Nordic Council of Ministers

FISCAL POLICY IN UNCERTAIN TIMES

Nordic Economic Policy Review 2024

Contents

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Authors and Editors

Editors: Jouko Vilmunen and Juha Junttila

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Introduction

Jouko Vilmunen, Professor, University of Turku

Juha Junttila, Professor, University of Oulu

Fiscal Stabilisers in Denmark

Torben Andersen, Professor, Aarhus University

Comment by Paul Lassenius Kramp, Head of Division, Danish Ministry of Finance

Comment by Søren Hove Ravn, Associate Professor, University of Copenhagen

Automatic Fiscal Stabilizers in Finland 1993–2021

Jenni Kellokumpu, Leading Specialist, Ministry of Finance

Leena Savolainen, Financial Specialist, Ministry of Finance

Simo Pesola, Fiscal Policy Auditor, National Audit Office

Comment by Antti Ripatti, Professor, University of Helsinki

Comment by Martti Hetemäki, Professor, University of Helsinki

Automatic stabilisers in Iceland

Arnaldur Sölvi Kristjánsson, Assistant Professor, University of Iceland

Comment by Katrin Olafsdottir, Associate Professor, Reykjavik University

Inequality and Fiscal Multipliers: Implications for Economic Policy in the Nordic Countries

Hans A. Holter, Assistant Professor, University of Delaware, University of Oslo and Nova School of Business and Economics

Ana M. Ferreira, Ph.D. Student, Nova School of Business and Economics

Comment by Juha Junttila, Professor, University of Oulu

Comment by Tord Krogh, Senior Economic Adviser, Norwegian Ministry of Finance

Developments of automatic stabilisers in Sweden 1998–2022

Markus Sigonius, Senior Economist, Swedish Fiscal Policy Council

Comment by Karl Harmenberg, Associate Professor, University of Oslo

Introduction

Jouko Vilmunen and Juha Junttila

1 Introduction

The severity of the 2008 financial crisis and its highly disruptive aggregate (and microeconomic) effects have intensified the debate over the role of conventional macroeconomic policies during crises. It is no exaggeration to say that the crisis challenged the prevailing mainstream macroeconomic orthodoxy at the time and how it explained the emergence of systemic financial crises and informed policy makers about how to manage them.

One particular consequence of the crisis and the associated debate has been the renewed interest in the efficiency of conventional macroeconomic policies, fiscal policy in particular. This issue has been further highlighted by two other major global events, the COVID-19 pandemic starting in 2019 and the Russian invasion of Ukraine in early 2022. All three of these global events have had vastly negative effects on economies and increased the risk of political instability in all corners of the world. Macroeconomic research and policy debates have taken these events into account, with studies focusing on, e.g. macroeconomic policies when countries face pandemic-type shocks (Junior *et al.* 2021).

One very important issue related to macroeconomic policy is the role of fiscal multipliers and automatic stabilisers. Given the major global shocks alluded to above, it is interesting to look at whether automatic stabilisers are still quietly doing their job[1] and whether there are signs of changes to the size and potential time and state dependence of fiscal multipliers and automatic stabilisers. However, one issue that is either not covered or not covered well in these studies, both theoretical and empirical, is the role of macroeconomic uncertainty and how it interacts with fiscal policy.[2] The

1. This nice and appropriate wording is borrowed from the title of the paper by D. Cohen and G. Follette "*The Automatic Stabilizers: Still Quietly Doing Their Thing*", FRBNY Policy Review / April 2000.
2. *Fiscal Policy and Uncertainty* (JEDC 145, pp. 1-35, 2022) by S. Jerow and J. Wolff is an important exception.

interaction between uncertainty and macroeconomics in general and between uncertainty and macroeconomic policy in this context of fiscal policy in particular should not be ignored, not least when economies are hit by large global shocks that give rise to crises and recessions like the ones alluded to above. Having said this, however, the Russian invasion has not triggered a severe recession, at least yet.

It is evident that macroeconomic uncertainty has increased during the last couple of years and affected fiscal (and monetary) policy in many parts of the world. It must have been very challenging for policy makers at the time of the COVID-19 pandemic and the Russian invasion of Ukraine to stick to the key objective of minimising uncertainty about future decisions. During the pandemic, policymakers worldwide introduced unprecedented amounts of fiscal stimulus to counter the sharp decline in global growth. However, the reopening of economies and other global events led to a surge in inflation, which prompted monetary policymakers to increase interest rates. This rapid adjustment has exacerbated policy uncertainty in general.

Earlier studies, such as Berg (2019), analysed the idea that greater uncertainty makes fiscal policy temporarily less effective by examining the relationship between business uncertainty and the efficacy of fiscal policy in Germany. The measures of business uncertainty used in the study were derived from company-level data in the Ifo Business Climate Survey and their interaction with the parameters for a structural vector autoregression was designed to produce state-dependent fiscal policy spending multipliers. According to Berg, the impact of greater uncertainty on the spending multiplier was generally small and often statistically insignificant in the short term, but there was a significantly positive impact on the long-term multiplier.

Some studies have proposed that the level of public debt also has an impact on the effectiveness of fiscal policy actions (Huidron et al., 2020; Geiger and Zachariadi, 2022; Eminidou et al., 2023). Bi et al. (2016) go into greater detail, using a nonlinear neoclassical growth model to show that the difference in the effects of government spending in high-debt and low-debt scenarios depends on the wealth effect on labour supply and on whether the government uses taxes or spending to retire debt. Hence, due to the interrelated state variables, for example, the previously conducted structural VAR estimations conditioning on debt alone may fail to isolate debt-dependent effects. In addition, uncertainty about when governments will introduce fiscal consolidation leads to wide confidence bands for spending multipliers, which further complicates efforts to estimate the debt-dependent government spending effects accurately.

Ghassibe and Zanetti (2022) have also analysed the state-dependence of the fiscal policy effects based on a theoretical model for state-dependent fiscal multipliers in a framework featuring two empirically relevant frictions: idle capacity and unsatisfied demand. According to their findings, the source of fluctuations (demand vs. supply) determines the cyclicality of multipliers. Hence, demand stimulation policies, such as government spending, have multipliers that are large in demand-driven recessions but

small and possibly negative in supply-driven downturns. Conversely, policies that boost supply, such as cuts in payroll taxes, are ineffective in demand-driven recessions but powerful if the downturn is supply-driven. Hence, the stipulation of that austerity, in the form of a reduction in government consumption, can have the largest multiplier in supply-side recessions and demand-driven booms, provided elasticities of labour demand and supply are sufficiently low. Their empirical analyses support their main theoretical assumptions.

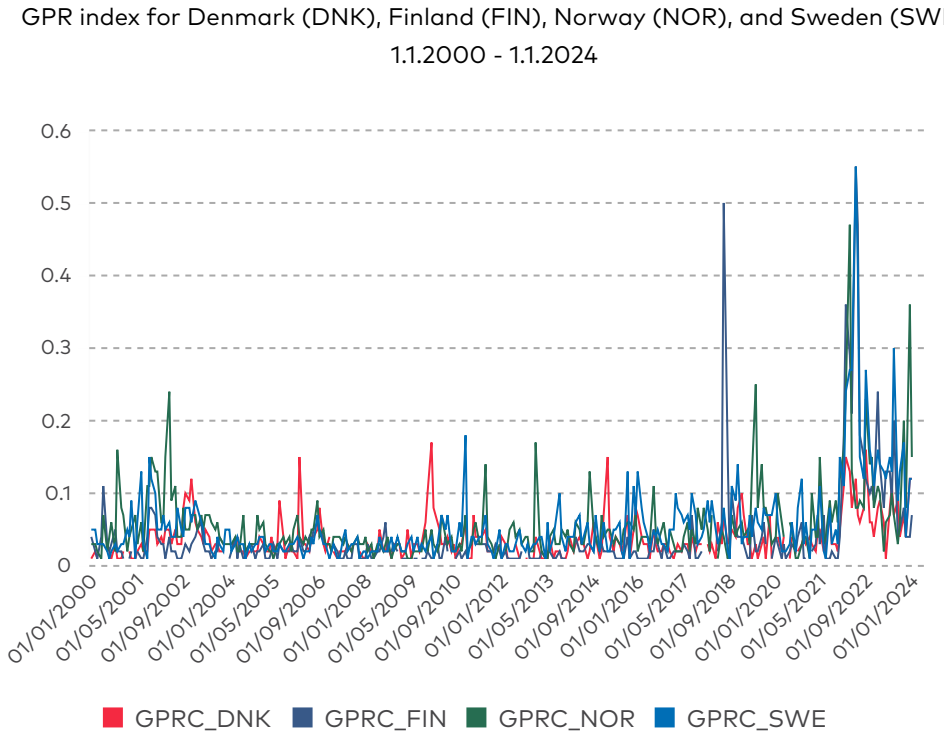
Finally, Dao et al. (2023) stress that the uncertainty stemming from rising inflation also plays a strong role in defining the effects of fiscal policy, and they go as far as to call for 'unconventional fiscal policies'. They claim that, for example, sudden surges in energy prices, like those in 2022, may be the root cause of this. They assess the impact of "unconventional fiscal policy," defined as a set of fiscal measures, possibly expansionary, motivated by a desire to dampen the effects of the increase in energy prices and to lower inflation. Their empirical study finds that the unconventional measures reduced euro area inflation by 1 to 2 percentage points in 2022 and may help to avoid an undershoot later on. These events trigger nonlinearities in the Phillips curve, and when they are taken into account, the net effect is to reduce inflation by about 0.5 percentage points in 2021–2024 and keep it nearer to the inflation target. About one-third to one-half of the reduction in 2022 reflects the direct effects of the measures on headline inflation, with much of the remainder reflecting the lower pass-through to core inflation. The fiscal measures were deficit-financed but only raised inflation to a limited extent by stimulating demand and instead had a modest stabilising effect on longer-term inflation expectations. After their paper was published, and as evidenced by the most recent developments, the prospective decline in inflation in the euro area was partly due to fortunate circumstances, with energy prices falling from their 2022 peaks and their pass-through effects fading and with less overheating than economies like the United States.

From the information provided e.g. in connection to the regularly published OECD Economic Outlook (see https://data.oecd.org/gga/general-government-deficit.htm and https://data.oecd.org/gga/general-government-debt.htm#indicator-chart), we can see that the recent fiscal (both debt and deficit) positions of the Nordic countries might also have been dependent on uncertainty surrounding the national economies in recent years. The biggest challenges faced by the fiscal budget positions and general government debt in all Nordic countries (except Norway) were observed during and immediately after the Global Financial Crisis (GFC) from 2007 onwards and during the COVID-19 pandemic. However, even though most of the Nordic countries (Finland and Iceland especially) dived into deeper waters in terms of public debt ratios compared to the OECD countries in general, their positions are still not among the worst, and only Iceland had a higher than OECD average general government debt ratio in 2022. However, due to the publication lags in the OECD data and especially the unexpected changes in the geopolitical and economic situations in 2022 and immediately

thereafter, the current situation in all these countries is clearly worse also due, for example, to the much higher interest costs of public debt.

As a reflection of one of the most important recent developments in global risk factors, we also point out that in the near future the increasing geopolitical risk due to the Russian invasion of Ukraine might be a root cause of even more negative developments in the public finance positions in most of the Nordic countries. Public spending on national defence will probably increase, at least in Norway, Sweden and Finland, for several years to come and, in view of one new risk indicator (the GeoPolitical Risk index, GPR; see Caldara and Iacoviello, 2022), the need for this is clearly mirrored in the development of national geopolitical risk indexes in the last two to three years (see Figure 1). Right after the Russian attack in February 2022, the GPR indexes in Norway, Sweden and Finland soared to all-time highs, and, at the time of writing, they are still higher than at any time prior to the invasion in the period studied. Especially the Swedish GPR index seems to have experienced longer sways of extremely high values after the Russian attack to Ukraine, and this can obviously be related to the delayed process of joining the NATO. In general terms, for all Nordic countries adding the urgent need to raise public military spending to the need to match the rising costs of interest on public debt with this development, will further emphasise the essential role for an in-depth understanding of the effects of fiscal policy actions, fiscal multipliers, and automatic stabilisers in the Nordic countries.

Figure 1. Geopolitical risk index (GPR) for the Nordic countries, data available for Denmark, Finland, Norway and Sweden, data downloaded from https://www.matteoiacoviello.com/gpr.htm on February 19, 2024



The Nordic Economic Policy Review 2024 consists of five papers presented at the seminar on 'Fiscal stabilizers in Nordic countries' in Reykjavik, Iceland, on 8 November 2023. The papers provide a rich perspective on fiscal stabilisation in Nordic countries, highlighting different challenges in managing the national economies. Of particular interest in terms of automatic stabilisers and fiscal stabilisation more generally in the papers presented at the conference was, and still is, the potential time and state-dependency of fiscal multipliers. The papers also discuss the key lessons for fiscal policy from the Global Financial Crisis, the COVID-19 pandemic and the Russian invasion of Ukraine. One topical issue covered in the papers relates to spending limits used and their potential effects on, in particular, constraining the efficacy of fiscal stabilisation, as well as their role in explaining any observed differences in the fiscal multipliers across spending items and tax instruments.

2 Fiscal stabilisation in the Nordic region

2.1 Denmark

The first paper reviews the fiscal framework and recent policy in Denmark. According to Professor Andersen, Danish fiscal policy has been rules-based for years, with much weight on long-term issues and healthy public finances. When it comes to active intervention in the business cycle and the perception that it is possible to finetune aggregate fluctuations, Denmark has switched from the more active approach of the 1970s and 1980s to the current fiscal policy framework with its focus on both the short term and the long term. Denmark has an open economy with a large public sector, a fixed exchange rate regime and free capital mobility. The currency regime has remained an important anchor for economic policy in general and implies a clear division of labour between fiscal and monetary policy since an independent monetary policy is not feasible under a fixed exchange rate regime with liberalised capital movements. The peg against the euro essentially implies that the euro-area inflation target becomes the implicit inflation target for Denmark, and it is up to fiscal policy to maintain the credibility of the peg.

According to Professor Andersen, fiscal policy planning in Denmark has become more structured and formalised over the years. For three decades now, the practice has been to draw up long-term plans focusing on fiscal sustainability, with medium-term plans usually defining a target for the structural balance at the end of the ten-year planning horizon. This provides a basis for determining the fiscal space available for new political initiatives concerning the public finances. Currently, the target GDP ratio for 2030 is -0.5. Denmark has gone a step further in its fiscal framework, which is legally defined in the 2012 Budget Act that implements the fiscal rules laid out in the Growth and Stability Pact. The act specifies not only a deficit limit for the structural public balance but also multiannual expenditure ceilings for central and local government as well as the regions. It also defines the sanctions for any violations of these ceilings. One interesting element of the fiscal framework is the "tax freeze", which is basically meant to ensure that the overall tax burden does not increase.

Discussing discretionary fiscal policy, Professor Andersen notes that while fiscal activism and the ability to finetune the business cycle have, over time, been reduced, discretionary policy changes remain important for various reasons. Discretionary policy measures rely on estimates of the cyclically adjusted budget balance, the fiscal effects of which have their roots in the ADAM model for the Danish economy used by the Ministry of Finance (MoF) and the SMEC model used by the Council of Economic Advisors. A new model, MACRO, has recently been developed and is going to be used by the MoF. Professor Andersen also highlights the distinction between defensive and offensive approaches in the discussion of discretionary fiscal policy. This distinction

hinges on the timing of fiscal policy measures relative to the state of the business cycle and actual changes in policy measures to dampen business cycle fluctuations. In his discussion, Professor Andersen clearly notes all the difficulties in assessing the state of the business cycle as well as the fact the set of appropriate fiscal policy instruments is restricted.

For automatic stabilisers to work as intended, it is necessary to have sufficient fiscal space for the implied budget variations, as Professor Andersen notes. To maintain sufficient fiscal space, symmetry is important, i.e. a surplus during upturns that creates room for automatic stabilisers to work in downturns. Without this space, discretionary policy interventions are needed to reassert the symmetry. Professor Andersen details the key mechanisms through which automatic stabilisers work with particular emphasis on private consumption and the nature of dominant business cycle shocks, that is, whether demand or supply shocks drive business cycle fluctuations and whether these shocks are temporary or permanent. An important part of Professor Andersen's account of automatic stabilisers is the observation that they are the net outcome of other policy measures, which trigger automatic responses. This observation is particularly interesting and important from the point of view of the potential time and state dependence of automatic stabilisers, a key element of the discussions at the Reykjavik conference.

Towards the end of his paper, Professor Andersen argues, perhaps not surprisingly, that the consequences of an ageing population and the implications for public finances have taken centre stage in the policy debate over fiscal sustainability in Denmark. Assessments of sustainability are made on a regular basis, and the sustainability indicator indicates the change needed to the primary budget balance needed for current policies to be consistent with the government's intertemporal budget constraint. To attain and maintain fiscal sustainability, the first issue was to quantify the challenges and needs for reform, including the raising and indexation of the statutory retirement age to correspond with trends for life expectancy. The conditions for fiscal sustainability also played a role. The second phase focused on ensuring that policies remained consistent with fiscal sustainability. Short-term targets for fiscal policy were a key feature during the implementation phase. A specific and interesting aspect of the Danish case is the U-shaped pattern of the underlying budget profile, called the hammock in the Danish policy debate, according to Professor Andersen. It reflects a low public debt and net wealth position at first, followed by a sequence of years with budget deficits and then systematic surpluses. As useful as the sustainability indicator is in summarising a lot of information in a single index, it has its problems in that it conceals the inherent uncertainties in sustainability projections. Robustness analyses circumvent the problems to an extent, as Professor Andersen notes, but the issue of uncertainty still remains.

2.2 Finland

The Finnish paper, written by Jenni Kellokumpu, Leena Savolainen and Simo Pesola, uses annual tax and benefit rules as well as macro- and microdata on government taxes and expenditures to estimate the size of automatic stabilisers in the period 1993-2021. The authors believe that their estimates suggest automatic stabilisers have not changed significantly as a result of various policy decisions, the reforms have been relatively moderate and have had offsetting impacts on automatic stabilisers.

The paper estimates the size of the automatic stabilisers by calculating the implied budgetary semi-elasticity, which measures the sensitivity of the budget balance-to-GDP ratio to aggregate fluctuations. Changes in the output gap reflect changes in the state of the business cycle in these calculations. To arrive at the estimate of overall budgetary semi-elasticity, the paper combines the estimated elasticities of four tax categories, direct income tax, corporate income tax, payroll tax and indirect taxes, as well as primary expenditure. The methodology used in the paper then decomposes the different elasticity estimates into structural and cyclical components, with the former related to tax and benefit rules and the latter providing information on how taxes and benefits respond to aggregate fluctuations.

The estimates seem to suggest that in the period observed, the budgetary semi-elasticity initially increased from 0.46 in 1993 to a peak of 0.5 in 1997 before declining continuously to 0.42 in 2008. From then on, the estimated semi-elasticity has gradually increased and, in recent years has remained close to the 2021 estimate of 0.47. The authors argue that the increase in the elasticity from 1993 to 1995 can be traced mainly to the higher revenue from corporate income taxes at the time. Then again, the average tax rate for wage income was lowered steadily from 1996 to 2009, contributing negatively to the fall in the semi-elasticity, a fall partially offset by the increase in tax progressivity on wage income in the 2000s. Overall, a number of factors, such as a rise in tax progressivity and wage income taxation, spending on unemployment and increases in VAT revenue in the last 15 years, have contributed to a higher level of semi-elasticity.

Before going into the details of the estimates, the paper offers an overview of the main policy reforms regarding automatic stabilisers in the period studied. An assessment of the role of automatic stabilisers in Finland combined with some concluding remarks outlines the key points. Reading through the policy reforms, the authors first show how wage income taxation has evolved. These taxes increased significantly during the recession of the early 1990s. After the peak in the average tax rate for full-time workers in 1995, the rate started to fall in 1996 due to reductions in various tax rates and social insurance contributions. In addition, earned income tax credit was first introduced in 2006, with a similar work tax credit replacing it in 2009,

the year when the continuous fall in the average wage income tax rate came to an end. Thereafter, it has remained relatively stable at a slightly higher level. Capital income taxation has undergone frequent changes during the period observed. From 1993 to 2011, the tax rate varied between 25% and 29% and in 2012, it went up from 28% to 30% and the flat rate was replaced by a progressive one by introducing thresholds, which were, over time, lowered from the initial level of €50,000 in 2012 to €30,000 later on, in 2015. Above these thresholds, taxes were increased from the initial 32% to 34%. Value-added tax, introduced in 1994, is an important source of tax revenue, and the general rate is currently 24%, with lower rates for some items.

The unemployment benefit system in Finland seems to be fairly complex, according to the authors. It has been changed several times with the occasionally contradictory aims of improving income security, boosting employment, providing stronger incentives to work and reducing government expenditure. The current system is a two-tier one combining basic unemployment benefit and earnings-related benefit, with the latter requiring a predetermined employment history and membership of an unemployment fund. The unemployment system has been changed a number of times since the basic reform in 1984, the major reasons being the changes in the state of the economy that have forced governments to constrain increases in public expenditure and to provide stronger incentives for the unemployed to take jobs. An addition to the system – the labour market subsidy – was introduced in 1994 for unemployed people who no longer fully satisfied or did not yet satisfy the conditions for unemployment benefit. The most recent reform of the unemployment system was the "activation model", which consisted of cuts in benefit after 65 days for anybody who had not been employed or had not been part of a job-seeking programme for a sufficiently long time during those 65 days.

The authors go on to summarise the key estimates of the budgetary semi-elasticities, reflecting the cyclical responses of specific tax and expenditure components. In their methodology, the contribution to annual semi-elasticity estimates is determined by three factors: the revenue/expenditure-to-base elasticity, the base-to-output gap elasticity and the overall size of individual tax and expenditure categories relative to GDP.

Of the revenue elasticities, the estimated output-gap elasticity of direct taxes on labour is 0.68 in the period 1987–2021. Compared to international evidence, the results suggest that wages and employers' social security contributions react more strongly to aggregate fluctuations. However, the results also indicate time variation in that the estimates appear to depend on the specific period. As the authors rightly note, the output elasticity of aggregate wages plays an important role in the analysis of automatic stabilisers, since these are affected both by the contribution of direct taxes to labour and payroll taxes. More specifically, smaller estimates of wage elasticity lower the size of the automatic stabilisers.

After finalising the calculation of revenue elasticities for payroll, corporate and indirect taxes, the paper proceeds to present results for the elasticity of total government current primary expenditure. Underlying these calculations is the assumption that unemployment-related expenditure is strictly proportional to unemployment and the only expenditure item that varies with the business cycle. This assumption does not seem counter-intuitive as the estimated output elasticity of unemployment presented in the paper is about -5. Hence, this expenditure item is potentially the most important for automatic stabilisers, especially since the significance of the bulk of income-related expenditure for automatic stabilisers (housing benefits, for example) has decreased over the last decade. When estimating the elasticity of earned income taxes, the paper makes the assumption that the shape of the income distribution has remained the same in the period 1993–2021. Naturally, such an assumption simplifies the calculations, but it would be better to assess the validity and importance of this assumption given, e.g. the results in Guvenen et al. (2022). Note also that the GRID data used in Guvenen et al. (2022) does not include Finland.

Overall, the evidence for Finland seems to suggest that the budgetary semi-elasticity estimates have stabilised around the 2021 estimate of 0.47. They initially increased from 0.46 in 1993 to a peak of 0.50 in 1997, falling afterwards to 0.42 in 2008. The general conclusion of the paper is that the size of the automatic stabilisers has not changed significantly over the period 1993–2021. Although the GDP share of income tax and unemployment expenditure has fluctuated, their effect on the budgetary semi-elasticity has been partly offset by their respective elasticities. Needless to say, automatic stabilisers play a critical role in creating and maintaining fiscal buffers, i.e. providing sufficient fiscal space to help mitigate debt sustainability risks, as the authors note in their concluding remarks. However, Finland was not particularly successful in building these buffers in the good times that followed the financial crisis, as witnessed by the large increase in the public debt ratio from 34.7% in 2008 to 72.6% in 2021. Various policy reforms have not significantly changed the size and effectiveness of automatic stabilisers in Finland. Finding out whether this was because of the characteristics of the Nordic welfare state or because Finland failed to provide strong enough incentives to work is one of the challenges future research should address.

2.3 Iceland

The paper by Professor Arnaldur Kristjánsson presents estimates of the strength of the automatic stabilisers in Iceland. The importance of automatic stabilisers in maintaining overall macroeconomic stability is also shared and emphasised by this paper. It starts by noting that the components of automatic stabilisers on the expenditure side are primarily unemployment benefit and income-tested transfer payments. Rules and regulations in Iceland stipulate that people made redundant are eligible for unemployment benefit provided they worked a sufficiently high number of days in the period before they were made unemployed. Several means-tested transfer payments

are also used to ensure adequate income for individuals facing adverse employment shocks. On the revenue side, all taxes based on income or consumption are naturally most strongly related to automatic stabilisation. Of course, the details of the tax system, as well as changes to it, are important for automatic stabilisation, not least because of potential behavioural effects. The tax system in Iceland is interesting in the sense that marginal rates differ between individuals with and without children. There seems to be greater variability in the marginal rates for people with children. Then again, the tax system in Iceland is progressive: the average marginal tax rate of 37% exceeds the average tax rate of 27% for an average full-time employee.

When measuring the automatic sensitivity of net tax liabilities to changes in income, the paper uses the income stabilisation coefficient, defined as the share of income growth absorbed by tax payments. All things being equal, higher average tax rates imply higher automatic stabilisation, whereas for the income stabilisation coefficient marginal tax rates determine the size of automatic stabilisers. The tax system in Iceland shares features with some of the other Nordic countries in that labour incomes are taxed progressively, while capital incomes are subject to flat tax rates.

The paper presents a series of scenarios in which an income shock either increases or reduces incomes by five per cent. In the paper's two experiments, the income shock applies either only to earnings or both to earnings and capital income, with transfer income remaining constant across experiments. An additional experiment computes the effects of an income shock that exacerbates income inequality. In the experiments, individuals of working age are also either randomly made redundant or the proportion of unemployed individuals increases. The simulation results for individual income stabilisation of a five per cent proportional drop in income clearly show that individual income is stabilised most strongly stabilised at the thresholds of the marginal tax rates. On the other hand, a higher share of capital income weakens income stabilisation at the individual level.

The baseline scenarios for aggregate income stabilisation for a symmetric income shock of five per cent affecting either earnings only or both earnings and capital income suggest that automatic stabilisers change only marginally across negative and positive income shocks. Approximately 40% of a proportional income change is absorbed by the tax system. Adding capital income does not markedly change the results. Income changes that exacerbate inequality produce asymmetries in the automatic stabilisers, which are, on average, higher than proportional income changes, but the overall effects are modest, quantitatively approximately 0.5 percentage points. Since capital income is taxed at a lower marginal tax rate of 2% compared to the 37% or 46% marginal tax rate of labour income, the income stabilisation coefficient for capital income is lower, at about 19%. This is slightly below the marginal tax rate on capital income due to the low marginal tax rate on rental income.

The results for the effects of an unemployment shock show substantially larger automatic Income stabilisation effects than those for income shocks. Roughly 70% of the shocks are stabilised by the tax system. If, alternatively, increases in the proportion of people unemployed are used in the calculations, automatic income stabilisation increases, albeit only marginally. The unemployment benefit system explains the bulk of the stabilisation effects. As the author notes, these results for Iceland are in line with Nordic evidence but higher than for Europe and the USA for income stabilisation. Similar observations hold true for unemployment shocks.

The paper also includes calculations for the effects of the social security system. As it explains, the assumption underlying the calculations is that the incidence is borne by the employees, so social security contributions should increase the stabilisation coefficient. However, according to the calculations, the coefficient increases only slightly, by less than one percentage point in the case of an income shock. As the market income now includes social security contributions, the contributions from other income components fall. In addition, this effect is greater for the unemployment shock than the effect from the social security contributions. Consequently, the stabilisation coefficients for the unemployment shock are lower than in the baseline case.

Interestingly, the difference decreases between Iceland's stabilisation coefficient and that of other countries, particularly the EU and USA. The paper attributes this to Icelandic social security contributions being a minor component of overall tax revenue compared to many other countries. Then again, the stabilisation coefficients are larger in Denmark, Finland and Sweden for both the income and unemployment shock than in Iceland, while they are larger than in the US for income shocks and larger for unemployment shocks than in the EU. Interestingly, in the case of an income shock, the stabilisation coefficient is higher for incomes above the median, while for an unemployment shock, it is higher for incomes below the median. These results are stronger for income shocks that make inequality greater. All this is perhaps not too surprising given the major role of the progressive tax system in the case of income shocks and the dominant role of unemployment benefit in the case of unemployment shocks.

2.4 Norway

The Norwegian paper by Hans Holter and Ana Ferreira discusses recent research concerning the distribution of income and wealth as determinants of fiscal multipliers as well as what this implies for stimulus policy in the Nordic countries. Relevant recent research argues that fiscal multipliers seem to vary with time and state. In addition, countries with high wealth and income inequality appear to have larger fiscal multipliers, which have been shown, in turn, to increase with expenditure shocks, i.e. more expansionary government spending shocks generate larger multipliers, and more contractionary shocks give rise to smaller multipliers. These findings could be

attributed to neoclassical mechanisms that emphasise the relationship between fiscal shocks, the way they are financed and the response of labour supply across the wealth distribution. Empirically, it has been found that economies with high wealth and low income inequality have more credit-constrained and low-wealth households. These consumers have less elastic labour supply responses to fiscal policies that change future income but more elastic labour supply responses to ones that change current income. The fiscal multiplier is dependent on the labour supply elasticity across the wealth distribution. As the paper notes, Nordic countries are characterised by high wealth inequality and low income inequality, two features associated with having many credit-constrained and low-wealth households. It might, therefore, be expected that fiscal stimulus programmes that increase consumers' current income would have large effects, while programmes that increase consumers' future income would be associated with smaller impacts.

