, K., Nurminen, M. and Tukiainen, J. (2015): Tutkimusrahan uusi kilpailutus maksoi miljoonia. Kansantaloudellinen aikakauskirja, 111(4): 545-546.

Kupiainen, S. and Heinonen, N. (2016): Luokkakoko, Suomen Kasvatustieteellinen Seura, Research in Educational Sciences 72.

Koerselman, K. and Uusitalo, R. (2014): The Risk and Return of Human Capital Investments, Labour Economics 30, pp. 154-163.

Lankinen, T., Hagström-Näsi, C. and Korkman, S. (2012): Valtion tutkimuslaitokset ja tutkimusrahoitus: esitys kokonaisuudistukseksi. Valtioneuvoston kanslian julkaisusarja 3/2013.

Lassila, J. and Valkonen, T. (2011): Julkisen talouden rahoituksellinen kestävyys Suomessa. Etla Discussion Papers 1237.

Lavy, V. and Schlosser, A. (2005): Targeted remedial education for underperforming teenagers: costs and benefits. Journal of Labor Economics, 23(4): 839–874.

Lindwall, P. (2013): Budgeting for Contingent Liabilities, GOV/PGC/SBO(2013)7, OECD.

Lindh, T. and Ohlsson, H. (1996): Self-employment and windfall gains: evidence from the Swedish lottery. The Economic Journal, 106: 1515-1526.

Leuven, E., Lindahl, M., Oosterbeek, H. and Webbink, D. (2007): The effect of extra funding for disadvantaged pupils on achievement. The Review of Economics and Statistics, 89(4):721–736.

Lundin, D., Mörk, E., and Öckert, B. (2008): How far can reduced childcare prices push female labour supply?. Labour Economics, 15(4), 647-659.

de la Maisonneuve, C. and Oliveira Martins, J. (2013): Public spending on health and long-term care: a new set of projections. OECD Economic Policy Papers, 06.

Ministry of Education and Culture (2017a): Valmiina valintoihin II. Ammatillisesta koulutuksesta korkeakouluun. Opetus- ja kulttuuriministeriön julkaisuja 2017:25.

Ministry of Education and Culture (2017b): Opetusryhmäkoon pienentämiseen ja koulutuksellisen tasa-arvon edistämiseen suunnatut valtionavustukset. Valtiovarainvaliokunnan Sivistys- ja tiedejaostolle. 2.6.2017.

Ministry of Finance, (2017a): Valtiovarainministeriön kestävyysvajelaskel-mien menetelmäkuvaus, 20.6.2017.

Ministry of Finance, (2017b): Overview of Central Government Risks and Liabilities, Spring 2017, Ministry of Finance publications, 20b/2017

Ministry of Social Affairs and Health (2009): Skenaarioita sosiaalimenoista – terveyden edistämisen vaikutukset ja analyysimallin esittely. Sosiaali- ja ter-veysministeriön selvityksiä 2009:7.

Murray, G., Hyytinen, A. and Maula, M. (2009): Growth entrepreneurship and finance. Chapter in Veugelers (ed.): Evaluation of the Finnish National Inno-vation System – Full Report. Taloustieto OY.

National Audit Office (2016a): Makroennusteiden luotettavuus. Valtionta-louden tarkastusviraston tarkastuskertomukset 11/2016.

National Audit Office (2016b): Valtion pääomasijoitustoiminta. Valtionta-louden tarkastusviraston tuloksellisuuskertomukset, 15/2016.

National Audit Office (2017): Separate report to Parliament: Fiscal policy evaluation report 2017

Ollikainen, J-P. (2017): The reform of vocational upper secondary education. Report to the Economic Policy Council.

Pathak, P. A. (2011): The mechanism design approach to student assign-ment. Annual Review of. Economics 3(1), 513-536.

Pekkarinen, T. and Sarvimäki, M. (2016): Parempi tapa valita korkeakoulu-opiskelijat, VATT Policy Brief 1-2016.

Pita Barros, P. and Siciliani, L. (2012): Public and Private Sector Interface. Handbook of Health Economics, vol. 2, 937-1001.

Prime Minister's Office (2013): Valtioneuvoston periaatepäätös valtion tut-kimuslaitosten ja tutkimusrahoituksen kokonaisuudistukseksi. 5.9.2013.

Prime Minister's Office (2017): Hallituksen Vuosikertomus, Hallituksen jul-kaisusarja 1a/2017

Saarimaa, T., Saastamoinen, A., Suhonen, T., Tervonen, L., Tukiainen, J. and Vartiainen, H. (2016): Kuntien sääntelyn periaatteet, Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja 21/2016.

Statistics Finland (2017): Koulutukseen hakeutuminen 2016, SVT Koulutus.

Seuri, A. and Vartiainen, H. (2018): Yliopistouudistus ja yliopistojen rakennekehitys. Report to the Economic Policy Council.

Seuri, A., Uusitalo, R. and Virtanen H. (2018): Pitäisikö oppivelvollisuusikä nostaa 18 vuoteen? Report to the Economic Policy Council.

Silliman, M. (2017): Targeted funding, immigrant background, and educational outcomes: evidence from Helsinki's "Positive discrimination" policy. VATT Working Papers 91.

Suhonen, T. (2014): Field-of-study choice in higher education: does distance matter. Spatial Economics, 9(4): 355-375.

Sundet, J., Barlaug, D. and Torjussen, T. (2004): The end of the Flynn effect? A study of secular trends in mean intelligence test scores of Norwegian conscripts during half a century. Intelligence 32:349–362.

Takalo, T., Tanayama, T. and Toivanen, O. (2013): Market failures and the additionality effects of public support to private R&D: Theory and empirical implications. International Journal of Industrial Organization, 31: 634-642.

Takalo, T and Toivanen, O. (2018): Economics of Finnish Innovation Policy. Report to the Economic Policy Council.

Teasdale, T. and Owen, D. (2005): A long-term rise and recent decline in intelligence test performance: The Flynn Effect in reverse. Personality and Individual Differences 39:837–843.

Toivanen, O. and Väänänen, L. (2016): Education and invention. The Review of Economics and Statistics, 98(2): 382-396.

Veugelers, R., Toivanen, O. and Tanayama, T. (2009): Education, research, and the economy. Chapter in Veugelers (ed.): Evaluation of the Finnish National Innovation System – Full Report. Taloustieto OY.

Woessmann, L. (2017): Vocational Education in Apprenticeship Systems: Facing the Life-Cycle Trade-offs. Report to the Economic Policy Council.

Wendt, K., Söder, I. and Leppälahti, A. (2015): A guide to understanding higher education R&D statistics in the Nordic countries. NIFU Working Paper 9/2015.

Zweifel, P., Felder, S. and Meiers, M. (1999): Ageing of population and health care expenditure: a red herring? Health Economics, 8: 485-496.