As the paper notes, different policy makers and researchers seem to have quite different expectations about the impact of fiscal policies. The academic literature has actually broadened views on this matter in that it has spread the idea that there is no such thing as *a fiscal multiplier*. Instead, the view seems to be that the multiplier depends on national characteristics and the state of the economy, the type of the fiscal instrument and the size of the fiscal stimulus.

Before reviewing what the more recent literature tells us about the determinants of fiscal multipliers, the authors present some stylised facts for the Nordic countries about fiscal institutions and wealth and income distributions. First, economic policies in the Nordic countries are characterised by a combination of a market economy and government intervention, the basis for a welfare state. Not all of the Nordic countries are members of the European Union. Iceland and Norway have decided to stay out. From a fiscal policy perspective, this distinction is important because the EU has its own guidelines for fiscal policy. As is well known, the EU fiscal rules include a ceiling for the nominal fiscal deficit of 3% of GDP, a structural balance and an expenditure benchmark requiring that an increase in government spending should be matched by additional discretionary revenue measures. Denmark and Finland have incorporated these rules, but Sweden has not. On the other hand, the Swedes introduced a new fiscal rule in 2000 that targets a nominal government surplus of 1% of GDP on average over the business cycle. Iceland and Norway set their own fiscal rules, with Iceland setting a 30% of GDP ceiling on total liabilities, while in Norway, the fiscal target is a structural budget balance for the central government after withdrawals from the Oil Fund. The structural non-oil deficit is allowed to vary over the business cycle and should, over time, be equal to the expected real return from the Oil Fund.

The Nordic countries are strongly committed to reducing income inequality, which is reflected in high progressive tax rates that impose heavier burdens on higher earners. They all have a property tax as well as a value-added tax. These countries see the property tax as a way to tax wealth, but since this tax falls on every household that

owns its home, it does not distinguish households paying a mortgage from those for which the house is exclusively an asset. Hence, the property tax does not consider the household net wealth. Nordic countries have high tax-to-GDP ratios by international comparisons. In 2021, it was well above 40%, meaning that a relatively large proportion of production went to the government budget and could be used to finance services.

The low income Gini coefficient in the Nordic countries (below 0.3) underscores that policies directed at redistribution, such as progressive taxation and robust social welfare programmes, may be working as intended, as argued by the authors. This does not mean that progressive taxation coupled with various welfare programmes is the only tool to fight income inequality since strong unions may have a say in the matter (for example). On the other hand, high wealth Gini coefficients in the range of 0.6–0.8 in the Nordic countries suggest high wealth inequality in these countries, which may be the outcome of the combination of relatively low and flat tax on capital income and high and progressive tax on labour income. We cannot, in the end, forget the role of the generous social security systems, which tend to reduce individual incentives to save.

The paper reviews recent literature on the determinants of fiscal multipliers. The authors seem to agree that there is no such thing as *a fiscal multiplier* but that the effects of fiscal policy depend on the fiscal instrument, the state of the economy and perhaps also the size of the fiscal stimulus. In particular, fiscal multipliers may vary across wealth and income distributions, the core theme of the paper. The first observation to make from the more recent literature is that countries characterised by higher wealth inequality tend to experience more pronounced economic responses to increases in government spending. The evidence suggests that the group of countries with above-average Gini coefficients has a significantly higher fiscal multiplier. Countries characterised by higher wealth inequality have a statistically significant and positive response to an increase in government consumption up to almost two years after the shock, while the group of low-inequality countries does not exhibit this pattern.

Model simulations, when individual workers face uninsurable income risk, suggest that the size of the fiscal multiplier is highly sensitive to the proportion of liquidity-constrained individuals in the economy and also depends importantly on the average wealth level in the economy. Liquidity-constrained households have a higher marginal propensity to consume goods and services and respond more strongly to fiscal shocks that change their current income. Large labour supply responses imply larger output responses. The marginal propensity to consume is also higher for relatively wealth-poor agents since they have a precautionary savings motive.

The authors also review recent research on fiscal multipliers in the context of consolidation programmes in the wake of the 2008 financial crisis. The basic argument in the literature is that the recessive impacts of fiscal consolidation programmes are stronger when income inequality is higher. The relevant data shows a strong positive

empirical relationship between higher income inequality and the fiscal multipliers resulting from fiscal consolidation programmes across time and place. The authors argue that a neoclassical model with heterogeneous households and incomplete insurance markets is well suited to explaining the relationship between income inequality and the recessionary effects of fiscal consolidation programmes. The underlying mechanism works through idiosyncratic income risk: in economies with lower income risk, there are more credit-constrained households and households with low wealth levels due to less precautionary saving. These credit-constrained households also have less elastic labour supply responses to increases in taxes and decreases in government expenditure. The first empirical exercise referenced by the paper documents a replication of studies by Blanchard and Leigh (2013, 2014), which find that the IMF underestimated the impacts of fiscal consolidation across European countries. The replication exercise finds that during the 2010 and 2011 consolidations in Europe, the forecast errors were larger for countries with higher income inequality, which implies that inequality amplified the recessive impacts of fiscal consolidations. The second empirical analysis referenced by the paper uses data from 12 European countries covering the period 2007–2013 and the consolidation dataset in Alesina et al. (2015). This exercise again finds a strong amplifying effect of income inequality on the recessive impacts of fiscal consolidation.

The research referenced tries to explain these findings by developing an overlapping generations economy with heterogeneous households, exogenous credit constraints and uninsurable idiosyncratic risk and calibrates the model to match the data from a number of European countries. The basic exercise studies how these economies respond to gradually reducing the government debt, either by cutting government spending or by increasing labour income taxes. The method of financing debt reduction seems to matter. A reduction in government expenditure basically means a positive lifetime income shock. Hence, credit-constrained households and households with low wealth levels have a lower marginal propensity to consume out of future income and do not consider changes to their lifetime budget. If, on the other hand, the fiscal consolidation involves raising taxes on labour income, labour supply is affected, with the income effect reducing labour supply and the substitution effect further influencing it. Credit constraints force households to increase their labour supply to avoid a significant drop in consumption.

On the other hand, when higher income inequality reflects more uninsurable income risk, there is a negative relationship between income inequality and the number of credit-constrained households. Greater risk intensifies the precautionary savings motive, thereby decreasing the share of households with liquidity constraints and low wealth levels. Unconstrained households have higher intertemporal elasticity of substitution and respond more strongly to both types of fiscal consolidation so that labour supply and output will respond more strongly in economies with higher inequality. This creates a correlation between fiscal multipliers and income inequality. A cross-country simulation analysis of 13 OECD countries shows that the model is able to

reproduce the cross-country relationship between both tax-based and spending-based fiscal consolidation and income inequality.

More recent research argues that fiscal multipliers increase in the event of government spending shocks, so that large negative shocks yield smaller multipliers, while large positive shocks generate larger ones. Empirical evidence referenced in the paper backs up these patterns, and the underlying research also shows that a fairly standard neoclassical model with heterogeneous households and incomplete insurance markets is able to account for the patterns observed. Once again, the key mechanism hinges on the differential response of labour supply across the wealth distribution. The mechanism is also robust enough to cope with an assumption about the form of financing and to survive the introduction of nominal rigidities in heterogeneous agent models of aggregate demand.

So, what are the implications for the Nordic countries of the research referenced in the paper? To start with, the basic message from the relevant research is that fiscal multipliers are significantly affected by income and wealth inequality through their effect on low-wealth and credit-constrained consumers. On the other hand, the Nordic countries are notable for significant wealth inequality but low income inequality. This implies that there will be a large proportion of low-wealth and constrained consumers in the economy. Furthermore, if higher income inequality is at least partially driven by idiosyncratic income risk, then more income inequality leads to more precautionary savings and fewer consumers close to the borrowing constraint. Both of the features – high wealth inequality and low income inequality – are suggestive of many low-wealth consumers. Empirical evidence referenced in the paper is consistent with this implication. A large proportion of low-wealth households in the Nordic countries, in turn, implies that the fiscal multipliers from fiscal consolidations that change households' current income are large and that those that change their future income have lower fiscal multipliers.

Putting some of the evidence into numbers, the background research referenced in the paper shows that the average estimate of the fiscal multiplier for 26 European economies is between 1.2 and 1.77. These estimates are generally quite high, and it seems like the fiscal consolidation in Europe has had a strong negative impact on the economy. On the other hand, the impact of fiscal consolidation in the Nordic countries is generally below the European average due to their lower income inequality: in Denmark, the estimated multiplier is in the range 0.78–1.21; in Norway 0.86–1.35, in Sweden 0.88–1.41, in Finland 1.15–1.69 and in Iceland 1.18–1.59 range. From the perspective fiscal policy aimed for consolidations, the combination of high wealth inequality and low-income inequality is very important, since policy makers need to be aware of where the burden of consolidations is on current or future income.

2.5 Sweden

Markus Sigonius uses Swedish data to investigate the potential trade-off between policies to make work pay and automatic fiscal multipliers. The paper is closely related, actually a forerunner, to the Finnish one. The author argues that Sweden is an interesting case study since it is a (Nordic) welfare state that has brought in significant reform to improve incentives to work.

It is indeed true, as the author notes, that the role of fiscal policy in stabilising the economy has been a topic for discussion for the last decade, one reason being that monetary policy has been constrained by the effective lower bound on the central bank's key interest rate. More recently, discretionary fiscal policy has supported the macroeconomy during the COVID-19 pandemic and also when households and companies were faced with soaring electricity prices following Russia's invasion of Ukraine. The paper puts this support into numbers by reporting that central government's discretionary policy during the pandemic amounted to SEK 330 billion for 2020–22, and the figure for high energy prices during 2022 and 2023 amounts to approximately SEK 70 billion. The paper also notes that another much-discussed topic in the labour market policy debate in recent decades has been policies to make work pay, for example, lowering taxes on earned income and reducing unemployment benefit. There is a potential conflict, however, between stabilisation policy and policies to make work pay: both higher taxes that generally go with automatic stabilisers and (generous) unemployment insurance weaken incentives to work.

The main focus of the paper is to use the most recent data from Sweden to shed more light on the trade-off between policies to make work pay and the size of automatic fiscal stabilisers. Sweden has introduced significant reforms to improve incentives to work, for example, reducing taxes on labour income by about five per cent of GDP over 20 years. Roughly half of this is due to the earned income tax credit that was introduced in 2007 and was expanded in several steps, most recently in the budget for 2024. Moreover, expenditure on unemployment-related transfers has also been reduced, from 2–3 % of GDP in 1998 to 0.6% in 2022.

The paper sets out to estimate the size of automatic fiscal stabilisers in Sweden in the period 1998–2022 using a method that decomposes the elasticity of the fiscal balance over the business cycle into a structural part reflecting tax and benefit rules and a cyclical part reflecting how taxes and benefit-related aggregates respond to the state of the economy. The estimate of the structural component builds on the rules that apply in a given year, whereas the cyclical component can be estimated using time-series data. The author notes that the limitation of the method applied in the paper is that it does not model the behaviour of agents in the economy and is consequently subject to the Lucas critique. Moreover, the method says nothing about the source of

the shock hitting the economy. One straightforward interpretation is that it is an unconditional expectation of the fiscal balance for a given change in GDP. In defence of the method, it might be argued that it is informative and commonly used as a rule of thumb in analysing fiscal policy.

The paper makes a reference to Floden (2009), who applies the same approach to Sweden to find that automatic stabilisers have fallen from close to 0.6 in 1998 to only slightly above 0.5 in 2009. The implication is that a one percentage point change in the GDP gap would have been expected to change the government fiscal balance as a share of GDP by approximately 0.6 percentage points in 1998 and 0.5 percentage points in 2009. The paper extends Floden's analysis with more than a decade of additional data during which earned income tax credit was extended several times.

According to the results reported by the author, automatic stabilisers in Sweden fell slightly in the period 1998–2022. The paper extends the empirical analysis in Almenberg and Sigonius (2021) for the period 1998–2019. Direct taxes on labour have fallen considerably since 1998, in particular because of the earned income tax credit introduced in 2007 and gradually scaled up. However, the average tax rate has declined more than the average marginal tax rate, making the income tax more progressive. The consequence of this is that it partially offsets the effect of lower taxes on the automatic stabilisers. Then again, expenditure on unemployment benefit was also reduced during the first half of the period studied. The author concludes that despite all of these changes, the reduction in the size of the automatic stabilisers is modest compared, in particular, to the scope of the reforms. One important message concerning automatic stabilisers is that it seems to be possible to strengthen incentives to work without adversely affecting the workings of the automatic stabilisers.

On the other hand, the article also discusses how the recent crises have affected the size of the automatic stabilisers, as well as their role in stabilisation policy. The author informs the reader that several support measures were introduced by the Swedish government to aid households and companies during the COVID-19 pandemic in 2020 and 2021. Many of these measures were extended and the estimate of the total support is SEK 170 billion for 2020 and SEK 120 billion for 2021. The author's calculations suggest that if the automatic stabilisers had been allowed to operate freely, the public sector would have automatically distributed approximately SEK 100 billion to households and companies over the two years. Importantly, the author argues that the support was partly replaced with discretionary schemes aimed at keeping people safe and preserving labour market matches. These policies broke the link between the output gap and the usual effects on the public sector through the automatic stabilisers.

As in several other countries, inflation was high in 2022 and 2023 relative to its pre-pandemic level. The CPI with fixed mortgage interest rate was almost eight per cent in

2022 and about six per cent in 2023. Unexpected changes in inflation led to changes in the composition of GDP, with the wage share falling and the profit share increasing. Since tax on corporate profits has a higher elasticity than direct tax on wages, this compositional shift is expected to enhance the automatic stabilisers. On the other hand, the expenditure for unemployment insurance falls as a proportion of primary expenditure, in turn reducing the size of the stabilisers. The paper finds these effects similar in size such that they roughly offset one another. Hence, the automatic stabilisers in Sweden are still about 0.5, more precisely in the range 0.46 - 0.47.

The paper proceeds to present the structure of the estimates and informs readers that the study used annual data published by Statistics Sweden in February 2023. The macroeconomic time series that started in 1980 excludes effects from the COVID-19 pandemic, so the data for firms' share of the total value added to the economy and for the elasticity of the tax bases and unemployment rate during the business cycle ends in 2019. The wage income distribution in the paper is used to calculate the responsiveness of direct taxes on labour to changes in its tax base. The microdata on wage income distribution from Statistics Sweden is from 2016. The distribution is used as a proxy for the true distribution for the remaining years, scaled using the median income for each year. The measure of business cycle is the well-known output gap, i.e. the deviation of GDP from its long-run equilibrium trend. This figure and equilibrium unemployment were published by NIER in March 2023.

Some interesting observations concerning the data and estimated elasticities in the paper are worth noting. First of all, the evolution of the wage cost share from 1980 indicates that it increased throughout the 1980s and dropped quite significantly in the early 1990s. From about the mid-1990s, it increased back to its 1980s levels at just above 70% in 2019. Secondly, the response of direct taxes on labour to changes in the labour cost share saw a relatively large increase, relative to its pre-2006 average level, in 2006–2007. This increase happened at about the same time when both the average tax rate and average marginal tax rate dropped relative to their trends. The estimates also show that the sensitivity of direct labour taxes to changes in the GDP gap has increased over time, driven by an increase in the response of direct taxes on labour to changes in labour costs.

The Swedish data also reveals that the share of unemployment-related expenditure of both GDP and primary expenditure has indeed fallen quite a bit, from about 2.5 and 4.5 per cent in the late 1990s to less than one per cent and just above one per cent respectively in 2022, with the sharpest drops in the trends in 2008. In combining all of the results, the estimated elasticities are aggregated using proportions of GDP as weights. The calculations show that the size of the automatic stabilisers fell slightly up until 2011, from 0.55 in 1998 to 0.47 in 2011 and has remained relatively stable since then. The main reason for the weaker stabilisers prior to 2011 was the smaller contribution from direct taxes on labour and from primary expenditure. On the other hand, the effect on the automatic stabilisers of lower average taxes on labour has in

part been counteracted by increased progressivity in taxing labour income, due, in particular, to the design of the earned income tax credit. The lower contribution from primary expenditure is mainly due to the lower proportion of GDP made up of unemployment benefit. Overall, however, the reduction in the size of automatic stabilisers has been modest, considering the scope of the reforms. As already indicated, these results show it is possible to increase incentives to work without adversely affecting the automatic stabilisers. In a similar vein, discretionary policies during the COVID-19 pandemic did little to affect the size of the automatic stabilisers.

In discussing automatic stabilisers in times of crises, the author argues, first of all, that the COVID-19 pandemic showed that discretionary fiscal policy could be timely, targeted and temporary. Many support schemes were implemented just weeks after the pandemic emerged in Sweden. The aim was to preserve matches in the labour market. So, it seems that discretionary fiscal policy is better at stabilising the economy than its reputation would suggest. Interestingly, the need for large automatic stabilisers may have been exaggerated.

The soaring inflation in 2022 and 2023 surely qualifies as a shock that instils a sense of crisis in everybody. The tighter monetary policy pursued by the Riksbank in its fight to bring inflation down has surely had and is forecast to continue to have contractionary effects on the Swedish economy in 2023 and the next few years. The fiscal stance has been fairly neutral so as not to counteract the effects of the Riksbank's interest rate policy.

In general, when discussing any potential effects of inflation on automatic stabilisers, it should be remembered that these effects may work through the economy with a considerable time lag due, for example, to indexation practices applied to taxes and benefits. Hence, it may be very difficult to calculate accurate quantitative estimates of the effect of (high) inflation on automatic stabilisers. Qualitatively, it might be argued, as the paper says, that unexpected changes in inflation can lead to changes in the composition of the GDP. In 2022, for example, the wage share dropped while that of the profits increased. At the time the paper was written, this was forecasted to continue in 2023, and since corporate profits have a higher elasticity than tax on wages, this shift is expected to enhance the automatic stabilisers for these years. Nominal tax revenues increase with inflation, but at the same time, many types of expenditure also go up. In particular, unemployment insurance as a share of primary expenditure has fallen slightly in Sweden, which tends to w eaken automatic stabilisers. According to the author's assessment, however, these effects are of similar size, hence offsetting one another. The size of automatic stabilisers in 2022 has, therefore, remained stable at slightly below 0.5.

The author makes a reference to Almenberg and Sigonius (2021), which use the same method as in the current paper to calculate the size of the automatic stabilizers in Sweden for 1998 2021. Almenberg and Sigonius (2021) conduct two extensions to

validate the method used. First, the earned income tax credit is designed in a way that increases incentives to work for low-paid workers. Since many of those workers are in sectors that are sensitive to business cycles, Almenberg and Sigonius (2021) assess whether their results are affected by assuming that the entire income distribution is sensitive to business cycles. Their calculations show that the stabilizers were slightly lower in the first years of the period studied, compared to the results presented above and slightly higher in the last few years. For 2019, the automatic stabilisers were 0.50, compared to the 0.47 reported above.

In addition, the earned income tax credit creates a tax shield when people are unemployed in that their tax is lower when they find a new job. In the second extension, Almenberg and Sigonius (2021) allow the workers to be unemployed for a part of the year. After the introduction of the earned income tax credit, the marginal tax rate decreases with the time spent unemployed because the tax credit, in relation to the wage earned, is larger for small wages. Hence, an unemployed worker, who receives less in wages and more in unemployment benefits faces a lower marginal tax rate. This results in a smaller responsiveness of direct taxes on labour to the labour cost share. However, the difference compared to the baseline estimates is relatively small. Assuming that the change in the direct tax on labour stems from workers with an income up to 50% of the median income becoming employed again after half a year of unemployment, we arrive at automatic stabilisers of 0.44 in 2019 instead of 0.47.

Four additional robustness tests are presented in the appendix to Almenberg and Sigonius (2021). They explore how assessments of the automatic stabilisers are affected by (i) shortening the sample to include only data from 1998 onwards, (ii) different definitions of wage sum, profit share and unemployment-related transfers, (iii) the inclusion of expenditure that may (rightly or wrongly) be deemed to function as semi-automatic stabilisers and (iv) the uncertainty that stems from the regressions. The overall conclusion from the extensions and robustness test is that the method used in this article provides a reliable estimate of the current size of the automatic stabilisers. Hence, the result presented above, where the automatic stabilisers are slightly less than 0.5, holds true.

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Fiscal Stabilisers in Denmark

Torben Andersen

Abstract

This article reviews the fiscal policy framework and recent fiscal policy experiences in Denmark. It discusses the issue of how to design and time discretionary fiscal policies and focuses on the difficulties and uncertainties in assessing the business cycle, choice of instruments, shock dependence, challenges of targeting sectoral differences and experiences of unconventional fiscal policy measures. It also covers the role and source of automatic stabilisers and points out that there is an indication that they have become slightly weaker as a consequence of various reforms, which points to a trade-off between incentives and stabilisation/insurance. In recent years, fiscal policy has focused increasingly on medium-term and long-term issues, particularly sustainability, and the article discusses assessments of fiscal sustainability and their implications for policy.

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Keywords: fiscal multipliers; automatic stabilisers; fiscal policy; business cycle

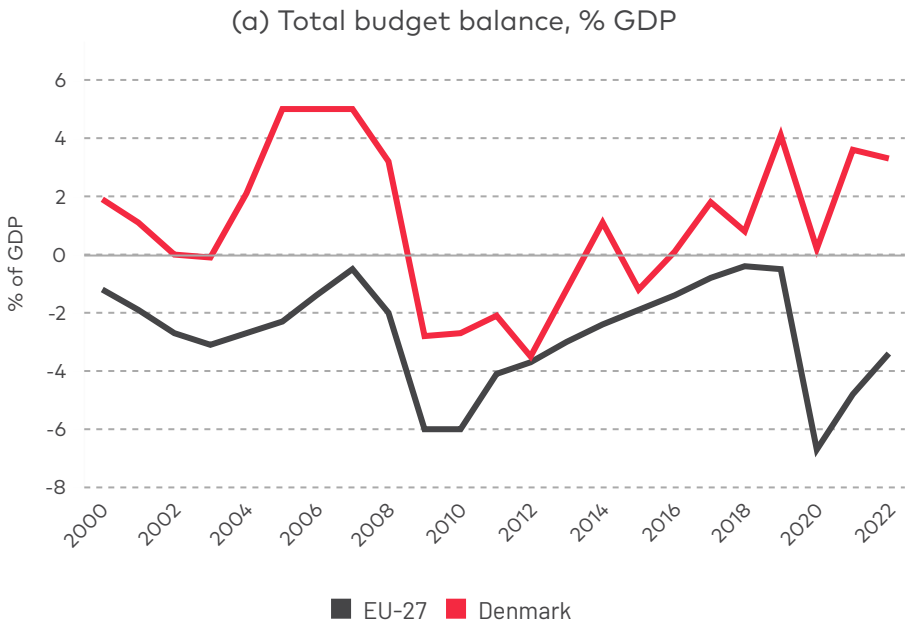
JELcodes: E32, E62, E61

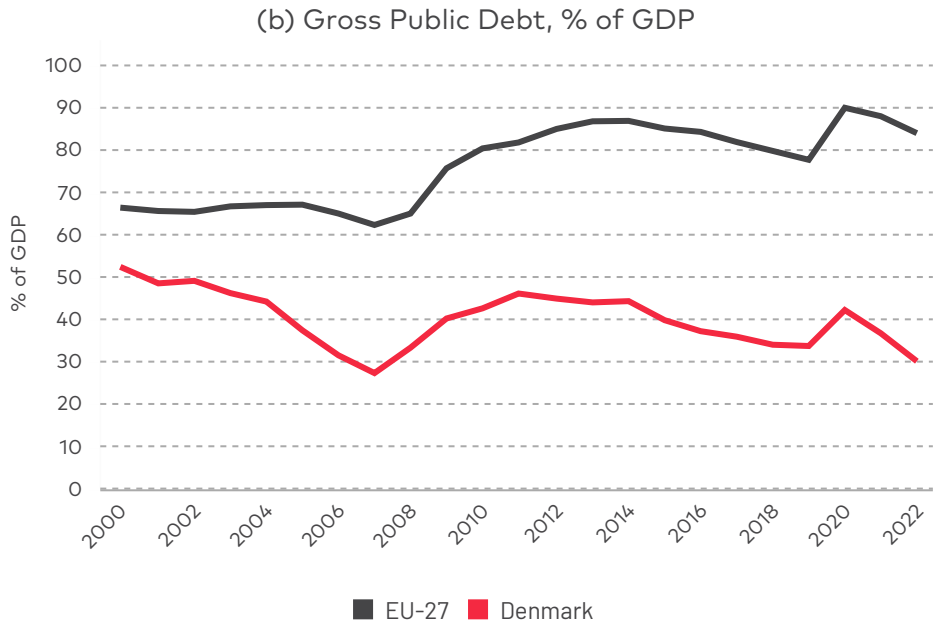
1 Introduction

For a number of years, fiscal policy in Denmark has been rule-based, with more weight attached to medium-term and long-term issues and the sustainability of public finances. The degree of activism in aggregate demand management policies and the perception of being able to finetune the business cycle are, thus, different than in the 1970s and 1980s when a more active approach was taken.

Since the recovery from the financial crisis, all standard macroeconomic indicators have been favourable – only interrupted by the COVID-19 pandemic – with economic growth, low unemployment, a surplus on the current account and sound public finances. This is the result of the medium-term focus in economic policy, among other things, and a string of structural reforms supporting high employment rates. The specific features of public finances are summarised in Figure 1, showing that the budget balance in Denmark has been in surplus on average and that gross debt has been reduced (net wealth is positive). The budget position has been systematically better than the EU average, and public sector debt is comparatively low.

Figure 1. Public finances – Denmark and the EU 27, 2000-2022





Note: EMU definitions of deficit and debt, the EU 27 (excluding the UK)
Source: Statistics Denmark

For a small and open economy with a large public sector, particular attention is paid to fiscal policy both in the short term and in the long term. This may explain why Denmark is one of the countries that has consolidated debt, introduced fiscal rules and integrated the issue of fiscal sustainability into policy making.

Although Denmark is an EU member state, it has opted not to join the EMU and pursues a fixed exchange rate vis-a-vis the euro[3]. This policy was launched in the early 1980s and has since remained an anchor point for economic policy, which enjoys broad political support and high credibility.

Adopting a fixed exchange rate implies a clear division of labour between monetary and fiscal policy since an independent monetary policy is not feasible for a country with liberalised capital movements. The peg essentially implies that the inflation target in the euro-area becomes the implicit inflation target for Denmark, and it is the responsibility of fiscal policy to safeguard the credibility of the peg (see, e.g., Andersen and Chiriaeva, 2007). This means that fiscal policy should ensure a path for competitiveness and economic performance more generally that is consistent with the implicit inflation target implied by the peg, and thereby support the credibility of the peg. Historically, this implication of the peg for fiscal policy was well understood, a

3. Denmark pursues a fixed exchange rate policy pegging the Danske krone (DKK) to the euro, formally as part of ERMII, with a +/- 2.25 % band around the central parity (DKK 746.038 per €100).

point underpinned by the notable policy intervention in 1997 due to a perceived risk that the economy was overheating. At that time, the concern was that the current account surplus would quickly be eroded at the same time as wage growth might pick up and deteriorate competitiveness since unemployment was perceived to have fallen to or below the structural unemployment rate. This led to policy measures aiming at reducing aggregate demand by curbing growth in public and private consumption (via mandatory savings and an increase in the excise duty on private loans). It is noteworthy that the intervention was anticipatory and based on a concern that the economy was on a trajectory inconsistent with the fixed exchange rate policy, and it was perceived that initiative had to be taken before problems grew out of hand. Over the years, macroeconomic developments have, thus, been consistent with the exchange rate peg. The peg has high credibility, as witnessed by the systematically very low sometimes even negative interest rate spread to the euro area (Germany).

This paper provides an overview of fiscal policies in Denmark in recent years (although it does not cover the COVID-19 crisis; see Andersen et al. (2022) for a discussion). Section 2 introduces the fiscal policy framework, which has been in effect since 2014. The experiences and challenges that emerge from discretionary fiscal policies are discussed in Section 3, while Section 4 considers the role of the automatic stabilisers and how they have been affected by recent structural reforms. Fiscal sustainability issues and analyses are discussed in Section 5, and Section 6 presents a few concluding remarks.

2 Fiscal policy framework

Fiscal policy planning has become more structured and formalised over the years. Since 1995, it has been customary to prepare long-term plans focusing on fiscal sustainability. This includes medium-term plans (with a horizon of about ten years) typically defining a target for the structural balance in the end-year of the planning horizon, which is then used as the basis for determining the "fiscal space" (råderum) available for new political initiatives either to increase expenditure or to change taxation within the planning horizon. The current medium-term plan has a structural budget balance target of -0.5% of GDP in 2030.

The fiscal framework is defined in a budget act passed in 2012 and effective from 2014, which implements the fiscal rules laid down in the Growth and Stability Pact but goes further by including not only a deficit limit for the structural public balance but also binding and multi-annual (four-year) expenditure ceilings for central government, municipalities, and regions. The Act also defines sanctions if the expenditure ceilings are violated[4].

4. If municipalities/regions exceed agreed expenditure ceilings, collective and individual sanctions are applied, in the form of a reduction in the block grants they from the State to the municipalities/regions.

The Ministry of Finance (2023) summarises the fiscal framework as follows:

- Within the framework of a sustainable fiscal policy, a balance requirement is established for the overall public finances. The structural balance must not exceed an annual deficit corresponding to the deficit limit at the presentation of the budget proposal for a given year unless there are exceptional circumstances. An automatic correction mechanism is activated in case of significant estimated deviations from the balance requirement.

- Expenditure ceilings support compliance with the overall fiscal policy targets. The ceilings establish binding limits for expenditures in the central government, municipalities, and regions. The expenditure ceilings are legislated by the Danish Parliament (Folketinget) and cover a continuous four-year period. Measures to improve financial management and economic sanctions support compliance with the ceilings.

- The Danish Economic Council provides – in addition to its other tasks – ongoing (annual) assessments of the sustainability of long-term public finances and the medium-term development of the public balance. They also ensure compliance with the expenditure ceilings and their alignment with the medium-term fiscal objectives.

While the Budget Act originally specified a deficit limit of 0.5%, it has been changed to 1% of GDP as part of a national compromise on Danish defence and security policy (March 2022). This is in accordance with EU rules since the public debt level is significantly below 60% of GDP.

The governance framework of the Budget Act has been partially deviated from in recent years due to extraordinary circumstances related to the outbreak of COVID-19 (2020–22) and the situation in Ukraine (2022). The presentation of the budget proposal for 2023 marked a return to the normal expenditure management framework.

In addition to the above rules, governments have introduced a "tax freeze", but it has been interpreted differently over the years. Currently, the interpretation is that any increase in taxes or duties must be accompanied by offsetting reductions in other taxes to ensure that the overall tax share does not increase[5]. Some excise duties are exempted (e.g., tobacco and nicotine), and revenue from the CO2 tax is returned in full to the respective sectors.

5. Indexation of tax rates and various nominal thresholds to ensure unchanged real values are not comprised by the tax freeze.

3 Discretionary fiscal policy

While fiscal activism and the belief in the scope for finetuning the business cycle have been lower in recent years than in the 1970s and 1980s, discretionary changes to fiscal policy remain important. In some cases, they are motivated by the business cycle situation, and in others by political decisions having different motivations. In the latter case it is a question how well these changes are timed to the business cycle situation. A recent example is the discussion about providing help to low-income families to compensate for the high and unexpected inflation in 2022 while avoiding a stimulus that increases inflation.

Discretionary policies are often gauged by considering changes in the cyclically adjusted budget balance. However, it is a summary measure which is estimated with considerable uncertainty and not necessarily a good measure of the aggregate demand effects of a policy change. Denmark has a long tradition of using a *fiscal effect* metric (*finanseffekten*) to present the effects of discretionary changes in fiscal policy. This metric measures the total effect on activity (GDP) of a given fiscal policy package as the sum of the changes in the included instruments times their respective multipliers. The fiscal effect is computed for both the immediate effect (one year) and the long term. Both the Ministry of Finance and the Council of Economic Advisors regularly report their assessment of the fiscal effect of implemented and planned discretionary fiscal policy changes.

The computation of the fiscal effects has its roots in Keynesian-type models for the Danish economy with rather detailed modelling of the public sector; the ADAM model used by the Ministry of Finance and the SMEC model used by the Council of Economic Advisors[6]. These models have been refined and updated over the years. While the two models are not too dissimilar, their presence has created an environment of openness and transparency on the quantitative assessments of the effects of fiscal policy. A new model – MAKRO – has recently been developed and is going to be used by the Ministry of Finance. Among the key features of this dynamic model is that it merges short-term effects with long-term structural aspects, see Bonde et al. (2023). One advantage of this is that it provides a more detailed analysis of the fiscal multipliers, their impact and dynamic effects depending on whether they are temporary or permanent, see Røpke et al. (2021).

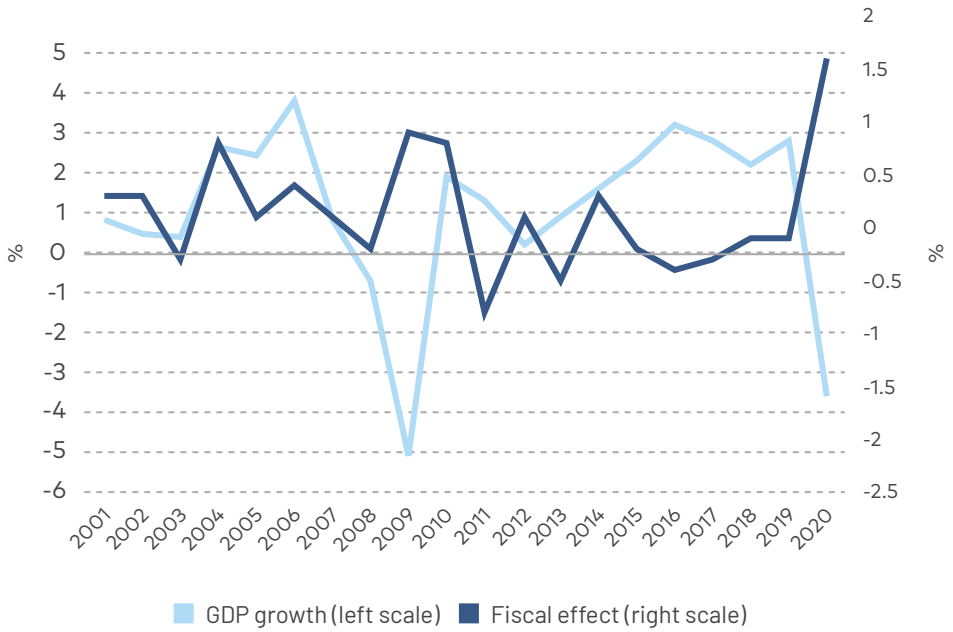
The fiscal effect, as estimated by the Council of Economic Advisors and the actual GDP growth rate are plotted in Figure 2. Since fiscal policy is planned on the basis of the anticipated business cycle situation, the data should be interpreted with some care. Nevertheless, the figure illustrates several points about discretionary fiscal policies. First, the correlation between output growth and the fiscal effect is about -0.5,

6. For information on the ADAM-model, see https://www.dst.dk/da/Statistik/ADAM/Modellen-ADAM. For the SMEC-model, see https://dors.dk/modeller-metoder/smec.

suggesting that fiscal policy has, on average, been countercyclical[7]. Second, the year-to-year variations show the consequence of economic policy changes that have not always been motivated by the business cycle situation but affect aggregate activity, nevertheless. Thirdly, there are episodes where fiscal policy has not been well timed to the business cycle situation. This applies notably to the period preceding the Financial Crisis when the Danish economy experienced a boom-bust pattern partly attributable to fiscal policy being too lean. In the years prior to the crisis, the economy was booming with low unemployment, high growth in private consumption and investments (housing), and fiscal policy was expansionary. However, policy makers were reluctant to tighten fiscal policy[8]. The prime minister, when confronted with calls from several economists to tighten fiscal policy, stated that textbooks had to be rewritten since "this time is different". The destabilising effects of fiscal policy came from two main sources: a tax freeze and high growth in public spending. The liberal-conservative government introduced the "tax freeze" with the intention of curbing public sector expenditures. The freeze meant that tax rates were not to increase. However, for property taxes and some excise duties, the freeze was defined in terms of nominal tax payments. At a time of rapidly rising house prices, this reduced the effective tax rates, which in turn pushed house prices further up. Growth in public consumption was also high. The average annual growth rate for public consumption was about 2% in the period prior to the Great Recession – primarily driven by increasing health expenditure – while the target for public expenditure growth was about 1%. Fiscal policy was, thus, clearly pro-cyclical during this period. The experience in these years was a motivating factor for the expenditure ceilings later introduced as part of the fiscal policy framework; see above.

7. The simple correlation is not a strict test of the cyclicality of discretionary fiscal policies, since many factors not anticipated when planning the fiscal policy may affect actual GDP.
8. Pedersen and Ravn (2014) use a Taylor-inspired rule to work out the fiscal policy response called for given that monetary policy cannot be deployed as a stabilisation instrument due to the exchange rate peg. They find that developments during this period called for a significant tightening of fiscal policy rather than the expansionary policy which was pursued. They show that this conclusion also holds true based on real-time data, which significantly underestimated the ongoing boom.

Figure 2. Fiscal effects and GDP growth



Note: The fiscal effect measures the one-year effect of fiscal policy on real GDP of fiscal policy changes relative to the previous year.
Source: (a) GDP growth: Statistics Denmark, (b) Fiscal effect: Economic Council, The Danish Economy, various issues.

When discussing discretionary fiscal policies, it is useful to make a distinction between a *defensive approach* referring to economic policy changes initiated for non-cyclical reasons, but the timing is made dependent on the business cycle situation so as not to be destabilizing, and a more *offensive approach* actively using discretionary fiscal policy changes to dampen business cycle fluctuations. The former is relevant even if there are reasons to be more sceptical about the ability to pursue an active stabilisation policy. An example of the former is a tax reform in 2004 which due a transition period implied that some tax decreases took effect before other taxes increased, and the timing matched that a temporary expansionary policy coincided with a period with low activity. Another example of problematic timing is a structurally motivated reform shortening the maximal unemployment benefit period from four to two years and a tightening of the employment condition to regain benefit entitlement (from 26 weeks to 52 weeks within the preceding three years). The reform was approved in 2010 to take effect in 2012 when the business cycle situation was expected to have normalised. These expectations were too optimistic (the output and employment gaps turned out to be about -3%), and it became an issue that many unemployed would lose their entitlement to unemployment benefit (and be transferred to social benefits, which are means-tested on a family basis) when implementing the

reform in a low activity environment. As a result, several ad-hoc measures were brought in to soften the effects of the reform; see Danish Economic Council (2014) for an account and analysis.

A more offensive use of discretionary fiscal policy to stabilise the economy raises difficult issues besides the political economy aspects, including the information, decision, implementation, and effect lags. Particular challenges pertain to the timing and composition of interventions and their dependence on the nature of the shock(s) driving the business cycle. In particular, a focus on aggregate demand may not be adequate when sectors are affected differently in a specific business cycle; see below.

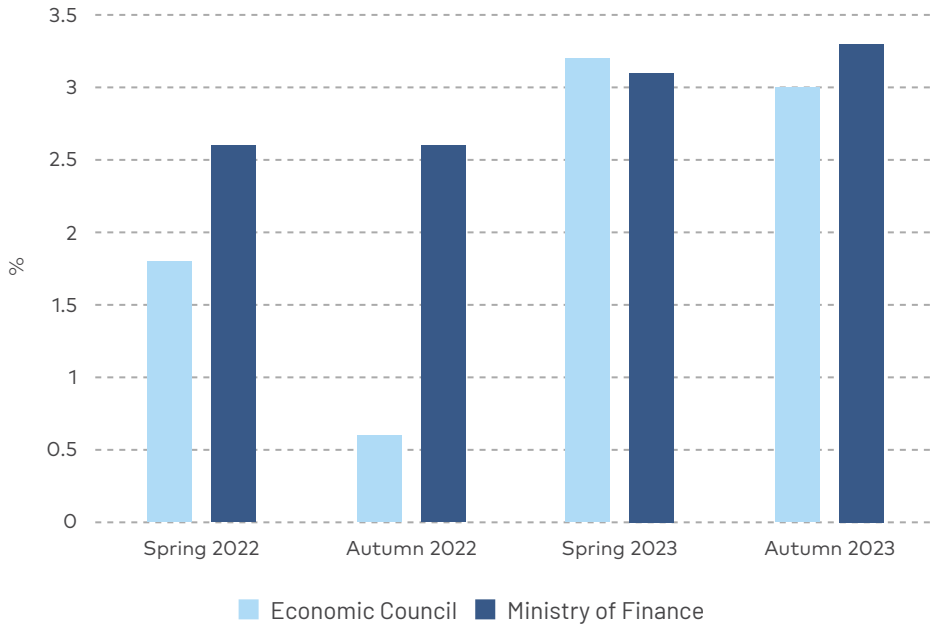
To find a balance between avoiding finetuning policies, the uncertainty involved in determining the output gap, and yet pursuing an active stabilisation policy, the Economic Council (2007) proposed a guided discretionary rule for discretionary fiscal policy targeting discretionary changes in severe economic situations. Intervention is – according to the rule – only justified if the output gap exceeds (numerically) 1% of GDP. If this condition is met, public consumption and investments should be changed by 1% if the output gap is 1%, corresponding to a fiscal effect of roughly 0.25%. Symmetrically, a similar tightening is called for in the case of a positive output gap of 1%. The Council has more recently re-interpreted the rule to be defined in terms of the employment gap, see Economic Council (2023).

The rule is an interesting starting point for a discussion of discretionary fiscal policy. The following discusses the difficulties in assessing the business cycle situation, choice of instruments, sectoral differences, and experiences of unconventional fiscal policy measures.

3.1 Assessing the business cycle

Discretionary fiscal policy cannot be changed at short notice, and therefore it has to rely on projections. However, the business cycle situation can change abruptly, as recent developments exemplify. The projections of the employment gap for 2023 by the Economic Council and the government at different projection horizons are shown in Figure 3. The Economic Council's projections have changed significantly across the different timings of the projections, and the assessments made in the autumn of 2022 had widely different implications for the appropriate discretionary fiscal policy than those made in early 2022 and at the start of 2023. The point here is not that the government had steadier (and more precise) projections than the Economic Council for the specific time period considered; there are other periods when the opposite was the case. The point is to illustrate the large uncertainty in assessing the business cycle situation even within a relatively short forecasting horizon and, thus, to pinpoint the difficulty in planning discretionary fiscal policies. Similarly, there may be large differences between the ex-ante data available when policy is planned and ex-post (revised) data; see, e.g. Cimadomo (2012) and Pedersen and Ravn (2014).

Figure 3. Forecasts of the employment gap for 2023



Note: Spring/autumn refers to the timing of the publication of the Economic Council Reports. The government refers to "Økonomisk Redegørelse" (Economic Survey) published in May and August by the Ministry of Finance/Economic Affairs.

While the rule proposed by the Economic Council is contingent on the size of the output (employment) gap, it is independent of the nature of the shock. This is crucial for the appropriate fiscal policy response. A case in point is the situation in 2022–23, with high unanticipated inflation caused by a global shock. This prompted a tightening of monetary policy, and, given the Danish peg to the euro, the Danish Central Bank raised its rates in line with the ECB. An issue of coordination of fiscal and monetary policy thus arises since the appropriate tightening of fiscal policy clearly depends on the monetary policy responses, an aspect not taken into account by the rule. In other situations, there may, of course, not be an issue of coordination of fiscal and monetary policies given the exchange rate peg, but the example shows one of the problems associated with a shock-independent rule. More generally, the appropriate fiscal response depends on the nature of the shock (demand or supply) and whether it is transitory or permanent. This suggests that a common fiscal policy response to a given output or employment gap is not appropriate.

3.2 Instruments

Discussions about fiscal policy are generally presented in terms of changes in either expenditure or taxes. The design of aggregate demand management policies involves the question of whether to target public or private demand. In the case of expansive policies, targeting private demand mainly involves tax instruments to increase disposable income (e.g. temporary reductions in direct taxes) or induce intertemporal substitution in demand (e.g. temporary VAT reductions). Public demand can be affected via expenditure on both consumption and investments.

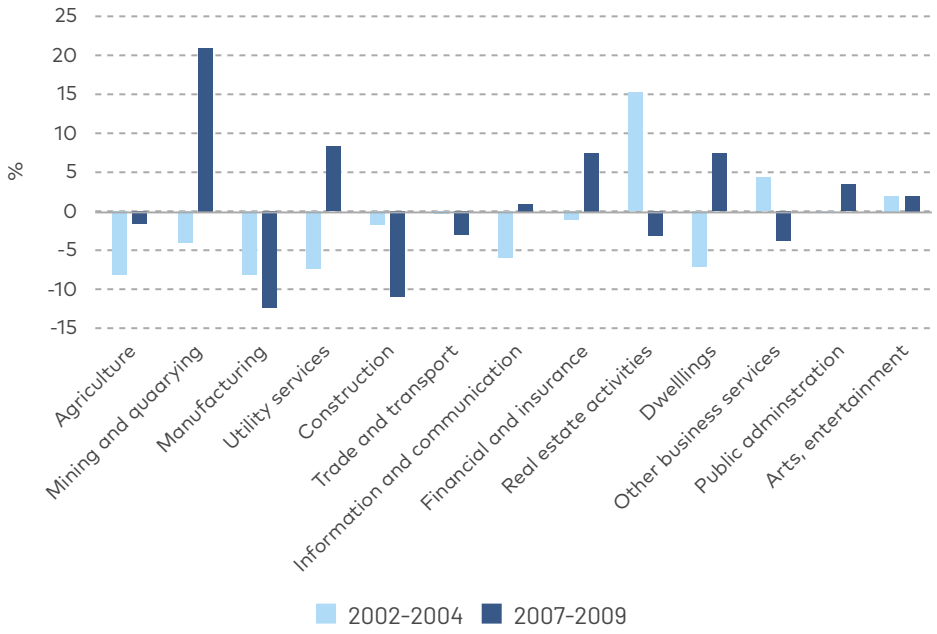
However, in practice, it is increasingly clear that the available set of instruments for demand management policies is restricted. Public consumption mainly consists of administration and provision of welfare services, neither of which is ideal for business cycle adjustments, and there are similarly strong smoothing arguments on the taxation side for keeping tax rates steady over time. On the transfer side, adjustments to transfers raise a political economy problem, especially if they are cut. Little room is left for manoeuvre, and public investments are effectively the most flexible instrument despite its limitations. First, the decision lags are long for most public investment projects, which means the instrument can mainly be used asymmetrically as a contractionary measure by postponing a planned project. Secondly, it targets specific sectors (mainly construction), which means it is not generally applicable; see below.

There is also a structural aspect. Traditional macro analyses take a very aggregate approach to the labour market, essentially assuming homogenous labour, which can be reallocated across sectors easily and without costs. The implication is that only the aggregate level of demand matters, and a reduction in one component (say net exports) can be compensated by an increase in another one (say public investments) to mitigate the effects on aggregate activity and employment. This may also be phrased in the way that different components of aggregate demand are perfect substitutes as far as employment is concerned.

This homogeneity assumption may be questioned for several reasons, especially since specific qualification requirements for many jobs tend to make labour non-homogeneous across types of production/sectors, and it follows that the composition of aggregate demand matters. When labour embodies sector-specific knowledge, it is not plausible that the labour can be reallocated across uses at low costs. The costs stem from training (explicit or on-the-job training) and the sluggishness with which workers adapt their reservation demands to changes in their labour market prospects (in particular, if it is associated with a different type of job, lower wage, etc.). Of course, the speed and willingness to adapt depend on wage formation and the design of the social safety net (benefit levels, active labour market policies etc.), including the options it offers for "postponing" the adjustment.

This point is illustrated in Figure 5, showing changes to employment in various sectors during two different periods when the employment rate was falling. Two observations stand out. First, although aggregate employment was falling, there were significant differences, with employment rising in some sectors. Second, the sectors most severely affected were not the same during the two crises, e.g., the construction sector was hardly affected by the first crisis but more severely during the second. Since the sectors differ in the composition of the workforces, it follows that the types of workers affected during the two crises are different. Even this illustration is based on aggregate data not fully displaying the sectoral differences related to the type of labour. Increased specialisation driven by both new technology and globalisation makes the standard macro approach to the labour market more questionable.

Figure 4. Changes to employment by sector; 2001–2003 and 2007–2009.



Note: In the 2002–2004 crisis, total employment fell by 1.4%, in the 2007–2009 crisis by 2%. Employment in persons. Sectors are not weighted by their importance for total employment.
Source: Statistics Denmark

Sectoral adjustment effects like these have important implications for fiscal policy[9]. First, even if falling private demand is counteracted by a fiscal stimulus, there will be a transitional phase with excessive unemployment (increasing mismatch problems) due to declining demand in contracting sectors and the sluggish process by which labour is reallocated. It is far from self-evident that a general increase in demand will "lift all boats" in the labour market. The people made redundant may possess other skills than those in demand as a result of a more expansionary fiscal policy. The implication is that shocks may have more persistent effects (including greater wage/unemployment dispersion), and fiscal policy may have a weaker short-term impact due to these supply factors.

Second, it is crucial to determine whether the changes are transitory or permanent. In the case of transitory changes, reallocation of labour may entail inefficiently large adjustment costs due to excessive job turnover. In the case of permanent changes, the issue is more complicated. On the one hand, it is important that the policy does not constrain the necessary structural adjustment process. On the other hand, if unused resources are only sluggishly absorbed in other sectors, there may be an argument for some temporary support even for declining sectors. It is not an easy task to address these issues, since it requires an identification of the sectors facing particular problems and targeting policies accordingly. General measures like tax cuts may not be targeted accurately enough, and sector-specific measures may amount to subsidies, which raises questions both in relation to EU rules and moral hazard problems arising if sectors are bailed out.

In summary, an active use of discretionary fiscal policies to stabilize the business cycle is challenged for several reasons, suggesting that such interventions are only relevant in the event of large shocks and that the automatic stabilisers should be allowed to do their job; see discussion below.

3.3 Unconventional fiscal policies

The preceding discussion took a standard approach to the set of fiscal instruments. Therefore, it is interesting to mention some notable examples of *unconventional* demand management policies targeting private demand in Denmark.

In 1998, a mandatory pension saving scheme (SP) was introduced requiring all those in employment to pay 1% of gross earnings[10]. Originally, this was only meant to apply for

9. The effects and design of fiscal policy in the presence of sectoral adjustment costs have not been much researched. One exception is Steigum and Thøgersen (2003). In a full employment model, they allow for the costs of transferring labour from the non-tradeable sector to the tradeable sector. The policy response to a negative private wealth shock comprises both that fiscal policy redistributes from future to current generations by running a deficit (consumers are non-Ricardian) and that demand for non-tradeables is supported in the transition.
10. When launched the scheme was redistributive as contributions were allocated equally among all participants, but in 2002–03 this redistributive element was abolished, and individuals were credited for their personal contributions.

a year, but it was made permanent and then suspended in 2004. The motivation behind the scheme was to reduce demand and avoid overheating the economy (a reintroduction of the scheme was actually discussed in 2008 for the same reason). The contributions were accumulated in a funded pension scheme and to be paid out when reaching the statutory retirement age (65 at the time). In an effort to boost private consumption in the wake of the Financial Crisis, individuals were allowed to withdraw their balance in 2009. This is an example of an off-budget demand management policy to increase private consumption and aggregate demand without a negative effect on public finances. Actually, it frontloaded some tax revenue since pension contributions are deductible, but pensions are taxable income. In an analysis of this policy, Kreiner et al. (2019) find that the policy did increase spending for liquidity-constrained households and that the spending propensity was increasing in the tightness of the liquidity constraint.

Another example of an unconventional demand management policy is the "unfreezing" of holiday pay[11] during the COVID-19 crisis, which simultaneously both improved the disposable income of households and tax revenues since holiday allowances are taxable income. In the autumn of 2020, holiday pay corresponding to DKK 31 billion (1.4% of GDP) was paid out, followed in early 2020 by DKK 22 billion (1% of GDP). This had a considerable impact on households' disposable income.

It is unclear whether such policies can be used again in the future. The example of the holiday payment arose by chance due to the reform of the holiday pay system (and motivated by the experience with the release of the mandatory pension savings). Generally, it is not advisable to allow a short-term factor to influence the design of pension systems. The SP pension arrangement was motivated by the experience that mandatory pension schemes reduce consumption and therefore have a contractionary effect, and an expansionary when released. But it is not clear whether this could be repeated. As a response to the unanticipated high inflation in 2022–2023, some transfer payments have been temporarily increased, e.g. to pensioners, partly to mitigate the consequences of the time lag in the indexation of transfers (basically, all transfers are indexed by wage increases). These measures can be interpreted as examples of unconventional fiscal policy, although they were not motivated as a measure to support aggregate demand. More general use of cash transfers during deep crises raises political economy issues in ensuring that such changes are temporary and targeted to groups with a high marginal propensity to consume.

11. In Denmark, a part of wage income (typically 12.5%) is reserved for a holiday allowance paid out during holiday periods. In the past, holiday allowances depended on wage income earned in a previous period (i.e., there was a lag between the accrual of holiday allowances and the period in which the money was paid out). A recent reform synchronised the earnings and holiday periods, and to avoid a double pay-out of holiday allowance, one part was frozen until retirement age. In response to the COVID-19 crisis, it was decided to allow individuals to request a pay-out of the frozen holiday allowances in two rounds (autumn 2020 and early 2021).

4 Automatic stabilisers

Automatic stabilisers are widely appreciated as the rule-based part of fiscal policies not suffering from the same challenges as discretionary fiscal policies. Therefore, calls are regularly made to strengthen the automatic stabilisers (and thereby also to reduce the use of discretionary fiscal policies). In the wake of both the Financial Crisis and the COVID-19 pandemic, calls have been made to strengthen automatic stabilisers, see e.g., IMF (2023). The fact that monetary policy is constrained by the zero-lower bound on the interest rate has also been put forward as an argument for the need to strengthen automatic stabilisers because it is difficult to time discretionary fiscal policy in relation to business cycle fluctuations; see, e.g., Blanchard and Summers (2020).

The automatic budget response or stabilizer is a summary concept for the automatic response of public sector revenue and expenditure to changes in the level of economic activity (the business cycle). They are the net outcome of other policy choices, which then produce these automatic responses, including taxation, implying that tax revenue changes when income changes and the social safety net when social expenditures changes, when (un)employment changes, and so on.

Automatic stabilizers work primarily by stabilizing private consumption – a key component of aggregate demand (and thereby also indirectly private investments). This is generally considered an important and valuable part of fiscal policy. Automatic stabilisers cushion individuals' disposable incomes and, therefore, serve an insurance purpose because they have a direct and positive welfare effect for risk-averse agents. They also contribute to stabilization of the aggregate economy via their stabilising effect on disposable income and hence private consumption and aggregate demand; see, e.g., Van der Noord (2000). Moreover, they tend to mute the consequences of economic crises on income inequality; see, e.g., Domeij and Flodén (2010), Dolls et al. (2011c), and OECD (2014).

Automatic stabilisers are rule-based automatic responses to changes in the business cycle. Hence, they do not require up-to-date information on the state of the economy, and they do not require any discretionary policy actions to work. Therefore, they generally work more swiftly, counter-cyclically, and more targeted than discretionary policies, being subject to information, decision, and implementation lags (see above).

A necessary condition for automatic stabilisers to work is fiscal space making room for the implied budget variations. Maintaining symmetry across the business cycle is important. Budget surpluses (and, therefore, consolidation) during upturns create room for budget deficits and automatic stabilisers to work during downturns. If such fiscal space is missing, discretionary tightening of fiscal policies may be called for during a recession, which counteracts the effects of the automatic stabilisers. There are many examples of countries offsetting automatic stabilisers by discretionary policy

changes due to lack of fiscal space. Price et al. (2015) find that in nearly half of the OECD countries, automatic fiscal easing was accompanied by discretionary tightening for half of the period 1980–2018. Prudent fiscal policy in good times is, therefore, an important precondition for automatic stabilisers to perform their countercyclical role in bad times. In Denmark, it has been an important argument in favour of fiscal rules that they safeguard the space to allow the automatic stabilisers to do their job.

In assessing automatic stabilisers, two aspects are particularly important: the nature of the shock (demand or supply) and its persistence (temporary or permanent). In general, the optimal policy response depends on the nature of the shock, while automatic stabilisers "average" across types of shock. Automatic stabilisers work best to cushion demand-driven business cycles. They do not distinguish between temporary and permanent shocks. Since it is possible to diversify temporary but not permanent shocks, this is important. The effects of aggregate shocks are reflected in the budget balance accumulated over time if shocks are persistent, as seen during, for example, the Financial Crisis. The implication is that automatic stabilisers can never be set to "autopilot". If shocks are persistent, close monitoring and intervention are needed to avoid that public debt comes on an unsustainable trajectory.

While automatic stabilisers are widely discussed and praised, there is no well-defined or commonly accepted way to measure their strength. The literature features assessments taking a microeconomic approach based on microsimulation models capturing the details of tax and transfer schemes, macroeconomic models allowing for various behavioural and equilibrium responses, or a statistical approach assessing the sensitivity of the public budget to variations in output[12]. For a brief overview and references; see, e.g., Mohl et al. (2019). The first two approaches are resource-demanding and model-specific, which is why the statistical approach is widely used. It is relatively simple and allows accessible time series for public revenue and expenditure to be used; see, e.g., van der Noord (2000), Debrun et al. (2008) and Price et al. (2015). The issue with this approach is that the estimated relationship is shock-dependent (depending on the sample period used in the estimation), and it captures budget responses which are not necessarily closely related to the aggregate demand effects being important from a stabilisation perspective. For instance, variations in the revenue from corporate taxation are important from a budget perspective but less so for the short-term aggregate demand effects. Despite the widespread use of this metric, it is thus not clear that it appropriately measures the links contributing to stabilize the incomes of households and thus aggregate consumption and demand; see Andersen (2016) and Maravalle and Rawdanowicz (2020) for a discussion. It should be noted that the methods referred to above find that Denmark is among the countries with the strongest automatic stabilisers, and its level has been relatively stable over time; see, e.g. Price et al. (2015) and Maravalle and Rawdanowicz (2020).

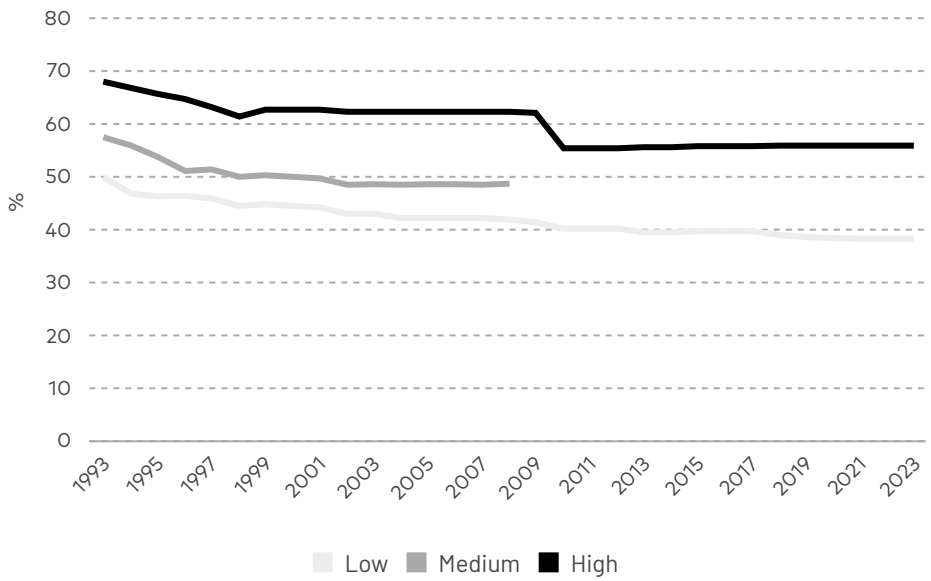
12. This is measured by the semi-elasticity of the budget balance to a change in the output gap; that is, by how many percentage points the budget deficit/surplus (measured relative to GDP) changes following a 1% increase in GDP.

The following takes a different and more theory guided approach, focusing on the part being both most important for aggregate demand and directly related to policy instruments (see Appendix). The starting point is the basic source of the automatic stabilisation of private consumption and thus aggregate demand that arises via the effects on disposable income originating from changes either on the intensive margin due to changes in wages and/or hours worked or on the extensive margin from changes in employment due to business cycle fluctuations. For the former, the marginal tax rate is the relevant metric of how changes in income affect disposable income and, hence, the potential for private consumption. On the extensive margin, the relevant metric is the participation tax measuring how disposable income is affected by a shift between employment and non-employment. The participation tax depends both on the tax rate and the generosity of the transfers received when out of work (e.g., unemployment benefit or social assistance). In practice, the participation tax varies between groups in the labour market, and in general, the budget effect is, therefore, the sum of changes in employment in different groups multiplied by their respective participation taxes.

Over a sequence of years, policy initiatives have focused on the strengthening of work incentives to work via both changes in the taxation system and the design of the social safety net. This has contributed to reduce the number of people in the working-age population receiving public transfers and increased the structural employment rate. Figures 5 and 6 show the developments in the marginal tax rates on earned income and the participating tax (both identified as the key transmission links in the Appendix), and in both cases, there is a downward trend[13]. Thus, these changes have weakened the automatic stabilisation of household disposable incomes. This is not to imply that the policy changes are sub-optimal, but it does point to the difficult of strengthening work incentives without weakening the automatic stabilisers. There is a trade-off between efficiency and insurance (stabilisation).

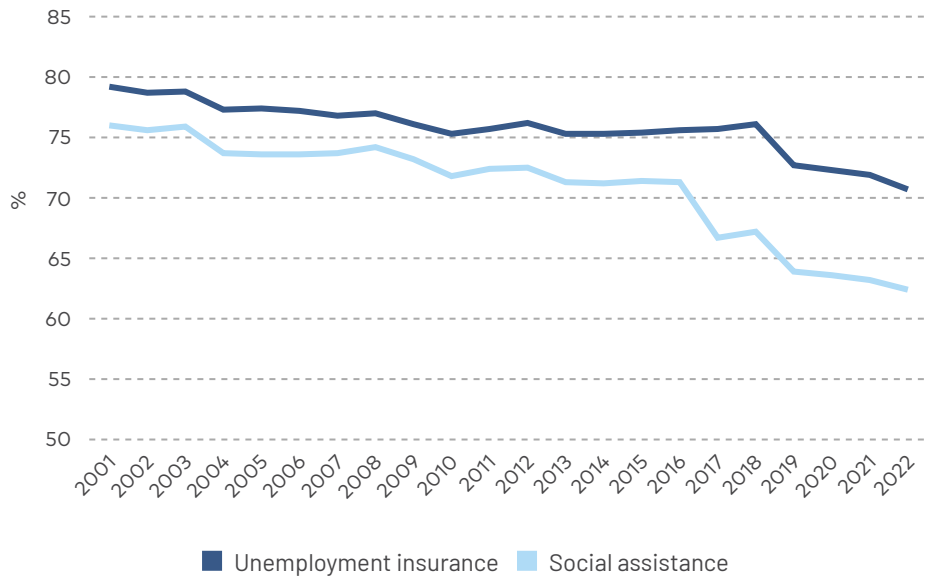
13. If a tax cut is accompanied by a broadening of the tax base, the net effect on the stabilisation of disposable income is ambiguous because the latter implies that a broad income base is covered by the stabilisation mechanism. Broadening tax bases has been more important for corporate taxation (for example) than household taxes.

Figure 5. Marginal income tax rates for earned income, 1993–2023



Note: The income tax system used to have three tiers, but the middle tier was abolished with effect from 2009. The taxes include the earned income tax credit (beskæftigelsesfradrag) introduced in 2004, but not the additional tax rebate for singles with children. Marginal taxes are computed using the average municipal tax and do not include the church tax.
Source: Ministry of Taxation, www.skm.dk

Figure 6. Participation taxes for individuals eligible for unemployment insurance or social assistance



Note: The participation tax for single people without children (important for social security).
Source: www.oecd-ilibrary.org

The preceding discussion makes it clear that the automatic stabilisers are the net outcome of decisions made on the taxation system and social safety net. It is a straightforward implication that the more extended the welfare state, the higher the tax rate and social transfers and, therefore, the more sensitive the budget is to changes in private employment.

The fact that the automatic stabilisers are the net outcome of other policy choices and not the outcome of a separate policy decision is often overlooked when calling for them to be strengthened. This interrelationship also brings out an important trade-off between incentives and insurance (stabilisation); see, e.g., Gruber (1997), Knieser and Ziliak (2002), and Andersen (2016). As an example, a high level of participation taxes does, on the one hand, strengthen the automatic stabilisers and the ability to cushion shocks, but on the other hand, it weakens the incentive structure with detrimental effects on structural employment.

Summing up, automatic stabilisers play an important macro role. They are rule-based and are the net outcome of policy decisions on the tax structure, social safety net, etc. The automatic stabilisers are, therefore, not the result of macro considerations but other decisions in other policy areas. As a consequence, reforms to strengthen work incentives have tended to weaken the automatic stabilisers, and this raises the question of finding other ways of strengthening them without jeopardizing work incentives, such as, for example business cycle dependent unemployment insurance; see discussion in Andersen (2023).

4.1 Fiscal sustainability

The consequences of ageing and the implications for public finances have taken centre stage in economic policy discussions in recent years. Assessments of fiscal sustainability are regularly made and provide important input to economic policy discussions. The key metric is the sustainability indicator giving the permanent change in the primary budget balance (as a % of GDP) needed for current policies to be consistent with the intertemporal budget constraint for the government.

During the first phase, the issue was to understand the nature of the demographic changes and to quantify the challenges and need for reform. This led to a string of reforms, including (in particular) increases in and subsequent indexation of the statutory retirement age to the development in longevity. These reforms ensure that the conditions for fiscal sustainability are met; see Ministry of Finance (2023), Economic Council (2023), Hansen et al. (2023). During the second phase, the focus has been on ensuring that policies remain consistent with fiscal sustainability, and this is implemented via the setting of short-term targets for fiscal policy; see above on the fiscal policy framework.

Since 2015, both the government and the Economic Council have assessed fiscal policy

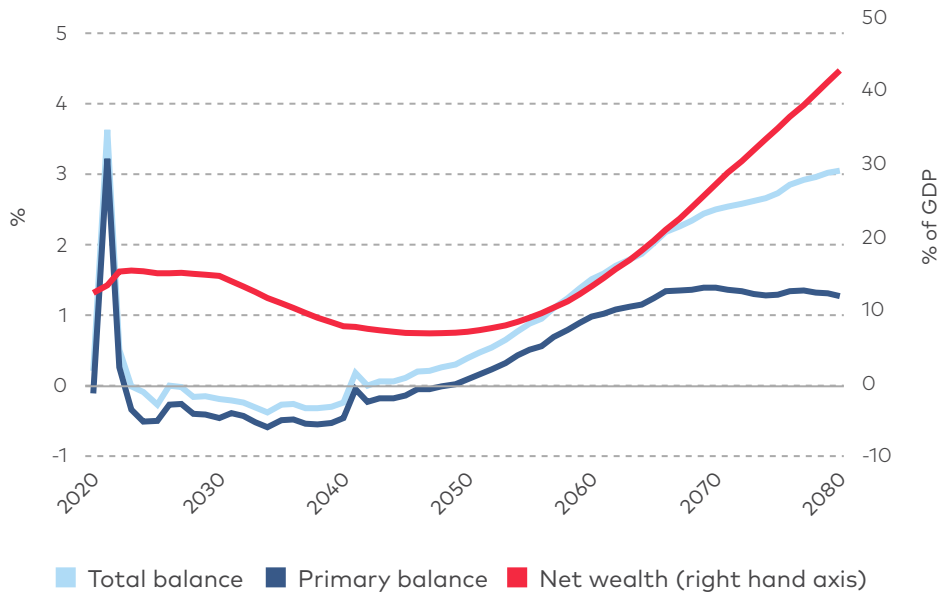
to be sustainable, but the sustainability indicator has varied over time, and the assessments made (with the sustainability indicator varying between -0.2 and -1.8; that is, leaving some room for spending hikes/tax cuts), see Economic Council (2023). These different assessments also point to the underlying uncertainty in the sustainability metric, which is no surprise given its forward-looking nature and the fact that it depends on a long list of assumptions.

The specific aspect of the Danish case is that the underlying budget profile displays a U-pattern (in policy debates known as "the hammock"); see Figure 7. The starting point is favourable (including low gross debt and a net wealth position), followed by a sequence of years with deficits and then systematic surpluses (note the deficit on the total balance is smaller than on the primary balance due to the positive net wealth). In present value terms, the future surpluses are sufficient to cover the series of deficits (taking into account the initial net wealth position).

The main reason for this pattern is that although retirement ages are linked to longevity[14], the scheme has a speed limit implying that it takes several decades (according to current population projections) to reach the target for the indexation, which is an expected retirement period of 14.5 years for all cohorts. Hence, the speed limit implies that the expected retirement period for a sequence of cohorts exceeds this target. The current retirement age is 67, and it has been decided that it will be 68 from 2030 and 69 from 2035. Since future increases in the retirement age must be approved by parliament, there is an inherent risk in the underlying budget profile. The next decision is coming up in 2025, and according to the indexation rules, the retirement age should be increased to 70 with effect from 2040. If there are no further increases beyond 70, the primary balance will remain in deficit, and fiscal policy will not meet the sustainability requirement, see *Kommissionen om tilbagetrækning og nedslidning* (Danish Pension Commission, 2022).

14. Statutory ages in the pension system (for public pensions and early retirement, as well as age limits for payments from pension schemes) are established by law and, thus, regulated at the political level. Recent reforms—the 2006 Welfare Reform and the 2011 Retirement Reform—have increased the statutory retirement ages in steps from age 60 years to 64 years for early retirement (2023), for the public pension from 65 years to 67 years (2022), and also shortened the early retirement period from five years to three. The second element in the reforms is indexation of the early retirement age and pension age to the development in life-expectancy at the age of 60 in order to target the expected pension period to 14.5 years (17.5 including early retirement) in the long term (currently about 18.5/23.5 years). Parliament decides every 5th year with a 15 year lead the statutory retirement age, hence in 2020 it was decided that the statutory retirement age in 2035 will be 69, and in 2025 it is up for approval that it is going to be 70 years in 2040. There is a speed limit such that the statutory retirement age can only be increased by a maximum of one year every 5th year.

Figure 7. Projected developments in public finances, Denmark, 2020–2080



Source: Council of Economic Advisors (2023).

While the sustainability indicator usefully summarises a great deal of information in a single metric and is relatively easy to communicate, it also suffers from the problem that it conceals the uncertainty inherent in such projections (which increases with the length of the forecast horizon). While this can be circumvented to some extent by presenting – as is usually done – robustness analyses, the problem remains that the indicator is often interpreted too literally, i.e. without taking into account the uncertainty in the assessment.

Moreover, the indicator takes outset in the question of whether existing policies are fiscally sustainable; it is a feasibility test and not an optimality test. Plausibly policies and behaviours will be changed going forward, including higher expenditure on health and lower working hours, all of which would tend to have a detrimental effect on fiscal sustainability. Nonetheless, sustainability analyses have served their purpose and have been instrumental in giving greater weight to medium-term and long-term aspects of fiscal policy making, which has, in turn, contributed to minimise the role of myopia and zig-zag tendencies in policies.

6 Concluding remarks

The major shift in fiscal policy making in recent years reflects both less optimism about the potential to finetune business cycles and focus more on medium-term and long-term issues. This is explained by both the poor track record of active demand management policies during the 1970s and 1980s and the looming challenges of an ageing population. Institutionally, these changes are reflected in fiscal policy frameworks that aim to boost the continuity, consistency and credibility of fiscal policy making, and more predictable policies may in themselves be conducive to economic developments.

Discretionary fiscal policies remain relevant, although the challenges of timing such interventions to the business cycle developments are generally recognised. There is a consensus that such interventions should be reserved for "large shocks", although there is less agreement on how to define "large". In contrast, there is agreement on the virtues of automatic stabilisers, and calls are often made to strengthen them since they are rule-based and respond automatically to changes in the business cycle situation. However, this is easier said than done since the automatic stabilisers are the net outcome of decisions on the tax system, the social safety net, etc. A side effect of recent reforms designed to strengthen incentives to work has, therefore, been to weaken the automatic stabilisers. This points to a fundamental trade-off between incentives and insurance/stabilisation.

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Appendix: Automatic Stabilisers

To identify the key source of the part of automatic stabilisers important for private consumption, consider a stylised setting in which total household disposable income (Y^d) is given as

$$\textbf{(1)}\ Y^d = (1-t)\left(w_p L_p + w_g L_g + bN\right)$$

where t denotes the tax rate, w_p the wage rate in the private sector, w_{g18} the wage rate in the public sector, b the level of social transfers to non-employed[15], L_p the employment level in the private sector, L_g the employment level in the public sector, and N the number of recipients of social transfer payments (not in employment). At the business cycle frequency, public wages and employment are constant.

The business cycle is associated with changes in the private sector: i) wages or hours worked (intensive margin responses) and ii) employment (extensive margin responses). For the intensive margin response, it follows straightforwardly that

$$\textbf{(2)}\ dY^d = (1-t)\,dw_p$$

This captures the Domar-Musgrave effect that income taxation reduces the variability of disposable income. The higher the tax rate, the less disposable income varies relative to variations in the taxable income.

Turning to the extensive margin changes, the total population (P) is made up of employed in the private (L_p) and public sectors $(L_g)$and the non-employed[16] (N), $P = L_p + L_g + N$. Variations in private employment (for given L_g) are mirrored in changes in the number of non-employed, $dN = dL_p$. Hence, the effect of changes in private employment on disposable income is

$$\textbf{(3)}\ dY^d = (1-t)\left(w_p - b\right)dL_p$$

which can be rewritten as

$$\textbf{(4)}\ dY^d = (1-\tau)\,w_p dL_p$$

where $\tau \equiv t + (1-t)\,\dfrac{b}{w_p}$ is the so-called "participation tax" for the individual when transitioning between work and non-work, and b/w_p is the replacement rate of the transfers. To see this, note that the difference between income when working and non-working is

15. It is assumed that all transfer payments are taxable income (as is the case in some countries), but this is not crucial to the arguments.
16. This assumes that everybody out of a job is entitled to the transfer, which is a reasonable approximation for the Nordic countries

$$w_p(1-t) - b(1-t) = w_p\left(1 - \left(t + (1-t)\frac{b}{w_p}\right)\right) = w_p(1-\tau)$$

This makes the participation tax crucial to the response of disposable income to changes in employment. It captures the essence of the automatic stabilising effect from employment variations arising from the taxation of income and the social safety net providing income transfers to the non-employed.

Finally, to see the relation to the budget responses, the public sector primary budget balance (B) is in this stylized setting given as

(5) $B = t(w_p L_p + w_g L_g + bN) + T - w_g L_g - bN - G$

where T denotes other sources of tax revenue (exogenous), and G other public expenditure (exogenous). Note that the tax rate should be interpreted broadly as capturing both income and consumption taxes.[17] Observe also that in Denmark – and in most OECD countries – more than 90% of tax revenue accrues from the direct and indirect taxation of labour income, and about 2/3 of public consumption is wage expenditure; s, hence the above captures the main effects on the budget.

The budget effect of a change in private employment (for given public employment L_g) is

$$dB = (t(w_p - b) + b)\, dL_p$$

or

(6) $dB = \tau w_p dL_p$

The total budget effect of a transition of one single individual from non-work to work in the private sector is $\tau = tw_p + (1-t)\,b$, i.e. the sum of the tax paid and the after-tax value of the social transfer. The transition from work to non-work has a double effect on the budget, both the direct loss of tax revenue from reduced private income tw_p and the extra expenditure on social transfers $((1-t)\,b)$[18].

17. In this simple formulation, there is no distinction between income and consumption. Similarly, profit income is disregarded (taken to be exogenous).
18. In the case where there is only a change in wages in the private sector, the budget effect arises solely from the tax side and the automatic stabiliser is smaller.

Comment on Torben M. Andersen: Fiscal Stabilisers in Denmark

Paul Lassenius Kramp

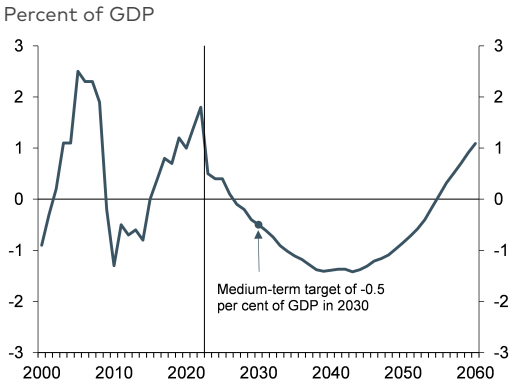
Torben M. Andersen provides an excellent overview of fiscal policy stabilisation in Denmark. This review of his article provides a few supplementary comments.

In Denmark, the medium-term target for fiscal policy is a structural budget balance of -0.5% of GDP in 2030, *cf. Figure 1*. This is consistent with fiscal sustainability (the sustainability indicator is estimated to be positive) and low public debt as a share of GDP, *cf. Figure 2*. The 2030 target implies a fiscal space for political prioritisation, including covering the expense of demographic changes, higher defence spending, the green transition, etc. It also provides room for discretionary stabilisation in the event of an economic downturn, within the structural deficit limit of -1% of GDP stipulated in the Danish Budget Act.[19]

The structural deficit limit of -1% of GDP laid out in the Budget Act allows the automatic stabilisers to operate freely in a normal economic downturn while complying with the deficit limit on the actual budget balance of -3% of GDP in the Stability and Growth Pact, *cf. Erfaringer med budgetloven 2014-2020, Ministry of Finance, April 2022*. In addition, expenditure ceilings in the Budget Act have a stabilising effect as they help e.g. prevent procyclical expenditure slippages during economic upturns.

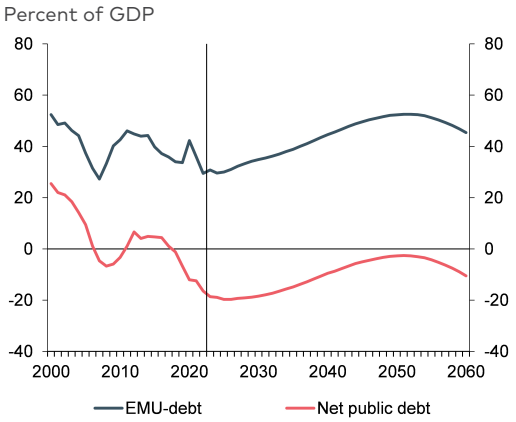
19. In case of exceptional circumstances, it is possible to deviate from the deficit limit.

Figure 1. Structural budget balance



Source: Danish Ministry of Finance, August 2023 projection

Figure 2. Public debt

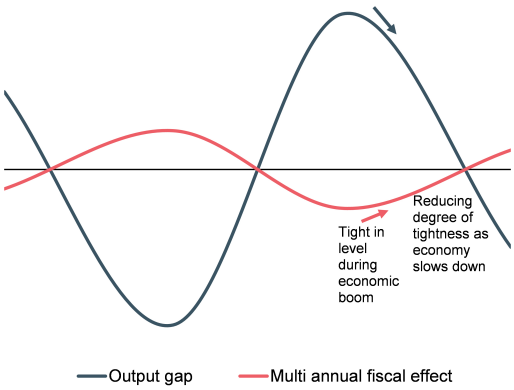


Source: Danish Ministry of Finance, August 2023 projection

The automatic stabilisers are large in Denmark compared to many other countries, which in itself reduces the need for discretionary stabilisation. Active stabilisation is primarily used to counter large economic shocks (such as the COVID-19 pandemic and high inflation of recent years), while it is generally considered unrealistic to finetune the business cycle. This is in part due to the uncertainties of the current and future business cycle, the lags in fiscal policy between recognising issues, making decisions and implementing them, and the adverse effects if frequent adjustments are made to tax rates, the quality of public services, etc.

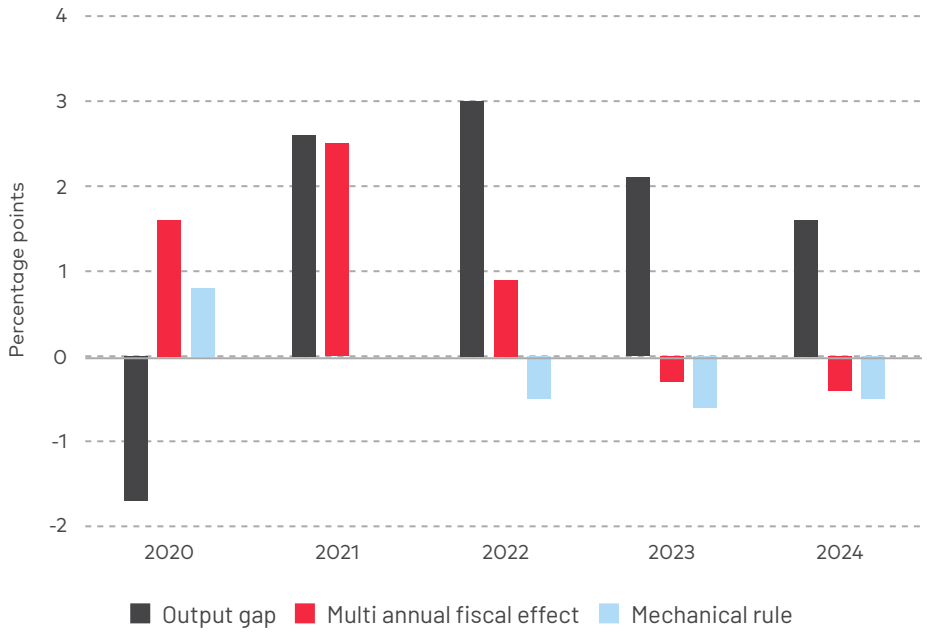
The Danish Economic Council (2007) described a mechanical rule implying that discretionary fiscal policy can aim to close ¼ of the output gap that would exist in the absence of discretionary measures. The ¼ assumption reflects the uncertainties related to discretionary fiscal policy. According to the rule, fiscal policy must be tight in an economic boom measured in level, not annual tightening and expansionary in a downturn. This implies that fiscal policy should not be tightened further from year to year when the economy slows down while the output gap remains positive. Instead, it may be appropriate to reduce the degree of tightness to support a soft landing, *cf. the red and blue arrows in Figure 3.* This is given the assumption that fiscal policy in the previous years was appropriate.

Figure 3. Illustration of fiscal stabilisation according to a mechanical rule



Source: Economic Survey, August 2023

Figure 4. Fiscal effects compared with benchmarks from a mechanical rule



Note: The multi-annual fiscal effect measures the impact of the discretionary fiscal and structural policy since 2019 on the output gap in a given year
Source: Economic Survey, August 2023

In practice, discretionary fiscal policy does not follow a mechanical rule, but it can be used as a benchmark for comparison with the fiscal stance. The Danish Ministry of Finance measures the impact of discretionary fiscal and structural policy on the output and employment gaps by means of the so-called "fiscal effects", which are based on calculations on the new macroeconomic model, MAKRO. Note that this is not equivalent to the changes in the structural budget balance; *see, e.g., Economic Survey, December 2023*.

In the forecast *Economic Survey, August 2023,* the multi-annual fiscal effect – which measures the impact of fiscal policy in the given year and the preceding years relative to the base year in 2019 – is estimated at -0.4 percentage points in 2024. Thus, fiscal policy helps dampen capacity pressure (output gap), which is in line with the implication of the illustrative mechanical rule, *cf. Figure 4.*

During the COVID-19 pandemic, the expansionary fiscal policy response in 2020 and 2021 was larger than the illustrative mechanical rule would suggest. This reflects the special nature of the crisis, including the extraordinary need to support businesses and employees and, at the same time, send a clear signal that great efforts were being made to support the economy which in turn contributed to reduce uncertainty.

The fiscal easing in 2020 and 2021 was offset by greater tightening in 2022 and 2023 than the rule would imply. Overall, this means that the level of fiscal policy, i.e. the multi-year fiscal effect in 2024, is broadly in line with the mechanical level rule.

Comment on Torben M. Andersen: Fiscal Stabilisers in Denmark

Søren Hove Ravn

The insightful paper by Andersen (2024) provides a thorough examination of some key shifts in Denmark's fiscal policy framework during the last three or four decades. Central to his analysis is the discernible transformation towards a "stability-oriented" approach, characterised by a pronounced focus on medium-term plans and long-term fiscal sustainability rather than short-term fine-tuning. This strategic shift has seen discretionary fiscal interventions reserved for significant shocks, such as the Financial Crisis and the COVID-19 pandemic. Otherwise, Denmark has relied to an increasing extent on automatic stabilisers to manage moderate economic fluctuations, underscoring the increasing confidence in the efficacy of these mechanisms. In this brief comment, I first attempt to make some qualifying statements about some of the points made by Andersen (2024) before turning to a discussion of the future of fiscal stabilisation policies in Denmark.

Andersen (2024) posits that automatic stabilisers in Denmark have weakened over the last 30 years, citing reduced marginal and participation tax rates as evidence of this weakening. However, it is important to keep in mind that Danish tax reforms during this period have generally focused on reducing tax rates while broadening the tax base. It is not clear that such reforms necessarily reduce automatic stabilisers. One way to shed light on this issue is to consult the computations of tax and spending elasticities (with respect to changes in economic activity) regularly calculated and published by the OECD. A comparison of the two most recent versions (Girouard and André, 2005; Price *et al.*, 2014) yields little or no evidence that automatic stabilisers in Denmark have been declining. Corporate taxes offer an illustrative example, as Denmark has reduced its corporate tax rate notably over the period in question. Yet, the OECD finds that the output gap elasticity of corporate tax revenues has increased from 1.65 to 3.15 due to a more cyclically responsive tax base. I believe more evidence is required before we can draw the conclusion that automatic stabilisers in Denmark have generally weakened. Herein lies an important message for policy makers: It is possible to introduce reforms aimed at reducing tax rates without weakening the automatic stabilisers as long as the reforms broaden the corresponding tax base.

My second remark is mostly a call for further work. Andersen (2024) rightly points out the difficulties associated with fiscal stabilisation policy in real time, not least due to data uncertainty. He provides illustrative evidence for 2023 while leaving out a more systematic assessment of this issue. The existing literature has found some evidence that fiscal policy in OECD countries tends to be countercyclical based on ex-ante (or real-time) data but procyclical (or perhaps acyclical) when using ex-post (revised) data (see, e.g., Cimadomo, 2012; or Bernoth *et al.*, 2015). It would be interesting to analyse whether up-to-date Danish data would yield a similar result.[20]

My final short remark concerns the fiscal response to the COVID-19 pandemic. While Andersen (2024) does not focus on the fiscal policy response to the pandemic, I find it worth pointing out that this response was, effectively, an illustration of the benefits of the "stability-oriented" approach to fiscal policy cited above. During the pandemic, Denmark's Finance Minister Nicolai Wammen promised to do whatever it would take to guide the Danish economy safely through the crisis, an approach made possible only by the country's fiscal stance before it.

Andersen (2024) raises a number of concerns associated with the use of government consumption and investment as well as tax policies for fiscal stabilisation purposes in the future. I share these reservations. Spurred by this, the rest of this comment offers some reflections on the remaining options for fiscal stimulus in a deep recession (other than automatic stabilisers). Inspired by recent academic research and by experiences from other countries, I will consider three somewhat unconventional types of fiscal policy that may be attractive from a Danish point of view.

First, it is not entirely unfair to say that Denmark was lucky in each of the last two deep recessions: In 2009, the Special Pension (SP) savings were available and could be readily released with a view to stimulate private spending. In 2020, a similar situation arose with respect to the "Holiday Savings", which were released at that time. Both of these had been accumulated for reasons largely unrelated to their potential role as fiscal stimulus, and the government found itself able to stimulate private spending at essentially no cost in both cases. This begs the obvious question of what to do next time. It appears wise to think carefully about this question well before the situation arises. In theory, one option would be for the government to impose systematic "recession savings" during boom times and release them when appropriate. In practice, this is unlikely to be a good idea for a range of reasons, including the distinction

20. In this regard, some evidence for Denmark exists. Pedersen and Ravn (2014) use an estimated DSGE model with a fiscal rule that stabilises the output gap and inflation and study ex-ante versus ex-post fiscal recommendations. One key finding is that for several years in the aftermath of the Financial Crisis, an analysis based on real-time data as well as real-time economic projections made by Danmarks Nationalbank would have called for a fiscal tightening, whereas an ex-post analysis would have suggested a substantial fiscal expansion.

between idiosyncratic and aggregate uncertainty and insurance, the fact that anticipation effects may erode the marginal propensity to spend the money, and other potential precautionary effects. A better case can probably be made for direct cash transfers from the government to households. Various forms of this policy have been implemented in the last three recessions in the US, with some success (see, e.g., Parker *et al.*, 2013). In addition, an empirical study of the SP release has found high marginal propensities to spend in Denmark, too (Kreiner *et al.*, 2019). Finally, while such transfers require a certain amount of fiscal space, this constraint currently does not appear to be a major issue for Denmark.

Another type of unconventional fiscal policy is to impose a temporary reduction in value-added taxes (VAT) to induce households to bring consumption forward in time. In theory, such a policy essentially works like an expansionary monetary policy (e.g., D'Acunto *et al.*, 2018). A recent empirical study documents large stimulative effects on consumer durables from a VAT reduction in Germany in 2020, indicating that this policy was largely successful (Bachmann *et al.*, 2023). The obvious caveat when applying these results to the Danish economy is that Denmark produces far fewer consumer durables than Germany. As a result, a reduction in the Danish VAT may end up stimulating the German or Swedish economy rather than domestic economic activity. However, given the recent German experience, it would be wise to estimate the amount of "leakage" associated with such a policy in a Danish context (again, ideally, well before the next recession hits).

Finally, in recent work (Druedahl *et al.*, 2022), my co-authors and I use an open-economy New Keynesian model with heterogeneous households and two sectors to study the policy response to foreign demand shocks. One key takeaway is that a fiscal devaluation – in the form of an increase in VAT combined with a reduction in the payroll tax or a higher employment subsidy – may be a very successful stabilisation policy under a fixed exchange rate regime. We show that conventional fiscal policies may stimulate the domestic non-tradeable sector but at the expense of the tradeables sector due to the associated appreciation of the terms of trade. Instead, a fiscal devaluation successfully mimics a monetary expansion, as it depreciates the terms of trade at the same time as stimulating the non-tradeable sector. Our findings, therefore, suggest adding fiscal devaluations to the standard fiscal policy toolkit in small open economies with a fixed exchange rate (or in a currency union).

In conclusion, Andersen (2024) provides a profound reflection on Denmark's fiscal policy over time. While certain dimensions merit further exploration, the paper serves as a useful starting point for further discussion of the country's fiscal toolkit.

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Nordic Economic Policy Review 2024

Automatic Fiscal Stabilizers in Finland 1993–2021

Jenni Kellokumpu, Leena Savolainen, Simo Pesola

Abstract

During the last three decades, Finnish Governments have sought to improve incentives to work by lowering income tax on earnings and reforming social security. While these reforms have improved incentives to work, they can have a detrimental effect on the automatic stabilisation of the economy via public spending and taxes, which calls for more discretionary fiscal policy during economic fluctuations. We estimate the size of Finland's automatic stabilisers 1993–2021 using annual tax and benefit rules as well as macrodata and microdata for general government taxes and expenditure. Our findings suggest that the automatic stabilisers have not changed significantly as a result of policy decisions: the estimate of the budgetary semi-elasticity for Finland has been close to 0.5 during the whole period. This means that the budget-to-GDP ratio changes by 0.50 percentage points for a 1% increase in GDP. Our interpretation of this result is that the reforms have been relatively moderate and that the effects of reforms, which have weakened automatic stabilisers, have been partly offset by the effects of such reforms, which have contributed positively on automatic stabilisers.

Keywords: Automatic fiscal stabilisers, business cycle, make-work-pay policies, economic policy, budgetary semi-elasticity

JEL Classification: E65, E62, J68, J65

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Summary

We find that during the period analysed, the budgetary semi-elasticity increased from 0.46 in 1993 to a peak of 0.50 in 1997, after which it declined continuously until it reached 0.42 in 2008. From then on, the semi-elasticity gradually increased, and in recent years, it has remained close to the 2021 estimate of 0.47. The hike from 1993 to 1995 can be traced back mainly to the increase in corporate income tax revenue at the time. The average tax rate for wage income fell steadily from 1996 to 2009, which contributed to the decrease in the semi-elasticity during that period. However, this was partly offset by the increased progressivity of wage income taxation in the 2000s. At the same time, expenditure on unemployment benefits decreased largely due to lower unemployment, and consequently its contribution to the semi-elasticity also decreased. From the financial crisis of 2008–2009 until 2021, wage income tax rates went up slightly, especially at the higher income levels. At the same time, however, policies designed to improve incentives to work resulted in lower tax rates for low-income levels. This has made taxation more progressive, resulting in a rise in the overall wage income taxation and translating into a higher estimate of the budgetary semi-elasticity. Other contributing factors to higher budgetary semi-elasticity in 2008–2021 included the fact that spending on unemployment started to rise again after 2008 as unemployment went up and that there was a significant one-off rise in the level of unemployment benefits in 2012. Revenue from VAT has also risen markedly during the last 15 years as the rate has gone up by two percentage points, which has contributed to a higher level of semi-elasticity.

1 Introduction

The term automatic fiscal stabilisers refers to the elements of government expenditure and revenue that change automatically in response to business cycles. They have a counter-cyclical effect, smoothing out the effects of economic fluctuations. Automatic stabilisers work without explicit government interference. However, their size is affected by political decisions regarding revenue and expenditure-related legislation. Finnish governments have spent the last three decades trying to improve incentives to work by lowering tax on earned income and by reforming social security in an attempt to improve the public finances.

In this study, we estimate the size and evolution of automatic fiscal stabilisers in Finland in the period 1993–2021. We adopt the methodology first used by Girouard and André (2005), who estimated the size of the automatic stabilisers by calculating a budgetary semi-elasticity. The budgetary semi-elasticity measures the sensitivity of the budget balance to economic fluctuations as a percentage point change in the budget balance-to-GDP ratio to a one percentage point change in the business cycle, which is measured by the output gap.[21] The overall budgetary semi-elasticity is a combination of the elasticities of four tax categories (direct income tax, corporate income tax, payroll tax and indirect taxes) as well as primary expenditure. The methodology decomposes the different elasticities into structural and cyclical parts, the former reflecting tax and benefit rules, the latter examining how the tax and benefit aggregates respond to economic fluctuations.

We find that during the period analysed, the budgetary semi-elasticity increased from 0.46 in 1993 to a peak of 0.50 in 1997, after which it declined continuously until it reached 0.42 in 2008. From then on, the semi-elasticity gradually increased, and in recent years, it has remained close to the 2021 estimate of 0.47. The hike from 1993 to 1995 can be traced back mainly to the increase in corporate income tax revenue at the time. The average tax rate for wage income fell steadily from 1996 to 2009, which contributed to the decrease in the semi-elasticity during that period. However, this was partly offset by the increased progressivity of wage income taxation in the 2000s. At the same time, expenditure on unemployment benefits decreased largely due to lower unemployment, and consequently its contribution to the semi-elasticity also decreased. From the financial crisis of 2008–2009 until 2021, wage income tax rates went up slightly, especially at the higher income levels. At the same time, however, policies designed to improve incentives to work resulted in lower tax rates for low-income levels. This has made taxation more progressive, resulting in a rise in the overall wage income taxation and translating into a higher estimate of the budgetary semi-elasticity. Other contributing factors to higher budgetary semi-elasticity after 2008 included the fact that spending on unemployment started to rise again after 2008 as unemployment went up and that there was a significant one-off rise in the level of unemployment benefits in 2012. Revenue from VAT has also risen markedly during the last 15 years as the rate has gone up by two percentage points, which has contributed to a higher level of semi-elasticity.

Our results differ to some extent from the previous estimates for Finland. Previously, the budgetary semi-elasticity for Finland has been estimated by the OECD and the European Commission. By applying the 1991 tax code information to the 1991 distribution of income, Giorno et al. (1995) found that Finland's budget semi-elasticity was 0.5. This estimate was revised to 0.63 when the 1996 tax code information was

21. A semi-elasticity applies to a ratio, while an elasticity applies to a level (absolute number or monetary amount). The semi-elasticity reflects the impact of the business cycle both on the numerator and on the denominator of the budget balance ratio. (Mourre et al. 2019)

applied to the 1992 distribution of income by Van den Noord (2000). Later, the elasticity was again revised to 0.48 by Girouard and André (2005) based on the tax/benefit position of households in 2003 and the income distribution data for 2001, and then once again to 0.55 by Price et al. (2015) based on the income distribution and tax and benefit codes of 2011. The European Commission's budgetary semi-elasticity for Finland was 0.574 in 2014, estimated by Mourre et al. (2014), and updated to 0.582 in 2019 (Mourre et al. 2019). Our article differs from these others in several aspects: we use annual tax and benefit codes, which give a more reliable picture of the size of the automatic stabilisers in that year. This allows us to see the trends for the automatic stabilisers over time and provides up-to-date information on budgetary semi-elasticity by using the latest available tax and benefit rules for 2021. In addition, we only use single-earner households, whereas previous studies have used either couples with two children or an average of the estimates of different types of households. Our calculations point to a slightly lower level of budgetary semi-elasticity than the other estimates, which may be due to the reasons mentioned above.

It is interesting to compare the estimated size of the automatic stabilisers to the estimates for Sweden calculated by Almenberg and Sigonius (2021). They find that the budgetary semi-elasticity in Sweden was roughly 0.5 throughout the period 1998–2019, although it fell slightly 1998–2009. They conclude that in Sweden, the "make-work-pay" policies increased the progressivity of taxation and cut the overall income tax revenue of GDP. At the same time, government spending on unemployment benefits fell. It is not surprising that the automatic stabilisers are of the same magnitude in both countries since Finland and Sweden are very similar Nordic countries with relatively generous unemployment benefit payments, progressive taxation and similar average tax rates. Both countries have also spent the last two decades focusing on improving incentives to work by reducing taxes on low incomes.

By comparing our results to the ones derived from the European Union's fiscal surveillance, we show that the budgetary semi-elasticity estimate used by the European Commission is tilted towards the higher end of the range. The budgetary semi-elasticity is used to calculate the cyclically adjusted budget balance, which has played a key role in fiscal surveillance. Despite the relatively high semi-elasticity estimate by the European Commission, the structural balance estimates calculated with our semi-elasticity and with the one used by the European Commission do not differ significantly in most years. However, in 2007 and 2008, there is a difference of more than 0.5 percentage points stemming from different semi-elasticity estimates. Within the context of the European Union's fiscal surveillance and fiscal rules, differences of this magnitude are meaningful and, in certain circumstances, could lead to differing interpretations of compliance with the fiscal rules.

The paper starts with an overview of the main big policy reforms related to automatic stabilisers in Finland in the period 1993–2021 (Section 2). The data is then used to analyse the trend for budgetary semi-elasticity (Section 3). This is followed by a closer

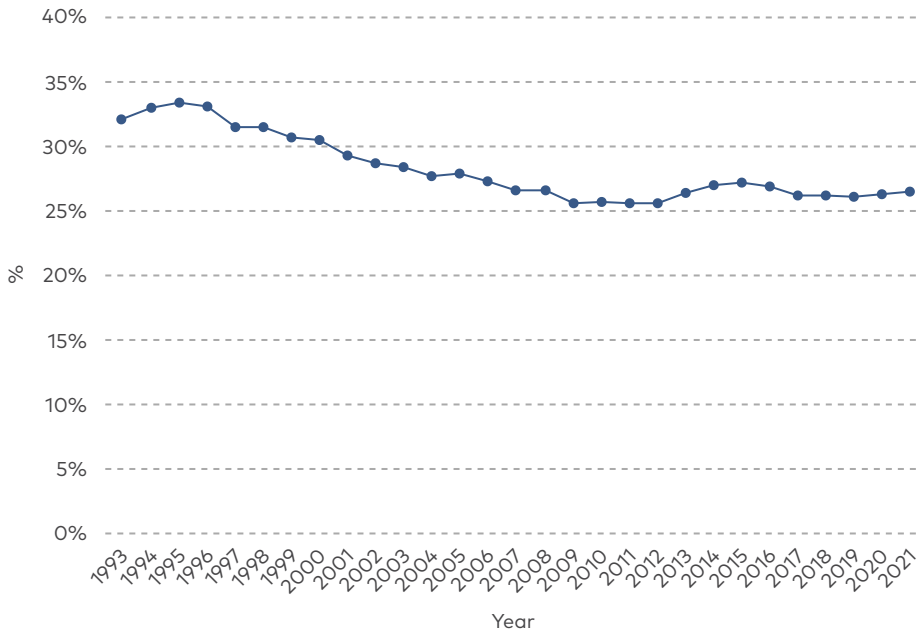
look at the different components of the budgetary semi-elasticity over time (Section 4). Finally, we assess the role of automatic stabilisers in Finland and provide some concluding remarks (Section 5).

2 Policy reforms

2.1 Taxation

Wage income taxation was raised significantly during the recession in the early 1990s. The average tax rate for a full-time worker peaked in 1995 (figure 1). From 1996, the tax rate started to decline as the state income tax rates and the social insurance contribution rates were lowered, and the municipal earned income tax deduction increased. In addition, earned income tax credits were introduced for the first time in 2006 and replaced by a similar work credit in 2009. The continuous decline of the average wage income tax rate ended in 2009, after which it has stayed at a similar but slightly rising level. (For further details, see, e.g. Kirkko-Jaakkola 2022.)

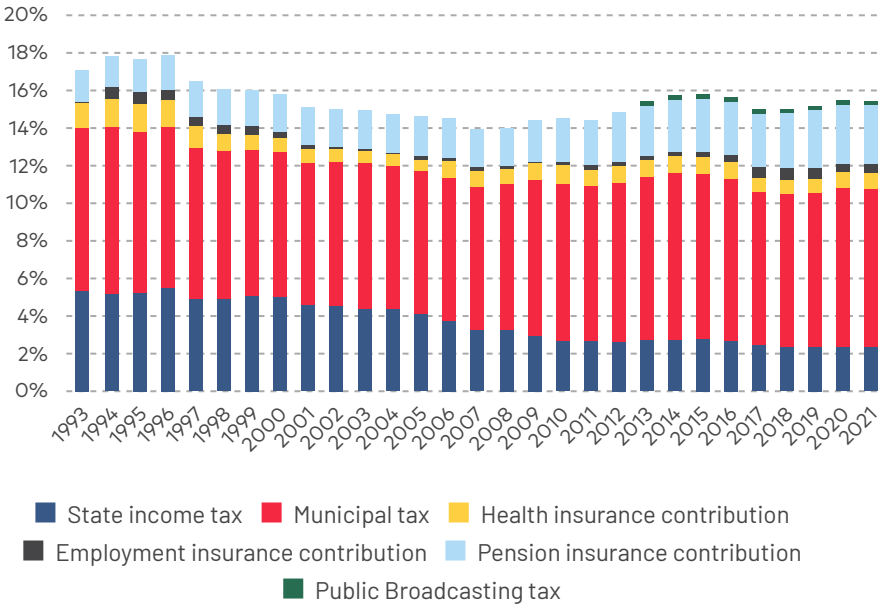
Figure 1. Average tax rate for median income full-time worker



Note: The tax rates are calculated for a median yearly wage income corresponding to €36,266 in 2019 as per the index of wage and salary earnings. Source: Finnish Microsimulation model (SISU), own calculations

Figure 2 shows the income tax revenue and compulsory social security contributions for 1993–2021 of GDP. The make-work-pay policies of previous governments have aimed at reducing wage-income taxation and shifting the focus of taxation to consumption. We can see that national income tax revenue fell, but this was offset to a large extent by the higher municipal income taxes and pension insurance contributions. The average municipal tax rate rose from 17.20% to 20.02% and employees' pension contributions went up from 3% to 7.15% in the period 1993–2021.

Figure 2. Wage-income taxes and contributions 1993–2021, % of GDP



Source: Statistics Finland

Capital income tax rates varied between 25% and 29% from 1993–2011. In 2012, the capital income tax rate was increased from 28% to 30% and changed from a flat tax to a progressive one: capital income exceeding €50,000 was taxed at 32%. In 2014, the threshold was lowered to €40,000 and a year later to €30,000, and the rate was increased to 34% for income exceeding the threshold. There was also a wealth tax for the highest income decile between 1993 and 2005. For example, the tax rate was 0.8% for net assets above €250,000 in 2005. However, the wealth tax was abolished in 2006, and the focus of taxation was transferred from share ownership to share dividends. The corporate income tax rate was reduced from 29% to 26% in 2006, to 24.5% in 2012 and to the current 20% in 2014 as a response to cuts in corporate tax rates in other European countries.

Value-added tax (VAT) was introduced in 1994 at a rate of 22%. All value-added tax categories were raised by one percentage point to boost government tax revenue in 2010 and 2013. The current 24% level is one of the highest in the euro area. However, there are lower rates for some items. For example, food, restaurants and catering services are taxed at 14%, whereas alcohol and tobacco are taxed at the standard rate of 24%. Pharmaceutical products, books, newspapers and cultural events are subject to a VAT rate of 10%. In addition, some business operations, such as health care and medical services, are VAT-exempt.

Currently, a little over a third of all general government tax revenue comes from income taxes, a third from consumption taxes and less than a third from social security contributions.

2.2 Unemployment Benefit System

The Finnish unemployment benefit system has been changed in recent decades, with the occasionally contradictory aims of improving income security, boosting employment, improving incentives to work and cutting government expenditure. This has resulted in a relatively complex system.

The current set-up is based on the 1984 reform, which created a system of two benefits: basic unemployment benefit and earnings-related benefit, the latter requiring a predetermined employment history as well as membership of an unemployment fund. In the 1990s, cuts were made to unemployment benefits to restrain the growth of public expenditure and to encourage the unemployed to join the labour market. In 1994, a third benefit, the labour market subsidy, was introduced. The labour market subsidy was meant for those who have used up the maximum amount of basic unemployment benefit or earnings-related benefit or do not have the employment history required for these benefits, and it is paid for an indefinite period.

The turn of the millennium marked a period of relaxation of eligibility conditions and increases in benefit levels (for a more comprehensive description of the changes in unemployment benefits, see Kyyrä et al. 2017). Since the financial crisis, the eligibility rules and the level of unemployment benefits have been both relaxed and tightened. A significant one-off increase of €100 per month was made to all three benefits in 2012.

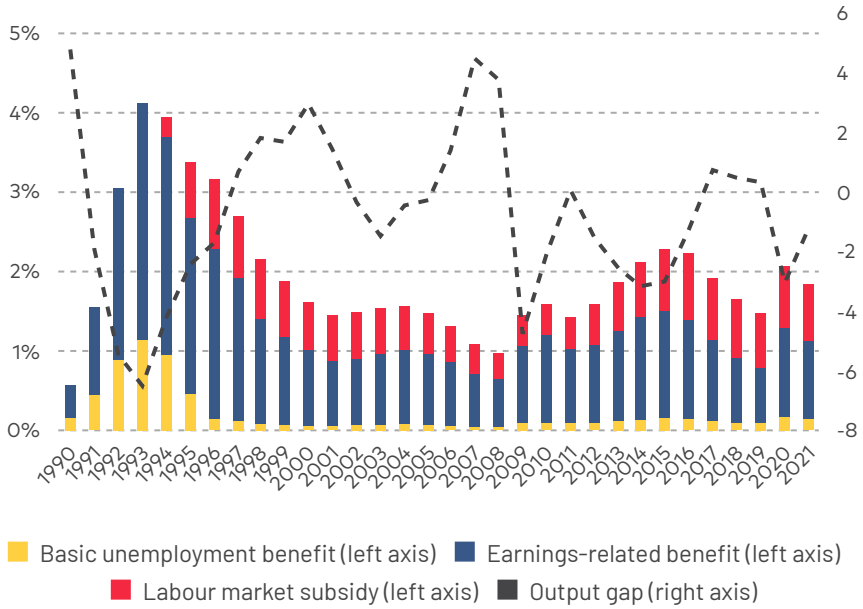
To boost employment, earnings relief, which had been in effect from 1985 to 1997, was re-introduced in 2014 and at a higher level than previously. This means that it is possible to earn €300 per month without losing unemployment benefits. Income above €300 reduces benefits by 50% of the amount earned. In 2017, the duration of earnings-related unemployment benefits was shortened from 400 days to 300 days for those with an employment history of fewer than three years and from 500 to 400 days for those with more than three years of employment history. However, unemployed persons over 58 years of age and with an employment history of at least five years

during the past 20 years were still entitled to 500 days of earnings-related unemployment benefit. In 2017, the higher benefits based on a long history of work was also abolished, and the higher replacement rates based on active labour market participation were reduced.

In 2018 and 2019, an "activation model" was in place. The unemployment benefit was cut by 4.65% for the next 65 days if an unemployed person had not been employed or had not participated in job-seeking service for a sufficiently long time during the past 65 days. The waiting period before receiving unemployment benefit has been shortened and lengthened several times in recent years, and it is now five days.

Figure 3 shows fluctuations in unemployment expenditure and the output gap, which measures the business cycle.

Figure 3. Unemployment benefits and output gap 1990-2021



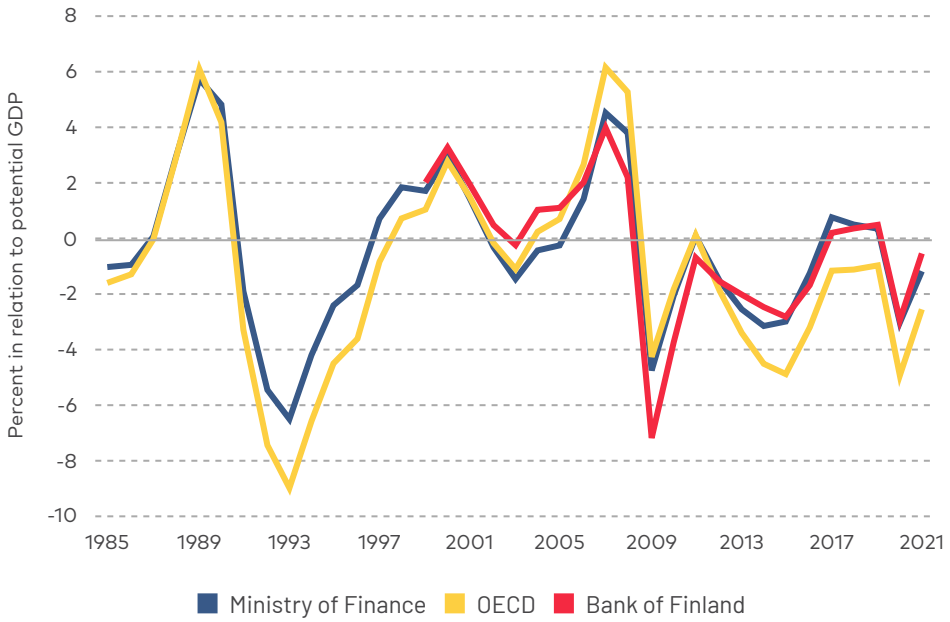
Source: Finnish Institute of Health and Welfare and Ministry of Finance

3 Data for the budgetary semi-elasticity

In the analysis, we use data from Statistics Finland for the national accounts in the years 1987 to 2021. The data includes macroeconomic variables such as GDP, gross operating surplus, compensation of employees, and tax revenue from different tax categories. In addition, the total current primary expenditure is retrieved from the European Commission's AMECO database. Public expenditure on unemployment transfers is based on data from the Social Insurance Institution of Finland, and the unemployment rate is based on data from the Labour Force Survey by Statistics Finland. When calculating the elasticity of direct taxes on labour to its tax base, we approximate the distribution of wage income in 2019 based on registered microdata acquired from Statistics Finland for approximately 800,000 individuals.

In addition, we utilise estimates of the potential output from the Finnish Ministry of Finance. This is based on the EU's commonly agreed methodology (CAM) and is also used by the European Commission. Potential output is needed to estimate the output gap – a measure of the business cycle. The output gap is the difference between actual and potential output, the latter indicating the maximum output of goods and services when the economy is at full capacity. Consequently, during a recession, economic output drops below its potential, creating a negative output gap and, in theory, triggering a potential monetary or fiscal response. Figure 4 shows the output gaps for Finland as estimated by the Finnish Ministry of Finance, the OECD and the Bank of Finland. The estimates of these different institutions are, to a large extent, very similar.

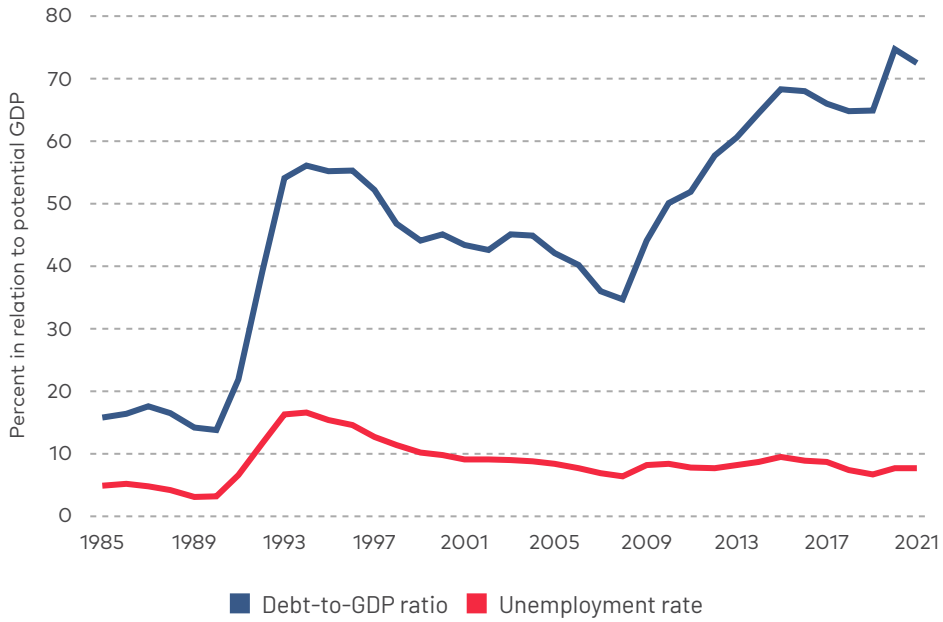
Figure 4. Output gap in Finland 1985–2021



Note: The Bank of Finland's output gap data includes estimates for 1999–2021.
Source: Finnish Ministry of Finance, Bank of Finland and OECD.

Figure 4 also highlights Finland's deep recession in the early 1990s, followed by a rapid recovery and a period of high GDP growth, which was driven by increased productivity and the success of Finnish technology companies – first and foremost, Nokia. While the 2008 financial crisis was nearly as deep, the recovery was more modest, and Finland's export-dependent industries were particularly affected by the global downturn. The following decade of slower growth can be attributed to the global economy's weak recovery, the eurozone crisis, and weaker demand in the euro area, which affected the Finnish export industry negatively. In the latter half of the decade, the Finnish economy grew more robustly, with GDP growth and employment rates trending upward. However, despite structural reforms to improve competitiveness, unemployment remained higher since the financial crisis of 2008–2009 than before the crisis, and the general government debt-to-GDP ratio shows an upward trend (Figure 5). As seen in Figure 4, the coronavirus pandemic was a much smaller hit to the Finnish economy than the crisis of the early 1990s and the financial crisis of 2008.

Figure 5. Debt-to-GDP ratio and unemployment rate in Finland, 1985–2021



Source: Statistics Finland

The budgetary semi-elasticity measures the percentage point change in the budget balance-to-GDP ratio to a one percentage point change in the output gap (see the Appendix for the equation). As described above, the output gap is a measure of the business cycle, denoted by the difference between actual and potential output, the latter indicating the maximum output of goods and services when the economy is at full capacity. During a recession, economic output drops below its potential and, in a boom, rises above it.

During the period studied from 1993–2021, we estimate that the budgetary semi-elasticity first increased from 0.46 in 1993 to a peak of 0.50 in 1997, after which it declined continuously until it reached 0.42 in 2008. From then on, the semi-elasticity has gradually increased, and in recent years it has remained close to the 2021 estimate of 0.47. The increase in the budgetary semi-elasticity between 1993 and 1997 means that the improvement in the business cycle in 1997 improved the general government deficit-to-GDP ratio more than it would have if the 1993 legislation had been in place. The output gap improved by 2.4 percentage points between 1996 and 1997, leading to an automatic improvement to the government deficit-to-GDP ratio of 1.2 percentage points. If the budgetary semi-elasticity had been the same in 1997 as in 1993, the

government deficit-to-GDP ratio would have improved by 1.1 percentage points. This illustrates that the estimated increase in automatic stabilisation between 1993 and 1997 was not major. Overall, the change in the size of the budgetary semi-estimates between years is relatively minor throughout the period of 1993–2021. In the next section, we take a closer look at the various components of budgetary semi-elasticity.

4 Tax and expenditure items driving the change in automatic stabilisation

A closer look at the different components of budgetary semi-elasticity offers valuable insight into the cyclical responses of specific tax and expenditure components. It shows which tax and expenditure items drive the cyclical balance within the business cycle. Furthermore, the budgetary semi-elasticities of different tax and expenditure categories highlight the response of individual tax bases to the output gap. In this methodology, the contribution to yearly semi-elasticity estimates is determined by three factors: First, the revenue(expenditure)-to-base elasticity, which highlights how tax revenue and primary expenditure respond to the changes in tax bases and unemployment. Second, the base-to-output gap elasticity, which highlights how the tax bases and unemployment respond to changes in the output gap (a measure of the business cycle). Third, the overall size of individual tax categories and primary expenditure is determined by their share of GDP.

4.1 Revenue elasticities

We estimate elasticities for four revenue categories: direct taxes on labour, payroll taxes (i.e., social security contributions), corporate income taxes and indirect taxes. This requires specifying macroeconomic proxies for the tax bases. On the revenue side, the elasticity of each tax category can be divided into two components: the output elasticity of the relevant tax revenue, which is computed through the elasticity of tax revenues to the relevant tax base and the elasticity of the tax base to the output gap.

The tax estimates are calculated as follows. First, we estimate the elasticity of the specific tax base with respect to the business cycle using time series data (see Appendix for the equations). Second, we calculate, year by year, the elasticity of tax revenues to changes in the tax base, using the tax rules for each specific year. Earned income tax is progressive, but the progressivity has changed over the period 1993–2021. Taking into account the change in the tax system's progressivity is particularly important because more progressive income taxation contributes positively to the overall semi-elasticity estimates (as shown later in the calculations).

4.2 The elasticity of direct taxes on labour to the output gap

When estimating the elasticity of direct taxes on labour to the output gap, the tax base is defined as the sum of wages and salaries, including employers' social security contributions, from the national accounts.

The elasticity of the wage sum to the output gap is 0.68 when estimated for the period 1987–2021, which we use throughout our estimates. This is higher than the sum calculated by Girouard and André (2005), who used the period 1980–2003 and estimated wage sum elasticity to the output gap to be 0.53 for Finland.

Our result implies that wages and employers' social security contributions react more strongly to economic fluctuations than suggested by Girouard and André (2005). However, as shown in Table 1, there are notable differences in the results between different time periods, and the estimates depend on which time periods are used. The elasticity of the wage sum (wages and salaries, including the employer's social security contributions) to the output gap plays an essential part in the analysis since it affects the contribution of both direct taxes on labour and payroll tax to automatic stabilisers. Therefore, smaller estimates of wage elasticity have a decreasing effect on the overall size of the automatic stabilisers.

Table 1. Regression results with different subsamples

Time period	Elasticity $\epsilon\beta_w$
1987–2021	0.68* (0.31)
1987–1995	1.20* (0.41)
1995–2005	0.54* (0.20)
2000–2021	0.32 (0.19)
2016–2021	0.83* (0.38)

Note: Standard errors are reported in parentheses. Significance level: **p<0.01, *p<0.05. The Durbin–Watson test indicates a minor positive correlation in the error term.

Next, we estimate the elasticity of earned income taxes, including employees' compulsory social security contributions, to the wage sum. This can be calculated as the ratio between the marginal and average tax rates as in Girouard and André (2005).

We use the Finnish SISU microsimulation model and the tax codes for each year included in the model to calculate the average and marginal tax rates for the years 1990–2021. The average tax rate includes the state income tax, municipal tax, health insurance contribution, pension insurance contribution, unemployment insurance contribution and public broadcasting tax. As in Almenberg and Sigonius (2021), the average and marginal tax rates are evaluated for single-earner households with an income of $\left\{0.01\hat{W}, 0, 02\hat{W}, \ldots 8.00\hat{W}\right\}$, were $\hat{W}$ denotes the median income for the year t.

The income distribution of full-time workers in single-earner households aged 15–74 in 2019 is used for each year, but it is adjusted using the wage and salary earnings index. Hence, our calculation of the marginal and average tax rates based on the median income of 2019 relies on the assumption that the shape of the income distribution was constant between 1993 and 2021. In the baseline estimate, we assume the individual works full-time and the income is solely wage income. At each wage level, we calculate the marginal tax rate by increasing wages proportionally by 5%.

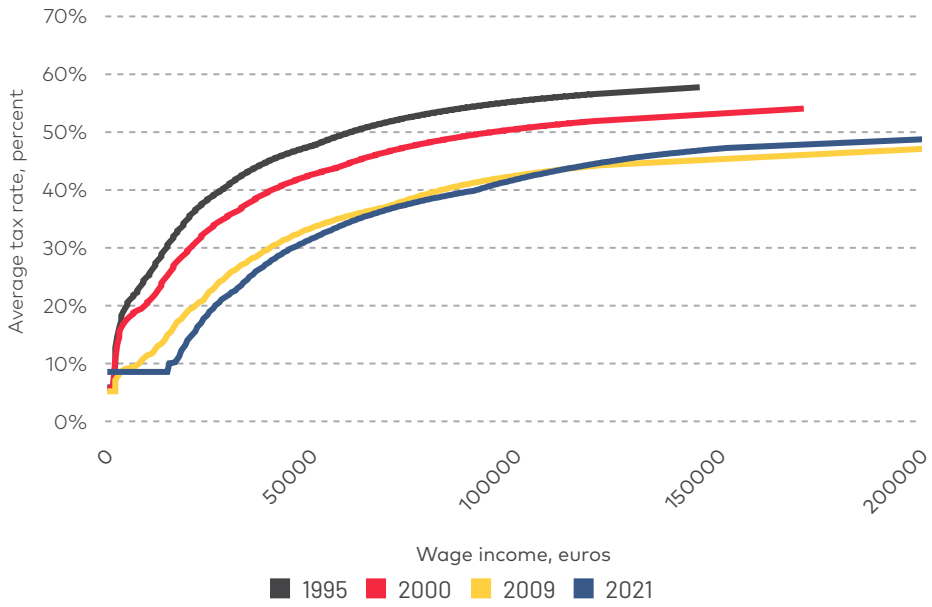
Table 2 shows the average tax rate, the marginal tax rate, and the elasticity of personal income tax on wages to the wage sum for the years 1993–2021. The average tax rate decreased significantly after 1995, to its lowest point in 2009 at 25.2%, and then increased somewhat to 26% in 2021 (see also Figure 5 for the average tax rates at different income levels). The marginal tax rate followed a similar pattern (see also Figure 6 for the marginal tax rates at different income levels). However, figures 5 and 6 show that the average and marginal tax rates have decreased more for lower income levels than for higher income levels during the period studied. As a result, the elasticity of personal income taxes has risen from 1.5 to 1.7 over the period 1993–2021 (Table 2).

Table 2. Marginal tax rate, average tax rate and the elasticity of direct taxes on labour to the wage sum

	Marginal tax rate (%)	Average tax rate (%)	Elasticity, ϵ_{τ_W}
1993	46.6	31.9	1.5
1994	47.8	32.9	1.5
1995	47.8	33.3	1.4
1996	47.2	32.9	1.4
1997	45.2	31.3	1.4
1998	45.2	31.4	1.4
1999	44.6	30.6	1.5
2000	44.4	30.4	1.5
2001	43.4	29.1	1.5
2002	42.8	28.4	1.5
2003	42.4	28.0	1.5
2004	42.0	27.3	1.5
2005	42.1	27.5	1.5
2006	41.5	26.9	1.5
2007	40.9	26.5	1.5
2008	40.9	26.4	1.6
2009	40.3	25.2	1.6
2010	40.6	25.3	1.6
2011	40.7	25.3	1.6
2012	41.1	25.1	1.6
2013	41.7	25.9	1.6
2014	42.3	26.4	1.6
2015	42.6	26.6	1.6
2016	42.9	26.3	1.6
2017	42.3	25.7	1.6
2018	42.3	25.7	1.6
2019	42.4	25.6	1.7
2020	43.0	25.8	1.7
2021	43.3	26.0	1.7

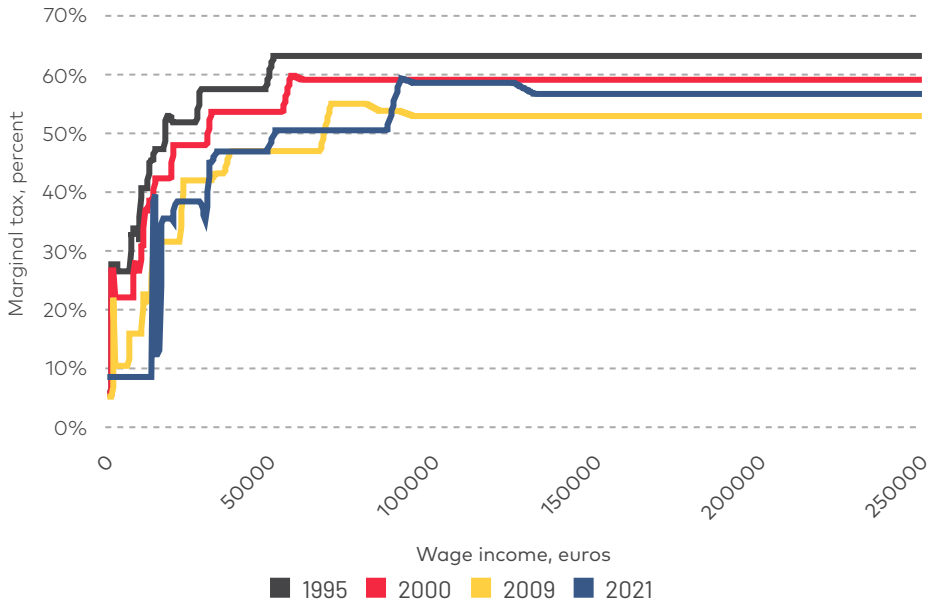
Note: The marginal and average tax rates are population averages weighted by earnings. The elasticity is the ratio between the marginal and average tax rate. Source: Finnish Microsimulation Model (SISU) and own calculations.

Figure 6. Average tax rates in 1995, 2000, 2009 and 2021



Source: Finnish Microsimulation Model (SISU) and own calculations

Figure 7. Marginal tax rates in 1995, 2000, 2009 and 2019



Source: Finnish Microsimulation Model (SISU) and own calculations

As an alternative approach, we also estimate the average and marginal tax rates in 2019, using the SISU model's register-based data, for each person aged 15 to 74, whether employed, unemployed or outside the labour force, excluding pensioners. The alternative approach produces a lower median marginal tax rate (38.1%) and median average tax rate (16.2%) than the baseline estimate (42.4% and 25.6%, respectively). The lower tax rates are explained by the composition of the individuals covered by the calculation and the differences in income compared to the baseline estimate. In the baseline results, the marginal and average tax rates are population averages weighted by earnings, which are relatively high since the sample consists of individuals who have been in full-time employment for the whole year. The median income level in the alternative approach is significantly lower. The elasticity of personal income taxes to the tax base, $\epsilon_{\tau W}$, is higher (2.3) in the alternative approach than in the baseline result (1.7). Using this higher elasticity produces an estimate of 0.52 for the budgetary semi-elasticity, i.e. the size of automatic stabilisers, compared to the baseline estimate of 0.45.

Table 3. Median marginal and average tax rates of the working-age population aged 15 to 74 (excluding pensioners) in 2019.

	Mean marginal tax rate (%)	Mean average tax rate (%)	Elasticity $Y\,\epsilon_{\tau W}$	Automatic stabilisers
2019	38.1	16.2	2.3	0.52

Source: Finnish Microsimulation Model (SISU) and own calculations

4.2.1 Payroll taxes

The elasticity of payroll taxes to the output gap is calculated as a product of the elasticity of the wage sum to the output gap and the elasticity of payroll taxes to the wage sum. The latter is assumed to be 1 since social security contributions are levied at a flat rate and are not capped in Finland. This elasticity is then multiplied by the aggregate cyclical elasticity of the wage bill calculated earlier. Hence, the elasticity of payroll taxes to the output gap has the value 0.68.

4.2.2 Corporate income tax

The elasticity of corporate income tax to the output gap is derived from the profit share in GDP and the wage sum elasticity to the output gap. The profit share in the economy shows broadly how much of the value added is distributed as gross profits in

the economy instead of as wages and salaries The elasticity of corporate income tax revenue to the tax base (defined as gross profits) is assumed to be proportional. This assumption is justified by the corporate tax being paid at a single statutory rate. Therefore, cyclical fluctuations only affect corporate profits. The elasticity is then defined using the elasticity of the wage sum to the output gap but with an opposite sign. Defined in this way, the profit share has varied around 40% of GDP during the period of time studied, and we assume an average value of 0.386 for our profit share, which is one percentage point higher than the figure arrived at by Girouard and André (2005). With the values above, the elasticity of corporate income taxes is 1.51.

4.2.3 Indirect taxes

In accordance with Girouard and André (2005), the elasticity of indirect taxes to output gap is set to 1, despite possible caveats. Indirect taxes here include VAT, excise taxes, and taxes on household capital income. Private consumption, which acts as the tax base for VAT and excise duties, can be linked to changes in the business cycle. Revenue from VAT and excise duties is affected by income and can, therefore, be affected by changes in the output gap. However, as per previous literature, we assume no shifts in the consumption pattern between the time periods; therefore, short-term fluctuations in the elasticities to the output gap are not taken into account. The elasticity of tax revenue to the tax base is assumed to be unitary for VAT and excise duties, although these taxes can have progressive or regressive elements. The capital income tax rate in Finland is progressive, but considering the low level of progressivity and the relatively small GDP share, we have stuck with the assumption of unitary elasticity.

The results for individual tax elasticities are summarised in Table 4. Column 1 shows the elasticity of the tax base of direct taxes on labour to the output gap. Column 2 shows the elasticity of direct taxes on labour to the wage sum. The elasticity of direct taxes on labour to the output gap is shown in column 3, and it is a product of columns 1 and 2. The final three elasticities are constant.

Table 4. Revenue elasticities to the output gap

	Elasticity of the wage sum to the output gap	Elasticity of direct taxes on labour to the wage sum	Elasticity of direct taxes on labour to the output gap	Payroll tax	Corporate income tax	Indirect taxes
	ϵ_{β_W}	ϵ_{τ_W}	$\epsilon_{\beta_W} * \epsilon_{\tau_W}$			
	1.	2.	3.	4.	5.	6.
1993	0.68	1.46	0.99	0.68	1.51	1.00
1994	0.68	1.45	0.99	0.68	1.51	1.00
1995	0.68	1.44	0.98	0.68	1.51	1.00
1996	0.68	1.43	0.97	0.68	1.51	1.00
1997	0.68	1.44	0.98	0.68	1.51	1.00
1998	0.68	1.44	0.98	0.68	1.51	1.00
1999	0.68	1.46	0.99	0.68	1.51	1.00
2000	0.68	1.46	0.99	0.68	1.51	1.00
2001	0.68	1.49	1.01	0.68	1.51	1.00
2002	0.68	1.51	1.02	0.68	1.51	1.00
2003	0.68	1.51	1.03	0.68	1.51	1.00
2004	0.68	1.54	1.04	0.68	1.51	1.00
2005	0.68	1.53	1.04	0.68	1.51	1.00
2006	0.68	1.54	1.05	0.68	1.51	1.00
2007	0.68	1.54	1.05	0.68	1.51	1.00
2008	0.68	1.55	1.05	0.68	1.51	1.00
2009	0.68	1.60	1.09	0.68	1.51	1.00
2010	0.68	1.61	1.09	0.68	1.51	1.00
2011	0.68	1.61	1.10	0.68	1.51	1.00
2012	0.68	1.64	1.11	0.68	1.51	1.00
2013	0.68	1.61	1.09	0.68	1.51	1.00
2014	0.68	1.60	1.09	0.68	1.51	1.00
2015	0.68	1.60	1.09	0.68	1.51	1.00
2016	0.68	1.63	1.11	0.68	1.51	1.00
2017	0.68	1.65	1.12	0.68	1.51	1.00
2018	0.68	1.65	1.12	0.68	1.51	1.00
2019	0.68	1.66	1.13	0.68	1.51	1.00
2020	0.68	1.67	1.13	0.68	1.51	1.00
2021	0.68	1.66	1.13	0.68	1.51	1.00

Note: Column (3) is calculated by multiplying columns (1) and (2). Payroll tax (4) to its tax base is assumed to be 1, which is then multiplied by the wage sum elasticity. The elasticity of indirect taxes to both the output gap and its tax base is set to 1.

4.3 Expenditure elasticities

In the next subsection, we calculate the elasticity for the government's total current primary expenditure. Using the same methodology as Girouard and André (2005), we assume unemployment-related expenditure to be strictly proportional to unemployment and the only expenditure that varies with the business cycle. It can be argued that income-related benefits, such as general housing benefit, social security and wage security, are all affected by cyclical fluctuations. However, policy reforms made in the last decade, especially the reform to include students as receivers of housing allowance[22] (t), have weaken their role as automatic stabilisers and resulted in them becoming more like universal welfare benefits. meaning that expenditure on these benefits does not depend on the business cycle.

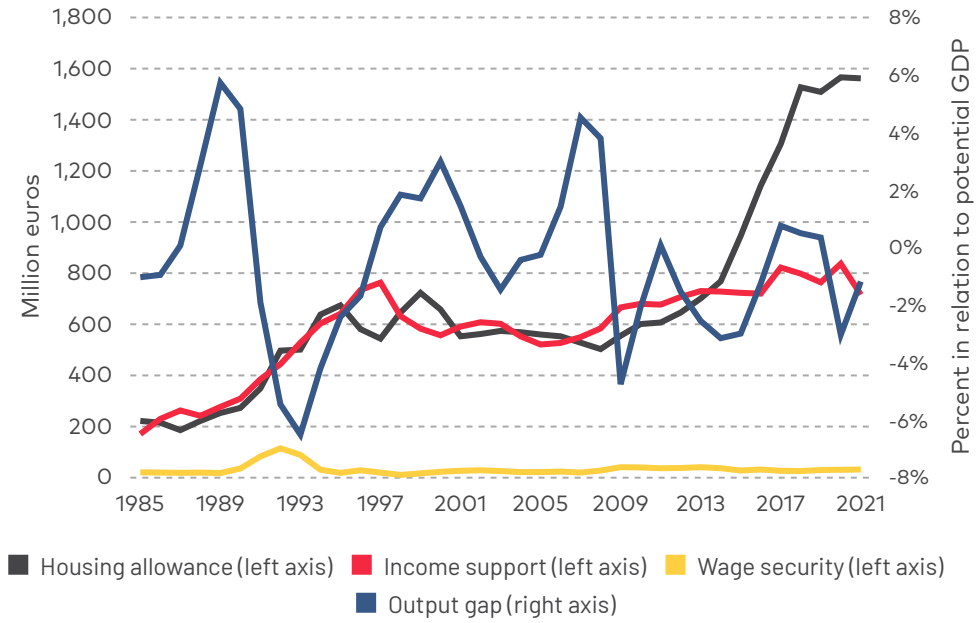
While unemployment benefit expenditure has a robust, negatively correlated relationship with the output gap (Figure 8), the correlation is lower or negligible for housing benefit, social security and wage security (Figure 9). Furthermore, as shown in Figure 9, these items of expenditure, especially the housing allowance, tended to go up during the examined period studied, especially after 2014. This can be recognised despite considerable fluctuations in the output gap. However, in principle, these items of expenditure should decline during economic upturns and thus create fiscal buffers, while the opposite should be the case during downturns and recessions.

22. Housing benefit for pensioners is excluded from the data.

Figure 8. Expenditure on unemployment benefits and the output gap in Finland, 1985–2021 (the values are in 'constant prices')

Source: Finnish Institute of Health and Welfare and Ministry of Finance

Figure 9. Housing benefit, social security, wage security and the output gap in Finland, 1985–2021 (the values are in 'constant prices')



Source: Social Insurance Institution of Finland, Finnish Institute of Health and Welfare and Ministry of Finance

Regarding budgetary semi-elasticity estimates, including these broader benefits automatically increases the semi-elasticity estimates since their contribution as a share of both primary expenditure and of GDP increases. However, if this expenditure is not closely affected by unemployment, its role as an automatic stabiliser can be questioned. We bypass this debate by providing a broader measure of the budgetary semi-elasticity, as shown later in Table 7.

4.4 Expenditure and unemployment gap elasticities

In order to calculate the elasticity of public expenditure to the output gap, we first estimate the elasticity of the unemployment rate to the output gap. Throughout the calculations, we use the mean adjusted NAWRU as our equilibrium unemployment. The adjustment factor for Finland is 0.72; hence, the equilibrium unemployment rate used in the calculations is 0.72 percentage points lower. While equilibrium unemployment can be defined in different ways, we use the Ministry of Finance's estimate of potential GDP, which includes the mean adjusted NAWRU as one of its components. This makes the data in our baseline calculations more consistent. The regression results are presented in Table 5 below.

Table 5. The elasticity of the unemployment gap to the output gap

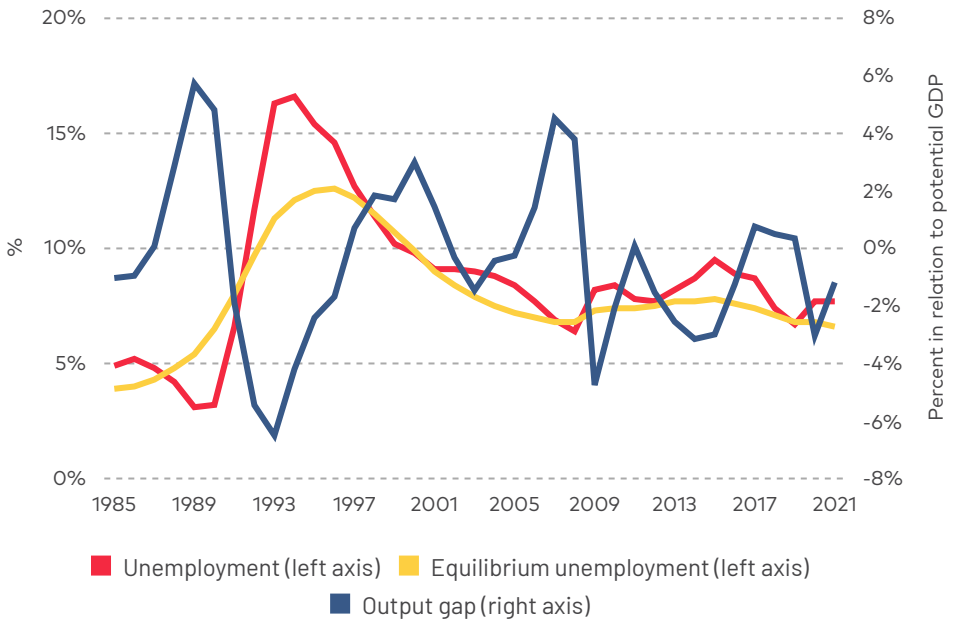
Time period	Elasticity (formel)
1987–2021	-5.02** (0.84)
1987–2008	-5.66** (1.14)
1990–2005	-5.95** (1.44)
1998–2021	-2.13** (0.52)
2008–2021	-2.08* (0.77)

Note: Standard errors are reported in parentheses. Significance level: **p<0.01, *p<0.05. The Durbin–Watson test indicates a minor positive correlation in the error term.

When estimating the elasticity of unemployment to the output gap for the whole period of 1987–2021, the elasticity yields a value of -5.02. The estimates are dependent on the length of the period, and the estimates for different subsamples range from -5.66 to -2.09, the estimates for after 1998 being significantly lower. Girouard and André (2005) estimate the elasticity to be -5.69 for the period 1980–2003. With a

more recent subsample from 1987–2021, we decided to use $\gamma_u = -5.02$ in our baseline estimates. This means that for a one percentage point increase in the output gap, the number of unemployed people falls by approximately by 5%. The elasticity is negative since actual measured unemployment is usually lower than equilibrium unemployment during a cyclical upturn, meaning that the unemployment gap is negative (Figure 9). Since 1997, actual unemployment has been very close to the estimated equilibrium unemployment. In the period after the financial crisis, both the actual and equilibrium unemployment rates have stayed around 7%. In Sweden, the estimated equilibrium unemployment was also around 7% in the 2000s, but the actual unemployment has varied more (Almenberg and Sigonius, 2021).

Figure 10. Unemployment, equilibrium unemployment in Finland, 1985–2021

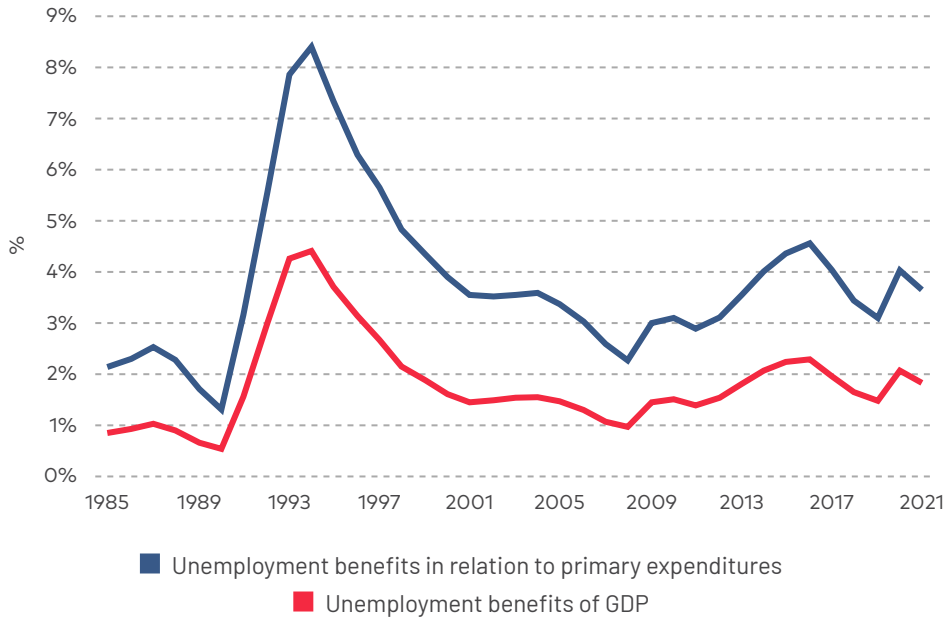


Sources: Ministry of Finance and Statistics Finland.

The expenditure on unemployment benefits has varied of GDP and as a share of primary expenditure (Figure 11.) After the economic crisis in the early 1990s, expenditure on unemployment benefits fell due to a decline in unemployment and overall reductions in unemployment benefits. This decline continued until 2008 when a decade of slow growth led to higher expenditure on unemployment benefits. Table 6 combines data on unemployment, unemployment-related expenditure, elasticities and the average tax rate for 1987–2021. Although affected by the 1990s recession,

expenditure on unemployment benefits as a share of government primary expenditure decreased from 7.6 % to 3.6 % between 1993 and 2021. It should also be noted that the unemployment and equilibrium unemployment levels have increased by over two percentage points during the same period. The results of the expenditure elasticity calculations are shown in Table 6 below.

Figure 11. Unemployment benefits as a share of government expenditure and of GDP



Sources: Statistics Finland, AMECO, Finnish Institute of Health and Welfare and own calculations.

Table 6. Expenditure elasticities

	Elasticity of the unemployment gap to the output gap	Average tax rate	Unemployment expenditure as a share of primary expenditure	Unemployment expenditure net of tax as a share of primary expenditure	Unemployment	Equilibrium unemployment	Inverted unemployment gap	Cyclically adjusted unemployment expenditure	Expenditure elasticity to the output gap
	γ_u	τ_W	$\frac{\sigma}{G}$	$(1-\tau_W)\frac{\sigma}{G}$	U	U*	$\frac{U^*}{U}$	γ_g	γ
	1.	2.	3.	4.	5.	6.	7.	8.	9.
1993	-5.02	31.9	7.6 %	5.18 %	16.3	11.3	0.7	0.036	-0.180
1994	-5.02	32.9	7.5 %	5.04 %	16.6	12.1	0.7	0.037	-0.184
1995	-5.02	33.3	6.7 %	4.45 %	15.4	12.5	0.8	0.036	-0.181
1996	-5.02	32.9	6.3 %	4.26 %	14.6	12.6	0.9	0.037	-0.185
1997	-5.02	31.3	5.7 %	3.92 %	12.7	12.2	1.0	0.037	-0.188
1998	-5.02	31.4	4.8 %	3.32 %	11.4	11.5	1.0	0.034	-0.169
1999	-5.02	30.6	4.3 %	3.01 %	10.2	10.7	1.0	0.031	-0.158
2000	-5.02	30.4	3.9 %	2.72 %	9.8	9.9	1.0	0.027	-0.137
2001	-5.02	29.1	3.6 %	2.52 %	9.1	9.0	1.0	0.025	-0.125
2002	-5.02	28.4	3.5 %	2.52 %	9.1	8.4	0.9	0.023	-0.117
2003	-5.02	28.0	3.6 %	2.56 %	9	7.9	0.9	0.022	-0.112
2004	-5.02	27.3	3.6 %	2.61 %	8.8	7.5	0.8	0.022	-0.111
2005	-5.02	27.5	3.4 %	2.44 %	8.4	7.2	0.9	0.021	-0.105
2006	-5.02	26.9	3.0 %	2.22 %	7.7	7.0	0.9	0.020	-0.101
2007	-5.02	26.5	2.6 %	1.91 %	6.9	6.8	1.0	0.019	-0.095
2008	-5.02	26.4	2.3 %	1.67 %	6.4	6.8	1.1	0.018	-0.090
2009	-5.02	25.2	3.0 %	2.24 %	8.2	7.3	0.9	0.020	-0.101
2010	-5.02	25.3	3.3 %	2.46 %	8.4	7.4	0.9	0.022	-0.109

2011	-5.02	25.3	3.0 %	2.22 %	7.8	7.4	0.9	0.021	-0.106
2012	-5.02	25.1	3.2 %	2.40 %	7.7	7.5	1.0	0.023	-0.118
2013	-5.02	25.9	3.6 %	2.70 %	8.2	7.7	0.9	0.025	-0.127
2014	-5.02	26.4	4.1 %	3.04 %	8.7	7.7	0.9	0.027	-0.136
2015	-5.02	26.6	4.5 %	3.29 %	9.5	7.8	0.8	0.027	-0.136
2016	-5.02	26.3	4.5 %	3.29 %	8.9	7.6	0.8	0.028	-0.140
2017	-5.02	25.7	3.9 %	2.93 %	8.7	7.4	0.8	0.025	-0.124
2018	-5.02	25.7	3.4 %	2.56 %	7.4	7.1	1.0	0.024	-0.123
2019	-5.02	25.6	3.1 %	2.30 %	6.7	6.8	1.0	0.023	-0.117
2020	-5.02	25.8	4.0 %	2.99 %	7.7	6.8	0.9	0.026	-0.133
2021	-5.02	26.0	3.6 %	2.70 %	7.7	6.6	0.9	0.023	-0.117

Note: Column (1) reports the unemployment gap to the output gap. Columns (2) and (3) report the average tax rate and unemployment expenditure as a share of primary expenditure, which is used to calculate unemployment expenditure net of tax in relation to primary expenditure, which is reported in column (4). Columns (5) and (6) report unemployment and equilibrium unemployment, respectively. Column (8) denotes the cyclically adjusted unemployment expenditure, which is calculated by multiplying columns (4) and (7). The expenditure elasticity to the output gap is then calculated by multiplying columns (1) and (8) and reported in column (9).

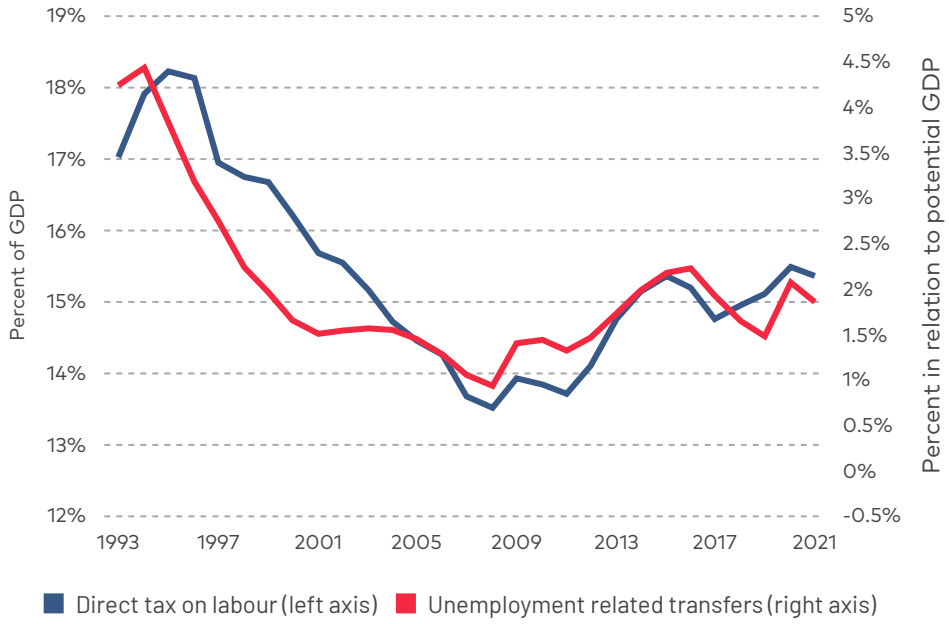
Sources: Statistics Finland, the Finnish Ministry of Finance, AMECO, Finnish Institute of Health and Welfare and own calculations.

4.5 A rise in progressivity and overall wage income taxation and increased spending on unemployment has increased automatic stabilisation after the financial crisis

Table 7 combines the calculated elasticities and their respective weights. During the period studied, the budgetary semi-elasticity estimates first increased from 0.46 in 1993 to a peak of 0.50 in 1997, after which they declined, reaching 0.42 in 2008. From then on, the semi-elasticity estimates gradually increased, and in recent years, they stabilised around the 2021 estimate of 0.47. It should be noted that the shift from 1993 to 1995 can be attributed primarily to the increase in corporate income taxes at the time. The average tax rate for wage income was lowered steadily from 1996 to 2009, which contributed to the decrease in the semi-elasticity. However, this was partly offset by the increased progressivity of wage income taxation in the 2000s. Simultaneously, expenditure on unemployment benefits fell due to lower unemployment and its contribution to the semi-elasticity was reduced proportionally. After the financial crisis, until 2021, the wage income tax rates have been slightly increasing, especially at higher income levels. At the same time, however, policies to improve the incentives to work have resulted in lower tax rates at low-income levels. This adds up as a rise in progressivity as well as a rise in overall wage income taxation and has translated into a higher estimate of budgetary semi-elasticity. Other contributing factors to the higher budgetary semi-elasticity were that unemployment expenditure went up in 2008, and there was higher unemployment and a significant one-off rise in the level of unemployment benefits in 2012.

Figure 12 highlights that both direct tax revenues and unemployment expenditure exhibit a similar general development in terms of their GDP shares, with both declining from 1995 to 2008, followed by a moderate increase in later years. Furthermore, as highlighted in Table 7 below, there is an abrupt 7% increase in the GDP share of the current primary expenditure between 2007 and 2009, reflecting the sharp GDP decline after the financial crisis. In addition, the fact that unemployment did not return to its pre-crisis levels after 2009 contributed to higher expenditure on unemployment benefits.

Figure 12. Direct taxes on labour (incl. employees' social security contributions) and unemployment-related transfers of GDP



Source: Statistics Finland, Finnish Institute of Health and Welfare and own calculations.

Table 7. Summary of elasticities, respective GDP weights, and budgetary semi-elasticity estimates

	Direct taxes on labour			Payroll tax			Corporate income tax			Indirect taxes			Primary expenditure			Automatic stabilisers	
	Elast	GDP share	Contı	Elast	GDP share	Contı	Elasti	GDP share	Contı	Elasti	GDP share	Contı	Elasti	GDP share	Contı	α	$\tilde{\alpha}$
1993	0.99	0.17	0.17	0.68	0.10	0.07	1.51	0.01	0.01	1.00	0.13	0.13	-0.18	0.54	-0.10	**0.46**	**0.49**
1994	0.99	0.18	0.18	0.68	0.10	0.07	1.51	0.01	0.01	1.00	0.13	0.13	-0.18	0.52	-0.10	**0.48**	**0.51**
1995	0.98	0.18	0.17	0.68	0.10	0.07	1.51	0.02	0.03	1.00	0.13	0.13	-0.18	0.51	-0.09	**0.49**	**0.53**
1996	0.97	0.18	0.17	0.68	0.09	0.06	1.51	0.03	0.04	1.00	0.13	0.13	-0.18	0.50	-0.09	**0.50**	**0.54**
1997	0.98	0.16	0.16	0.68	0.09	0.06	1.51	0.03	0.05	1.00	0.14	0.14	-0.19	0.47	-0.09	**0.50**	**0.54**
1998	0.98	0.16	0.16	0.68	0.09	0.06	1.51	0.04	0.06	1.00	0.14	0.14	-0.17	0.44	-0.07	**0.49**	**0.53**
1999	0.99	0.16	0.16	0.68	0.09	0.06	1.51	0.04	0.06	1.00	0.14	0.14	-0.16	0.43	-0.07	**0.49**	**0.53**
2000	0.99	0.16	0.16	0.68	0.08	0.06	1.51	0.06	0.09	1.00	0.13	0.13	-0.14	0.41	-0.06	**0.49**	**0.52**
2001	1.01	0.15	0.15	0.68	0.09	0.06	1.51	0.04	0.06	1.00	0.13	0.13	-0.13	0.41	-0.05	**0.45**	**0.48**
2002	1.02	0.15	0.15	0.68	0.09	0.06	1.51	0.04	0.06	1.00	0.13	0.13	-0.12	0.42	-0.05	**0.45**	**0.48**
2003	1.03	0.15	0.15	0.68	0.09	0.06	1.51	0.03	0.05	1.00	0.14	0.14	-0.11	0.43	-0.05	**0.45**	**0.47**
2004	1.04	0.15	0.15	0.68	0.08	0.06	1.51	0.03	0.05	1.00	0.13	0.13	-0.11	0.43	-0.05	**0.44**	**0.47**
2005	1.04	0.15	0.15	0.68	0.09	0.06	1.51	0.03	0.05	1.00	0.13	0.13	-0.11	0.44	-0.05	**0.43**	**0.46**
2006	1.05	0.15	0.15	0.68	0.09	0.06	1.51	0.03	0.05	1.00	0.13	0.13	-0.10	0.43	-0.04	**0.43**	**0.46**
2007	1.05	0.14	0.15	0.68	0.08	0.06	1.51	0.04	0.06	1.00	0.13	0.13	-0.09	0.41	-0.04	**0.42**	**0.45**
2008	1.05	0.14	0.15	0.68	0.09	0.06	1.51	0.03	0.05	1.00	0.12	0.12	-0.09	0.43	-0.04	**0.42**	**0.44**
2009	1.09	0.14	0.16	0.68	0.09	0.06	1.51	0.02	0.03	1.00	0.12	0.12	-0.10	0.48	-0.05	**0.42**	**0.45**
2010	1.09	0.14	0.16	0.68	0.09	0.06	1.51	0.02	0.04	1.00	0.12	0.12	-0.11	0.49	-0.05	**0.43**	**0.46**
2011	1.10	0.14	0.16	0.68	0.09	0.06	1.51	0.03	0.04	1.00	0.13	0.13	-0.11	0.48	-0.05	**0.44**	**0.47**
2012	1.11	0.15	0.17	0.68	0.09	0.06	1.51	0.02	0.03	1.00	0.14	0.14	-0.12	0.50	-0.06	**0.45**	**0.48**
2013	1.09	0.15	0.17	0.68	0.09	0.06	1.51	0.02	0.04	1.00	0.14	0.14	-0.13	0.51	-0.06	**0.47**	**0.50**
2014	1.09	0.16	0.17	0.68	0.09	0.06	1.51	0.02	0.03	1.00	0.14	0.14	-0.14	0.52	-0.07	**0.47**	**0.50**
2015	1.09	0.16	0.17	0.68	0.09	0.06	1.51	0.02	0.03	1.00	0.14	0.14	-0.14	0.51	-0.07	**0.47**	**0.50**
2016	1.11	0.16	0.17	0.68	0.09	0.06	1.51	0.02	0.03	1.00	0.14	0.14	-0.14	0.50	-0.07	**0.47**	**0.51**
2017	1.12	0.15	0.17	0.68	0.08	0.05	1.51	0.03	0.04	1.00	0.14	0.14	-0.12	0.48	-0.06	**0.46**	**0.50**
2018	1.12	0.15	0.17	0.68	0.08	0.05	1.51	0.03	0.04	1.00	0.14	0.14	-0.12	0.48	-0.06	**0.46**	**0.50**
2019	1.13	0.15	0.17	0.68	0.07	0.05	1.51	0.03	0.04	1.00	0.14	0.14	-0.12	0.48	-0.06	**0.45**	**0.50**
2020	1.13	0.15	0.18	0.68	0.07	0.05	1.51	0.02	0.03	1.00	0.14	0.14	-0.13	0.51	-0.07	**0.46**	**0.51**
2021	1.13	0.15	0.17	0.68	0.07	0.05	1.51	0.03	0.04	1.00	0.14	0.14	-0.12	0.50	-0.06	**0.47**	**0.51**

Note: Tax elasticities and their respective GDP shares. The contribution to automatic stabilisers is calculated by multiplying each year's elasticity by its share of GDP. Automatic stabilisers are calculated as a sum of the contributions from different tax categories minus government expenditure. α denotes the baseline estimate, where unemployment compensation is the sole expenditure affected by cyclical fluctuations. With $\tilde{\alpha}$, we relax this assumption and include general housing benefit, social security and wage security expenditure in cyclical components.

The elasticities for payroll taxes, corporate income taxes and indirect taxes are assumed to be constant throughout the period studied. As such, they affect the semi-elasticity estimates only via their respective shares of GDP. Payroll taxes and excise duties (included in indirect taxes) have remained fairly stable during the period. VAT revenue (included in indirect taxes) has increased markedly over the last 15 years as the VAT rate has increased by two percentage points, which has contributed to a higher level of semi-elasticity. A trend towards slightly lower corporate income tax revenue can be noted, especially in the last two decades.

Finally, the difference between the estimates in the final two columns is explained by the benefits included in them, which are assumed to be affected by cyclical fluctuations. In our baseline estimates, we only include unemployment benefits. However, in the final column, we also include housing benefit, social security and wage security expenditure. The broader estimate of budgetary semi-elasticity is moderately higher, and the difference varies between 0.03–0.05 compared with our baseline estimates. The higher level of the broader estimate is primarily driven by the housing benefit and social security, which considerably increase both the share of primary expenditure and the GDP share. Thus, they simultaneously affect both the elasticity and the overall weight, determined by the share relative to GDP. This effect was further highlighted in 2014 when earnings disregard was introduced and in 2018 when students were transferred to the general scheme for housing benefit. As mentioned before, unlike unemployment benefits, these benefits are not taxed in Finland and, therefore, are not netted-off tax in the calculations, which further amplifies their contribution. However, the role of housing benefit and social security as automatic stabilisers has weakened over time, and they can be considered more like universal welfare benefits. Hence, we consider our baseline results give a more reliable picture of the size of the automatic stabilisers.

5 Concluding remarks

The size of the automatic stabilisers in Finland changed little in the years 1993–2021. Our findings suggest that while income tax and unemployment expenditure of GDP fluctuated, the effect on the budgetary semi-elasticity was partially offset by their respective elasticities. The analysis also shows that before the 2008 financial crisis, the trend for the annual estimates of automatic stabilisers was downward, after which they increased. Altogether, the estimate of the budgetary semi-elasticity for Finland was close to 0.5 during the whole of the period 1993–2021. This suggests that policy decisions that led to reforms of the tax and benefit systems during those years did not significantly alter the overall size and effectiveness of the automatic stabilisers. This

comes as no great surprise given that Finland maintained the key characteristics of the Nordic welfare state a generous safety net in case of unemployment and relatively high progressivity and overall taxation of labour income despite the reforms made to improve the incentives for work. In fact, after the financial crisis, lower income tax rates for low-income individuals have been financed by higher rates at higher income levels. This adds up to a system of more progressive taxation as well as a rise in overall wage income taxation and makes a positive contribution to the automatic stabilisers. The benefit of strong automatic stabilisers was seen during the COVID-19 pandemic. The progressivity of taxation mitigated the loss of income in case of reduced hours of work or unemployment. Moreover, given that those laid off temporarily were also entitled to unemployment benefits in Finland, the need for discretionary fiscal policy was less obvious than in many other European countries.

In addition, building fiscal buffers by means of automatic stabilisers during economic upswings helps mitigate debt-sustainability risks. However, after the financial and eurozone crises and corona pandemic, the good times in Finland have not been good enough: public debt has risen from 34.7% in 2008 to 73.3% in 2022. The energy crisis due to Russia's war of aggression against Ukraine and the resultant high inflation have improved public finances through increased tax revenue. This has more than offset the temporary spending measures to compensate high energy prices for households and aid to Ukraine and the permanent measures introduced for national contingency planning. However, the improvement in the general government budgetary position in 2021 and 2022 was only temporary. The general government deficit significantly weakened in 2023 to 2.5 % due to stalled economic growth and inflation-driven growth in public expenditure. The forecast of Ministry of Finance (2023) is that the deficit will grow to 3.5% of GDP in 2024 driven by weak economic and employment growth and slow growth in tax revenue. The medium-term outlook for the public finances is also alarming. With the rising costs of ageing and servicing debt, public debt is projected to rise to over 85% by 2028 (Ministry of Finance, 2023). Such a rise calls for measures to increase employment – even at the expense of automatic stabilisation.

The economic and fiscal policy of Prime Minister Petteri Orpo's government (formed in June 2023) seeks to bolster the public finances and reverse the debt trend. According to the Programme of Prime Minister Petteri Orpo's Government, measures will be taken to improve the public finances, boost growth and jobs and cut spending. The goal is to increase the number of people in work by 100,000. To this end, taxation of earned income will be reduced for low and medium earners to improve the incentives to work. This will be achieved by increasing the earned income deduction and introducing an additional earned income deduction for each child. On the other hand, the eligibility conditions for unemployment benefits will be tightened. The government also plans to cut earnings-related benefit to 80% of the maximum after eight weeks of

unemployment and to 75% after 34 weeks and to abolish child supplements to unemployment benefits. Although these policies to make work pay are perhaps the most stringent ones since the 1990s, their effect on the size of the automatic stabilisers is likely to be moderate. Greater progressivity in earned income taxation will make a positive contribution to the budgetary semi-elasticity. However, this will probably be offset by the tightening of the eligibility conditions for unemployment benefits and cuts to the level of the benefits.

Comparing our results with those from Sweden (Almenberg and Sigonius 2021), we find similarities in how different policies have affected the semi-elasticity estimates. Particularly regarding income tax elasticities, increased progressivity, and income tax revenue and primary expenditure prior to the financial crisis. Additionally, both studies conclude that despite reforms, automatic stabilisers have not been impaired to any great extent. The main difference within the estimates can be traced to post-2008, when our results show that Finland's expenditure on unemployment benefits and income tax revenues of GDP started to return to higher levels, positively affecting the overall semi-elasticity estimates. In Sweden, income tax revenue of GDP has remained at a fairly stable level since the financial crisis. In addition, the income tax progressivity, which contributes to the semi-elasticity, has been more modest than in Finland. Regarding unemployment expenditure, Almenberg and Sigonius (2021) documented a clear and rather substantial fall in spending on unemployment benefits. However, although Finland has implemented multiple reforms to unemployment insurance, this has only led to a slight fall in its overall contribution to the semi-elasticity.

Comparing our results to previous studies in Finland, we note some variation between the semi-elasticity estimates. To a large extent, our baseline estimates are lower (Table 8). While there is some methodological divergence, the sources of these differences can be partially explained by assumptions made regarding underlying estimates and the elasticity estimates to the output gap. On top of that, as well as the periods and subsamples used, estimating the empirical relationship between the cyclical components of the tax bases is sensitive to how we measure variables that are not directly observable, such as the output gap and equilibrium unemployment, are measured. Furthermore, the calculations for income tax elasticities are affected by the type of representative family chosen.

Table 8. Semi-elasticity estimates from previous literature

Author(s)	Year	Estimate	Our estimate (Broader definition)
Giorno (1995)	1991	0.50	
Van den Noord (2000)	1999	0.63	0.49 (0.53)
Girouard & André (2005)	1996	0.55	0.50 (0.54)
	2000	0.46	0.49 (0.52)
	2003	0.48	0.45 (0.47)
Mourre et al. (2014)	2014	0.57	0.47 (0.50)
Price et al. (2015)	2011	0.55	0.44 (0.47)
Mourre et al. (2019)	2019	0.58	0.45 (0.50)
Our alternative approach	2019	0.52	

Note: Our alternative approach refers to our estimate where the elasticity of direct taxes is calculated using SISU register-based data for all individuals aged 15 to 74, whether employed, unemployed or outside the labour force, excluding pensioners.

The differences in individual elasticities and overall semi-elasticity between our estimates and those of Girouard and André (2005) stem partially from the different time periods or years used when taking into account that the individual unemployment gap and wage sum elasticities tend to be lower in more recent years. Moreover, we use up-to-date tax and legislation codes for each year and only single-earner households, whereas Girouard and André (2005) only use the 2003 tax/benefit legislation and a married couple with two children and two full-time jobs. In contrast, the studies conducted by Mourre et al. (2014 & 2019) and Price et al. (2015) use a different methodology to calculate total government revenue and expenditure elasticities. They also use cross-country estimates, and their parameters are based on average weights, which are updated every six years; hence, their results can differ from ours due to data revisions and the length of the subsamples.

It is challenging to link policy implementations directly to specific changes to the annual semi-elasticity estimates. It would be valuable, therefore, to complement these similar macro-level estimates with, for example, microsimulations. This would provide more precise information on how alterations to the taxation and benefits system affect the responsiveness of selected tax and expenditure categories. Using a combination of the above methods could also make overall results more robust.

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Appendix: A

The fiscal balance can be decomposed into structural and cyclical components as follows,

$$\textbf{(1)}\ b = b^* + a\left(\frac{Y - Y^*}{Y^*}\right)$$

where b^* denotes the structural balance, αdenotes the impact of automatic stabilisers measured by the budgetary semi-elasticity, and $\left(\frac{y - y^*}{y}\right)$ denotes the output gap.

The budgetary semi-elasticity measures the percentage point change in the budget balance-to-GDP ratio in relation to a one percentage point change in the output gap. The output gap is a measure of the business cycle, denoted by the difference between the actual and potential output, the latter indicating the maximum output of goods and services when the economy is at full capacity. Consequently, during a recession, economic output drops below its potential, creating a negative output gap and, in theory, triggering a monetary or fiscal response.

We estimate the budgetary semi-elasticity separately for the government's total current primary expenditure and for four different tax categories: direct taxes on labour (earned income taxes, including employees' social security contributions), payroll taxes (employers' social security contributions), corporate income tax and indirect taxes (VAT, excise taxes, capital income taxes). These separate elasticities are then aggregated into an overall budgetary semi-elasticity using their GDP shares as weights. The budgetary semi-elasticity, denoted by α_1, is then formed by the following equation (Almenberg and Sigonius 2021):

$$\textbf{(2)}\ \alpha = \sum_i \epsilon_i \frac{T_i}{Y} - Y\frac{G}{Y}$$

where $\xi_i$is the elasticity of revenue from tax i to the changes in the output gap, $\frac{T_i}{Y}$ is the share of tax $i$of GDP, $\gamma$is the elasticity of current primary expenditure (current expenditure net of interest payments) to the output gap, and $\frac{G}{Y}$ is primary expenditures of GDP.

The elasticity ϵ_i shows how public revenue responds to changes in GDP. When the elasticity is divided into two parts, $\epsilon_{\tau i}$and $\epsilon_{\beta i}$, the first part indicates how tax revenue changes in response to changes in the tax base, while the latter shows how the tax

bases change to the output gap. $\beta_i$denotes the logarithm of specific tax base $i, Y^*$the potential output in the economy, and τ_i, y and y^* logarithms of T_i, Y and Y^*, respectively.

$$\textbf{(3)}\epsilon_i = \frac{\delta \tau_i}{\delta \left(y - y^*\right)} = \frac{\delta_{\tau_i}}{\delta \beta_i \delta \left(y - y^*\right)} \equiv \epsilon_{\tau_i} \epsilon_{\beta_i}$$

The elasticity ϵ_i, can be divided into two components, where the first term, ϵ_{τ_i}, denotes the elasticity of tax revenue to the relevant tax base, and the second term, ϵ_{β_i}, denotes the elasticity of tax base to the output gap. The aforementioned tax base elasticities depend on their respective tax codes and related fiscal data, while their sensitivity to the output gap is estimated econometrically using time-series data.

Similarly, on the expenditure side, government spending elasticities respond to changes in GDP and are derived from two factors: primary expenditure changes relative to changes in unemployment, denoted by γ_{g_i}, and unemployment changes relative to fluctuations in the business cycle, denoted by γ_u. The logarithms for unemployment and equilibrium unemployment are denoted by u and u^*.

The elasticity of expenditure to changes in the output gap is denoted by γ_u, primary expenditure by G, while g denotes the logarithm for primary expenditure. Based on this decomposition, the elasticity of general government primary expenditure can be derived as follows:

$$\textbf{(4)}\ \gamma = \frac{\delta g}{\delta \left(y - y^*\right)} = \frac{\delta g}{\delta \left(u - u^*\right) \delta \left(y - y^*\right)} \equiv \gamma_g \gamma_u$$

Appendix B: The elasticity of direct taxes on labour to the output gap

When estimating the elasticity of direct taxes on labour to the output gap, the tax base is defined as the sum of wages, salaries and employers' social security contributions from the national accounts. In the equation, the log value of potential output is deducted from the log value of the tax base to estimate the tax base's cyclical component. The elasticity of the tax base to the output gap, ϵ_{β_ω} , is then estimated using the following equation:

$$\textbf{(5)}\Delta\left(w_t - y_t^*\right) = a + \epsilon_{\beta_\omega}\Delta\left(y_t - y_t^*\right)$$

where w is the log value of the wage sum, and y and y^* are the log values of actual and potential GDP, respectively. The relationship between the wage sum and the output gap is estimated using OLS, and we run the regression using annual data from Statistics Finland and the Ministry of Finance.

Next, we estimate the elasticity of earned income taxes, including employees' compulsory social security contributions, to the wage sum. This can be calculated as the ratio between the marginal and average tax rates as in Girouard and André (2005).

$$\textbf{(6)}\ \epsilon_{\tau_W} = \frac{\Sigma_j m\left(W_j\right) f(W_j)}{\Sigma_j a\left(W_j\right) f(W_j)}$$

where W_j is the wage of the individual, $m\left(W_j\right)$ is the marginal tax rate, $a\left(W_j\right)$ is the average tax rate, and $f(W_j)$ is the value-weighted proportion of individuals in income group j.

We use the Finnish SISU microsimulation model and the tax codes for each year included in the model to calculate the average and marginal tax rates for the years 1990–2021. The average tax rate includes the state income tax, municipal tax, health insurance contribution, pension insurance contribution, unemployment insurance contribution and public broadcasting tax. As in Almenberg and Sigonius (2021), the average and marginal tax rates are evaluated for individuals with an income of $\{0.01\hat{W}, 0,02\hat{W}, \ldots 8.00W\}$, where $\hat{W}$ denotes the median income for the year t.

The income distribution for full-time workers aged 15–74 in 2019 is used for each of the years, but it is adjusted using the wage and salary earnings index. Hence, our

calculation of the marginal and average tax rates based on the median income of 2019 relies on the assumption that the shape of the income distribution has been constant between 1993 and 2021. In the baseline estimate, we assume the individual worked full-time and their income consists solely of wages. At each wage level, we calculate the marginal tax rate by increasing wages proportionally by 5%.

Appendix C: Corporate income tax

The elasticity of corporate income tax to the output gap is derived from the profit share in GDP and the wage sum elasticity to the output gap. The profit share in the economy shows broadly how much of the value added is distributed as gross profits instead of labour compensation. The elasticity of corporate income tax revenue to the tax base (defined as gross profits) is assumed to be proportional. This assumption is justified by the corporate tax being paid at a single statutory rate. Therefore, cyclical fluctuations only affect corporate profits. The elasticity is then defined using the elasticity of the wage sum to the output gap but with an opposite sign, using the following equation

$$\textbf{(7)}\ \epsilon_{\beta_c} = \frac{1-(1-\theta)\,\epsilon_{\beta_w}}{\theta}$$

where θ is the average profit share in GDP, defined as the ratio of gross operating surplus to value added to the economy (Pionnier & Guidetti, 2015). Defined in this way, the profit share has varied around 40% of GDP during the period studied, and we assume an average value of 0.386 for our profit share, which is one percentage point higher than the value presented for Finland in Girouard and André (2005). With the above values, the elasticity of corporate income taxes is 1.51.

Appendix D: Expenditure and unemployment gap elasticities

In order to calculate the elasticity of public expenditure to the output gap we estimate the elasticity of the unemployment rate to the output gap using the following regression:

$$\textbf{(8)}\ \Delta\left(u_t - u_t^*\right) = a + \gamma_u \Delta\left(y_t - y_t^*\right)$$

Throughout the calculations, we use the mean adjusted NAWRU as our equilibrium unemployment. The adjustment factor for Finland is 0.72; hence the equilibrium unemployment rate used in the calculations is 0.72 percentage points lower. While the equilibrium unemployment can be defined in different ways, we also use the Ministry of Finance's estimate of potential GDP, which includes the mean adjusted NAWRU as one of its components. This makes the data in our baseline calculations more consistent. The regression results are presented in Table 5 below.

Table 9. The elasticity of the unemployment gap to the output gap

Time period	Elasticity (γ_u)
1987–2021	-5.02** (0.84)
1987–2008	-5.66** (1.14)
1990–2005	-5.95** (1.44)
1998–2021	-2.13** (0.52)
2008–2021	-2.08* (0.77)

Note: Standard errors are reported in parentheses. Significance level: **p<0.01, *p<0.05. The Durbin–Watson test indicates a minor positive correlation in the error term.

When estimating the elasticity of unemployment to the output gap for the whole period of 1987–2021, the elasticity yields a value of -5.02. The estimates are dependent on the length of the time period used, and the estimates for different subsamples range from -5.66 to -2.09, the estimates for after 1998 being significantly lower in terms of elasticity. Girouard and André (2005) estimate the elasticity to be -5.69 for the period 1980–2003. With a more recent subsample, we decide to use $\gamma_u = -5.02$, in

our baseline estimates.

The sign of the elasticity is negative since, typically, actual measured unemployment is lower than equilibrium unemployment during a cyclical upturn. This means that unemployment is below its equilibrium level and the unemployment gap is negative.

Following previous literature, we assume unemployment compensation to be the sole cyclical automatic component in public expenditure and the elasticity of primary expenditure to react only to fluctuations in unemployment. Recalling from (4):

$$\textbf{(9)}\ \gamma_g = \frac{\delta g}{\delta\left(u - u^*\right)}$$

We separate primary expenditure into two components:

$$\textbf{(10)}\ G = \hat{G} + \sigma$$

where $\hat{G}$ denotes all primary expenditure except unemployment-related transfers, and σ denotes unemployment-related transfers. When the unemployment-related transfers are at their equilibrium level $\sigma^*$and assuming that unemployment expenditure is proportional to unemployment, the relationship between expenditure and unemployment can be expressed as:

$$\textbf{(11)}\ \sigma = \frac{U}{U^*}\sigma^*$$

Since unemployment-related transfers are taxable, we calculate unemployment expenditure net of tax $(1 - \tau_{\overline{w}})$, using each year's average tax rate, denoted by $\tau_{\overline{w}}$. It must be noted that the general housing benefit and social security are not taxable benefits. Therefore, they are not netted of tax in the broader measure calculations

$$\textbf{(12)}\ \gamma_g = \left(1 - \tau_{\overline{w}}\right)\frac{\sigma^*}{G^*}$$

where G^*denotes the structural primary expenditure, which are then adjusted for the business cycle and approximated as G. We then get

$$\textbf{(13)}\ \gamma_g = \left(1 - \tau_{\overline{w}}\right)\frac{\sigma^*}{G^*} = \left(1 - \tau_{\overline{w}}\right)\frac{\sigma}{G}\frac{U^*}{U}$$

Comment on Jenni Kellokumpu, Leena Savolainen and Simo Pesola: Automatic Fiscal Stabilisers in Finland 1993–2021

Antti Ripatti

1 Introduction

One of the primary objectives of fiscal policy is to enhance welfare by mitigating aggregate volatility, i.e. by dampening the business cycle. Whether this actually improves welfare remains uncertain, as indicated in the literature on real business cycles. The timing of discretionary fiscal policy proves challenging due to implementation lags, (ex post biased) real-time estimates of the output gap and cyclical balance[23]. Ultimately, fiscal policy often becomes pro-cyclical and, as a result, amplifies business cycles. Automatic stabilisers, on the other hand, do not suffer from implementation lags or estimation or projection errors and may address the timing issue effectively.

Kellokumpu, Savolainen and Pesola examine the impact of changes in the output gap on the cyclical balance, which represents the business cycle component of fiscal policy. They assess the sensitivity of various government revenue and expenditure components to variations in the output gap. The individual components are then aggregated to arrive at the overall budgetary semi-elasticity. The estimated semi-elasticity is approximately ½, indicating that a one percentage point change in the output gap results in a ½ percentage point change in the cyclical fiscal balance (cyclical budget deficit relative to output).

In 2020, the output gap measure was -3 percent, and based on their estimate, 1.5 percentage points of the 5.5 percent general government budget deficit were attributed to the automatic response of government revenue and expenditure items.

To estimate revenue elasticities, they employ a step-wise procedure. Initially, they regress the (first difference) detrended tax base on the (first difference) of the output

23. See, for example, Cimadomo, J. (2012), 'Fiscal Policy in Real Time.' Scand. J. of Economics, 114: 440-465. https://doi.org/10.1111/j.1467-9442.2012.01697.x

gap, with potential output serving as the trending variable on both sides of the regression. The elasticity of tax revenues on the tax base is then either estimated or evaluated on the basis of the actual tax rates.

Covering the period 1985–2021, which includes multiple economic cycles, including two financial crises and significant changes in the taxation and unemployment benefit systems, the study demonstrates that the aggregate impact of automatic stabilisers is relatively stable.

2 Observations on the individual results

2.1 Income taxes

The examination of the relationship between the output gap yt – y⋆ and the tax base of income taxes, nominal wage sum wt, relies on the following regression[24]:

$$\textbf{(1)}\Delta\left(w_t - y_t^*\right) = \alpha + \beta\Delta\left(y_t - y_t^*\right) + \epsilon_t,$$

where y⋆ is the estimated potential output based on the common EU methodology (production function approach) and Δ is the first difference operator. The study does not reveal whether the compensation is deflated or not, but it should be. The correct equation would be:

$$\Delta\left(w_t - p_t - y_t^*\right) = \alpha + \beta\Delta\left(y_t - y_t^*\right) + \epsilon_t,$$

or

$$\Delta\left(w_t - y_t^*\right) = \alpha + \beta\Delta\left(y_t - y_t^*\right) + \Delta p_t + \epsilon_t,$$

where Δp_t is (GDP) inflation. Clearly, inflation should be correlated with LHS and, due to the Phillips curve, positively with the output gap:

$$\Delta p_t = \kappa\Delta\left(y_t - y_t^*\right) + \eta_t.$$

The estimated regression coefficient in (1) would then be $\widehat{\beta} = \beta + \kappa$. Hence, the estimate is upward biased. Normally, the estimates of κ are fairly small, in the ballpark of 0.1 such that the bias would not distort the results qualitatively.

The estimated elasticity of nonlinear taxation relies on the simulation of the

24. The authors use the same methodology as Almenberg and Sigonius (2021) in "Automatic fiscal stabilizers in Sweden 1998–2019," NIES Working Paper 155.

microsimulation model (SISU), incorporating a broad, representative dataset of individuals and their detailed budget constraints based on tax and social security details. The authors estimate a 5 percent general increase in wage income for all individuals and calculate average and marginal tax rates.

2.2 Indirect Taxes and Corporate Income Taxes

The elasticity of indirect taxes is calibrated assuming unit tax base elasticity with respect to the output gap and applying VAT tax rates to the tax base. Analysing corporate income taxes is challenging due to the lack of information on the tax base. The closest empirical counterpart is 1– labour share. Tax evasion, highly varying risk premia, etc., make estimating output gap elasticity virtually impossible.

2.3 Unemployment Benefits

The relationship between the unemployment rate and output gap is estimated using the following regression:

$$\Delta\left(u_t - u_t^*\right) = \alpha + \gamma_u \Delta\left(y_t - y^*\right) + \epsilon_t,$$

where u^* is the NAWRU consistent with the potential output measure y^*. Sub-sample estimation of γu reveals sensitivity to the particular sample period, reaching the upper limit of –6 in a sample dominated by the 1990s crisis and –2 in a sample dominated by the stagnant 2010s. This implies that a one percentage point decrease in the output gap could result in a variation of between a two and six percentage points increase in the unemployment rate. The authors then link the unemployment rate with public unemployment-related expenditure and find that the overall elasticity of this expenditure on the output gap is relatively small.

3 Welfare evaluation

McKay and Reis (2016) identify four channels for automatic stabilisers: 1) the disposable income channel; 2) the marginal incentive channel which is related, for example, to tax progressivity that evens out the work done over boom and bust periods; 3) the redistribution channel, which involves taxing low marginal propensity consumers and paying transfers to high marginal propensity consumers, i.e. from wealthy to poor; 4) the social insurance channel, which reduces the risks that agents face and discourages precautionary savings that make them likely to face liquidity constraints during large aggregate shocks. I employ these channels to classify the results below.

3.1 Disposable income channel

Let us approximate household disposable income dt as

$$d_t = w_t - w_t^{taxes} + u_t^{benefits}$$

where wt is the nominal wage income, wttaxes paid out of it and utbenefits unemployment benefit net of taxes. The paper estimates the output gap $y_t \equiv y_t - y_t^*$ elasticity of each component such that (using the same notation as the paper)

$$d_t = \epsilon_{\beta_\omega} \tilde{y}_t - \epsilon_{\tau_\omega} \epsilon_{\beta_\omega} \tilde{y}_t + \gamma \tilde{y}_t = (\epsilon_{\beta_\omega} - \epsilon_{\tau_\omega} \epsilon_{\beta_\omega} + \gamma) \tilde{y}_t.$$

Plugging in the parameter estimates gives $d_t = (0.68 - 1.7 \times 0.68 - 0.13)\tilde{y}_t = -0.47\tilde{y}_t$. This means that the variance of disposable income is substantially smaller than the variance of the output gap.

Income tax progressivity evens out the work effort. Quantitative evaluation requires a model with a heterogeneous agent environment. The same holds for evaluating the redistribution channel and social insurance channel. McKay and Reis (2016) combine an incomplete-markets model with a sticky price model to study the quantitative role of fiscal stabilisers in stabilising output volatility. Unsurprisingly, the demand effects, in the form of the disposable income channel, are not present in their model. Their finding is that the redistribution and social insurance channels play a stabilising role, particularly when monetary policy is constrained by the zero lower bound. The positive welfare effect is driven by the insurance aspect of social insurance.

4 Summary

Kellokumpu, Savolainen, and Pesola provide useful estimates of various government expenditure and revenue elasticities. The in-depth discussion and exploration of the effects of average and marginal tax rates and their evolution are valuable sources of information for macro-modelers. The same applies to unemployment benefits. Their dependence on the output gap is potentially less robust due to the usual uncertainties related to output gap estimation, such as real-time information and underlying trend and growth assumptions. Finally, the evaluation of the stabilising role of automatic stabilisers requires a quantitative, model-based approach, as emphasised by McKay and Reis (2016).

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Comment on Jenni Kellokumpu, Leena Savolainen, Simo Pesola: Automatic Fiscal Stabilisers in Finland 1993–2021

Martti Hetemäki

The article by Jenni Kellokumpu, Leena Savolainen and Simo Pesola (KSP) estimates the size of automatic fiscal stabilisers in Finland from 1993 until 2021. It uses the OECD approach and calculates a budgetary semi-elasticity. The budgetary semi-elasticity measures the sensitivity of the budget balance to cyclical fluctuation, which is measured by the output gap.

KSP provide a careful analysis using standard variable definitions, and the disaggregation of the tax elasticities is in line with previous studies. This makes the article's estimate of the size of automatic stabilisers comparable to previous estimates based on Finnish data. Hence, it provides interesting and important information about the level of and changes to the size of automatic stabilisers in Finland.

My main comment on the paper is that the authors have produced a solid and important contribution. The results will be very useful in evaluating Finnish fiscal policy.

I have two other comments: a technical one that should be kept in mind when using the results to calculate the structural fiscal balance and another one about the side effects of increasing income tax progressivity to maintain the size of automatic stabilisers.

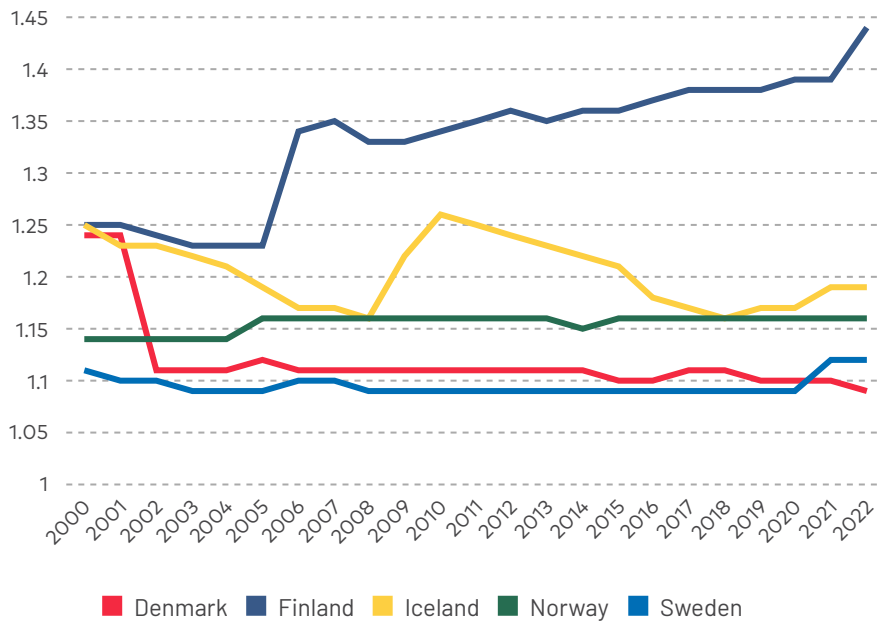
The technical comment concerns uncertainty regarding the unobservable potential output variable, which is used to measure the output gap variable. The output gap is the difference between the actual and potential output divided by potential output. My comment is a general one, and it concerns all papers that calculate the output gap variable using an approach that leads to an estimated potential output close to actual output. It is an approach that makes the potential output pro-cyclical and, in turn, this results in a structural fiscal balance close to the actual balance. For example, all large observed fiscal surpluses tend to be large structural fiscal surpluses, and the same is the case for deficits.

The pro-cyclicality of the potential output variable meant that the estimated output gap in Finland in 2007 (for example) was small, and the structural fiscal surplus was

estimated to be very large, given that the observed fiscal surplus was very large. The implication of all of this for the KSP article is that if the estimated potential output variable has a pro-cyclical bias, then that bias also affects the estimates of the size of the automatic fiscal stabilisers. I want to stress that this comment is not specific to KSP. Moreover, the authors draw attention to this problem. They note that the estimated elasticities are sensitive to how we measure variables that are not directly observable, such as the output gap and equilibrium unemployment.

My final comment concerns the effects of increased income tax progressivity on low incomes in Finland. The paper notes in the concluding remarks that lower income tax rates for low-income individuals have been financed by higher rates at higher income levels. This results in a more progressive taxation that makes a positive contribution to the automatic stabilisers. While tax progressivity helps to maintain the size of automatic fiscal stabilisers, it is important to be aware of unintended consequences. In the last 20 years or so, the earned income tax credit, which is phased out steeply as income rises, has increased significantly, lowering average tax rates but increasing marginal ones. This has markedly increased the tax progressivity for people on low incomes in Finland relative to the other Nordic countries (Figure 1). The marginal tax rates on low earnings in Finland are currently clearly higher than in the other Nordic countries (Figure 2). The high marginal income rates may have contributed to the large rise in part-time employment in Finland in the period 2000–2022 (Figure 3). Moreover, the high marginal tax rates may also have slowed down labour productivity growth.

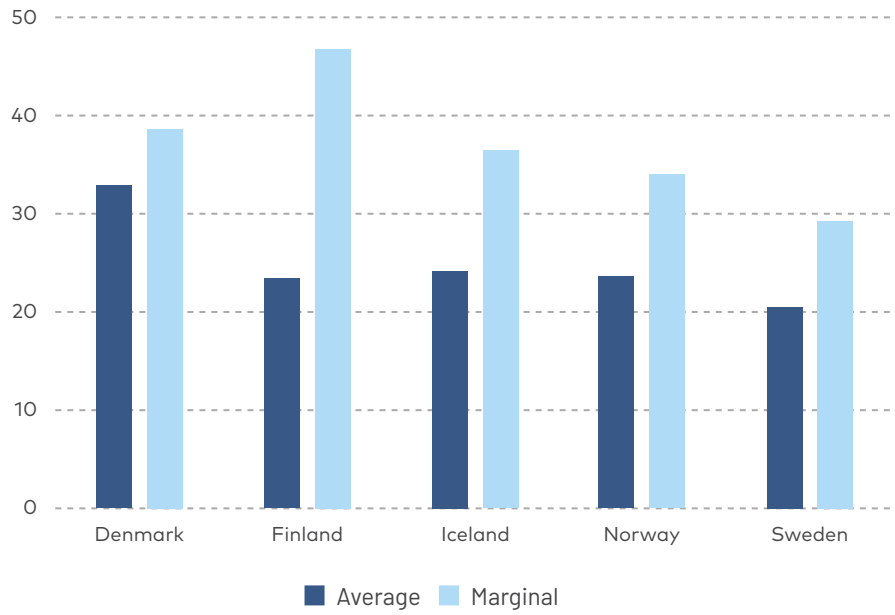
Figure 1. Tax progressivity for a single person at 67% of average earnings, 2000–2022



Source: OECD, *Tax progressivity is measured by the Musgrave-Thin index (MT), MT = (1 – a)/(1 – m), where a is the net personal average tax rate and m is the net personal marginal tax rate.

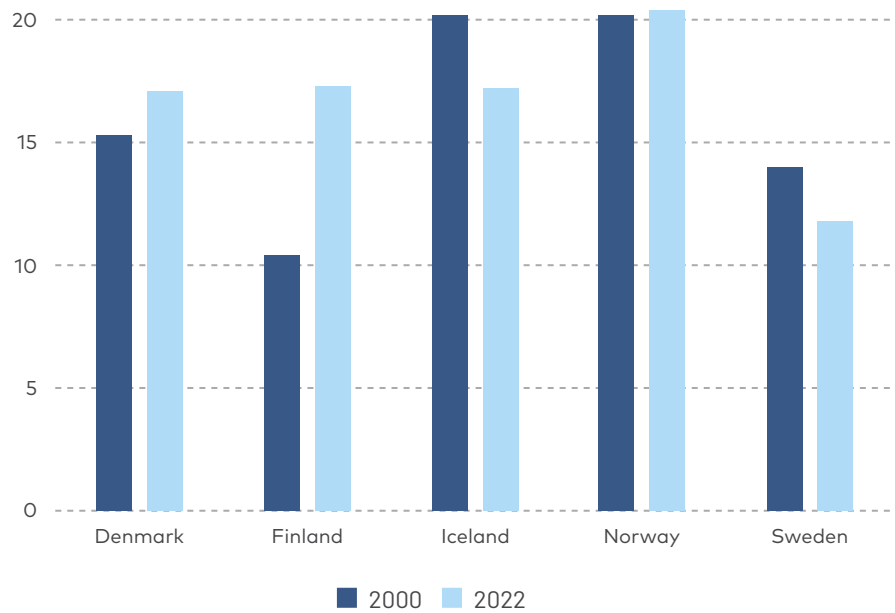
Figure 2. Net personal average and marginal income tax rates for a single person at 67 % of average

Earnings, 2022, %



Source: OECD

Figure 3. Part-time employment rate in 2000 and 2022, % of total employment



Source: OECD

Nordic Economic Policy Review 2024

Automatic stabilisers in Iceland

Arnaldur Sölvi Kristjánsson

Abstract

This article studies the size of automatic stabilisation in the Icelandic tax-transfer system using administrative tax records. Automatic stabilisers – changes in public spending and revenue without active policy intervention – are generally considered to be an important component of stabilisation policies. It estimates the effects of shocks to income and employment on tax revenue and transfer payments. The tax-transfer system absorbs approximately 40% of an income shock and 60% of an unemployment shock. With some notable exceptions, estimated automatic stabilisers are relatively robust across different scenarios. The tax system is more important at higher income levels, whereas the unemployment insurance system is more important at lower income levels. By international comparisons, Iceland has a relatively high automatic stabiliser.

Keywords: automatic stabilizers; fiscal policy; income stabilization, demand stabilization

JEL Classification: E64, E62, H32, E63

1. Introduction

The three main functions of economic policy are allocation, stabilisation and redistribution (Musgrave and Musgrave, 1989). Stabilisation calls for policies that mitigate economic fluctuations, i.e. bring the economy closer to a balance as targeted by monetary and fiscal policy. The prevailing consensus suggests that, in the absence of major economic shocks, monetary policy should bear the main burden of stabilisation since the time lag in decision making and implementation is shorter for interest rate changes than changes in taxes and spending.

Fiscal policy can bring the economy closer to balance by boosting aggregate demand in a downturn and lowering it in an economic upswing. Economic stabilisation is the result of active decisions on tax and spending (discretionary fiscal policy) and from the automatic stabilisers. The latter refers to changes in public spending and revenue that are due to changes in economic activity and do not require active intervention by policy makers. In a downturn, unemployment goes up and income growth slows down, which automatically increases spending on employment related benefits and changes tax payments. The size of such effects depends on how tax and transfer payment systems are designed and how income changes. Automatic stabilisers should be smaller in a country with very strict eligibility requirements for unemployment benefit.

Like other trends in economics and politics, the pendulum swings over time. It is fair to say that following the financial crisis and the COVID-19 pandemic, the pendulum has swung in the direction of actively deploying fiscal policy in times of crisis. For example, Blanchard and Summers say that "Automatic stabilizers should be improved, and the scope for discretionary responses to adverse shocks should be revisited." (2019: xiii).

In this paper, I use administrative tax records to report the results of the automatic stabilisers in Iceland, the tax records make it possible to accurately calculate tax payments for all taxpayers. I estimate the automatic stabilisers by investigating different shocks to market income and their effects on tax revenue and transfer payments. The effect of automatic stabilisers can be singled out by keeping everything else constant, including discretionary fiscal policy, monetary policy and behavioural changes. The paper follows the methodology used, among others, by Auerbach and Feenberg (2000) and Dolls et al. (2012).

To estimate the size and effects of the automatic stabilisers, I model shocks to income and employment. In the case of the income shock, market income changes either proportionally across the income distribution or in a manner that exacerbates inequality, e.g. income falls proportionally most for low-income individuals. As Iceland has a dual income tax system, whereby labour and capital income are taxed differently,

the shock hits earnings first and then earnings and capital income. The unemployment shock only changes the number of individuals in work. The automatic stabilisers account for changes in tax payments and unemployment benefit caused by the shock.

The paper is organised as follows. Section 2 describes the concept of automatic stabilisers. Section 3 describes the measurements used. In section 4, the data and scenarios are described. The results are presented in section 5, and the final section presents some conclusions.

2 Automatic stabilisers

Automatic stabilisers are mechanisms built into the tax-transfer system that stabilise income and, as a result, stabilise consumption.[25] The mechanism stems from the built-in feature of the tax-transfer system whereby spending increases and taxes decrease when the economy is in a downturn, and the opposite happens in an upswing. All of this takes place without any need for legislators to vote.

In general, the larger the automatic stabilisers, the larger the public sector's share of national income. Macro indicators such as revenue and expenditure to GDP ratios are sometimes used as a measure of automatic stabilisers (see, for example, Batini et al., 2014). The public sector is larger in Europe than in the US, for example, and the same applies to automatic stabilisers (Dolls et al., 2012).

The larger the automatic stabilisers, the smaller the effects of discretionary fiscal policy, i.e. fiscal multipliers are smaller. This is in accordance with standard Keynesian economics, as a larger share of any increased spending will end up as government revenue because a larger share of the increase in income is taxed. It is also in accordance with empirical evidence (see, for example, Mineshima et al., 2014). This means that countries with large automatic stabilisers will have less effective discretionary fiscal policies.

The components of automatic stabilisers on the spending side are primarily unemployment benefit and income-tested transfers. Such transfer payments increase automatically when income declines. Unemployment benefit and other employment-related transfer payments, e.g. social assistance, increase when a drop in income is due to higher unemployment. Income-tested transfers increase when income declines, whether it is due to unemployment or a drop in income.

25. Automatic stabilisation can also be channelled through investment see e.g. Buettner and Fuest (2010), and Devereux and Fuest (2009).

The components of automatic stabilisers on the revenue side consist mainly of taxes. All taxes calculated as a percentage of income or consumption exhibit an element of automatic stabilisation. In the labour income tax schedule, higher earnings are taxed at the marginal tax rate, which usually increases with income. Hence, as income goes up by a certain percentage, post-tax income rises by a smaller percentage.

3 Measurement issues

The automatic response of the tax-transfer system measures the automatic sensitivity of net tax liabilities to changes in income.[26] A widely applied measurement is called the *income stabilisation coefficient*, which is the share of income growth absorbed by tax payments, i.e.

$$\frac{\textit{changes in net tax payments}}{\textit{changes in market income}}$$

Imagine a proportional tax system under which all income is taxed at 40%. When income increases by 100 crowns, post-tax income increases by 60 crowns. This means that the tax system absorbs 40% of the growth in income. The same applies when income falls. When income goes down by 100 crowns, post-tax income only decreases by 60. Again, the tax system absorbs 40% of the change.

In a progressive tax system, the marginal tax rate exceeds the average tax.[27] The tax system absorbs a greater share of additional income than the average paid in income taxes. In 2020, the average tax rate for the average full-time employee was 29%, whereas the marginal tax rate was 37%. This gap is wider for lower incomes but narrower for higher incomes.

The size of the automatic stabiliser depends, therefore, on two factors. First, the average tax rate. The higher the average tax rate, the higher the automatic stabiliser. Second, the overall progressivity of the tax system. For the income stabilization coefficient it is the marginal tax rate that determine the size of the automatic stabiliser (Hutton and Lambert, 1979).

However, nominal amounts, tax thresholds and tax credits usually change at the turn of the year. If they go up proportionally with income, the average tax rate remains

26. See e.g. Musgrave and Miller (1948), Auerbach and Feenberg (2000), Dolls et al. (2012). The methodology followed here is described in Appendix A.
27. In a progressive tax system the average tax rate, the share of income paid in taxes, increases with income. This can be done through increasing marginal tax rates, a tax threshold and tax credits. The average tax rate is the share of income paid in taxes. The marginal tax rate is the change in tax payments when income increases.

unchanged. This means that when income changes in a predictable manner, and the tax authorities increase nominal amounts at the same rate as income, the automatic stabilisation will be muted. The effects of the progressivity discussed above disappear. Only effects equal to the average tax rate remain.

Iceland has what is called a dual income tax system, like the other Nordic countries, which combines a progressive tax schedule for labour income with a low flat rate on capital income. The income stabilisation from capital income and labour income tax are defined as above. Since the capital income tax is lower and the labour income tax is progressive, the income stabilisation coefficient of the capital income tax is lower. The overall income stabilisation is a weighted average of both tax systems, where the weights are the share of the income component in overall income growth (Kristjánsson and Lambert, 2015). This means that the composition of income growth matters for the income stabilisation coefficient. When the share of capital income in the income growth is larger, the income stabilisation coefficient will be lower.

It is assumed that the tax incidence for taxes paid by employees is borne by employees. This assumption also covers employers' social security contributions and pension contributions.[28] Consequently, we assume that the incidence from social security contributions is borne in full by employees. Both market income and net taxes will, therefore, include social security contributions. Changes in earnings will result in higher social security contributions and employers' pension contributions, leading to higher tax payments and an increase in market income.

For automatic stabilisers to stabilise aggregate demand, changes in current disposable income need to affect current consumption. People who are forward-looking will change their behaviour when changes in disposable income are permanent or their liquidity is constrained. The demand effect of temporary shocks depends on the frequency of liquidity constraints and to what degree individuals are forward-looking. Previous studies, such as those by Auerbach and Feenberg (2000) and Dolls et al. (2012), assumed that households facing liquidity constraints adjust expenditure proportionally to the changes in disposable income, whereas households without these constraints maintain consistent consumption levels. A different approach is taken in this article by making assumptions about the marginal propensity of consumption (MPC) for different income groups. The MPC is either assumed to be constant or to decrease with income.

28. Evidence indicates that the majority of the incidence from social security contributions paid by employers falls on employees (for reviews, see Fullerton and Metcalf, 2002; Melguizo and González-Páramo, 2013).

4 Data and scenarios

I use a comprehensive administrative tax database containing the records of all Icelandic taxpayers, using their data for 2020. The dataset includes demographic information, which facilitates linking couples, as well as detailed individual income data. This data makes it possible to calculate tax payments and child benefit payments for all tax peyers. Notably, the Icelandic tax system has relatively few exemptions and exceptions, which facilitates highly accurate payment calculations for the entire population.

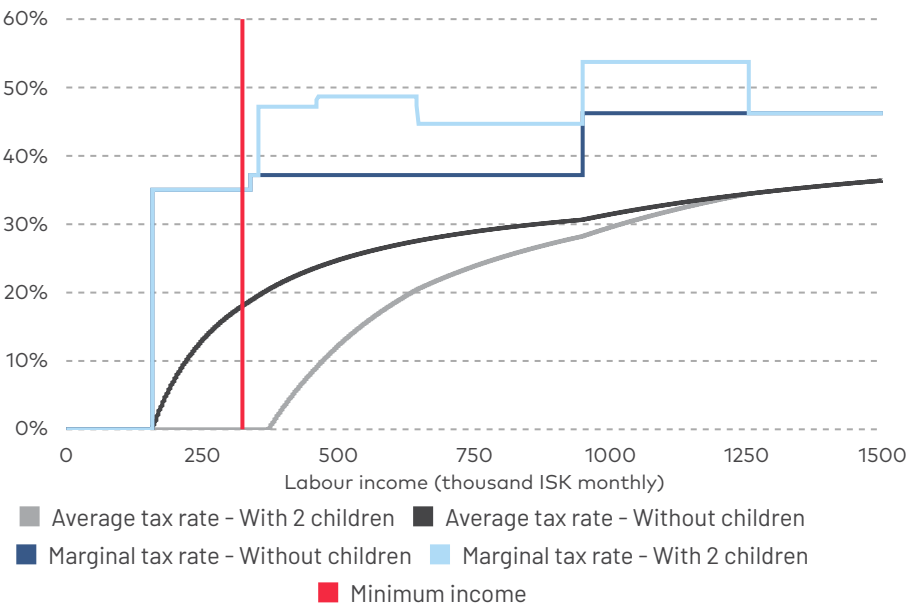
The tax and transfer components considered are:

- Labour income tax
- Capital income tax
- Child benefit
- Unemployment benefit
- Social security contributions
- Employers' and employees' pension contributions
- Value added tax

The labour income tax in Iceland has three brackets, up from two in 2019. The marginal tax rates ranged from 35.0% to 46.2% in 2020 (see Figure 1). Capital income is taxed at a marginal rate of 22% with a tax-free threshold. Rental income is taxed at 11%. Taxation on capital income is approximately 22% and proportional.

Child benefit is income-tested. As income goes up, child benefit goes down. The testing is based on household gross income. The reduction ranges from 4–10% for most households.

Figure 1. Marginal and average tax rates in Iceland, individuals with and without children, 2020.



Unemployed people have the right to unemployment benefit provided they worked enough hours in the year prior to becoming unemployed. Full entitlement equates to basic unemployment benefit for 30 months. In 2020, the amount was roughly 90% of minimum income. Individuals also receive income-related benefit for three months, which amounts to 70% of previous earnings up to a certain maximum, which amounts to 36% beyond minimum income.

Income-tested housing-related benefits are paid to tenants and homeowners, and these are not included in the analysis. The benefits paid to homeowners are rather low, excluding them only has a negligible effect on the results. The benefits paid to tenants are higher, but it is not possible to include them due to data limitations. However, as 79% of households where owner-occupied in 2022, this exclusion should not have a significant impact on the results (Statistics Iceland, 2024).

Employers pay a social security contribution, which is a tax, that amounts to 6.35% of earnings. Pension contributions are mandatory for employees and employers. The rates are 11.5% for employers and 4% for employees. These contributions entitle employees to a pension. The contributions are invested by pension funds. Although the payments do not constitute a tax, they are mandatory.

As per Dolls et al. (2012), I examine two types of shocks: an income shock and an

unemployment shock. The income shock is based on data for 2020, while the unemployment shock is based on data for 2019, as explained below. The income stabilisation coefficient for the income shock is slightly higher in 2020 than in 2019 due to the 2020 tax reform. The difference is approximately 0.2 ppt.

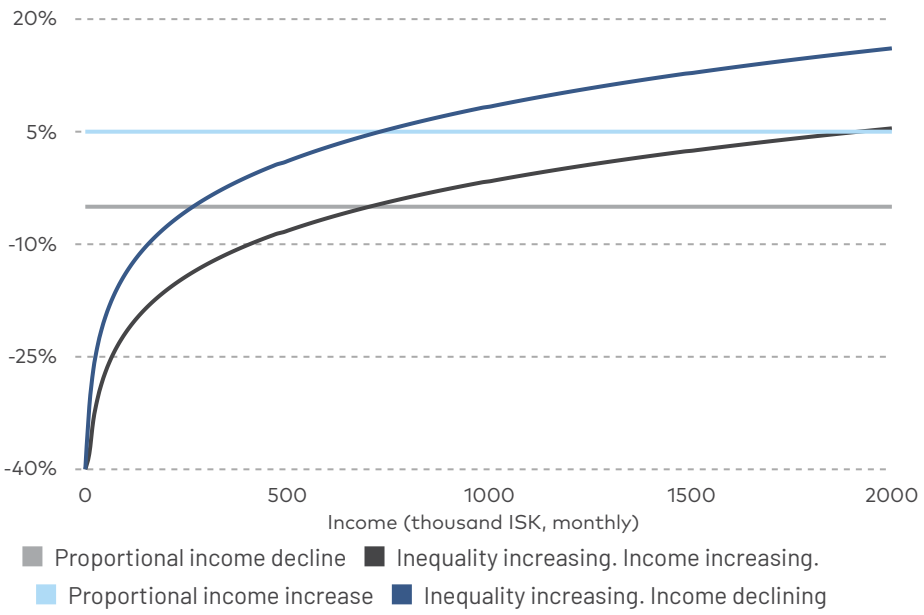
4.2 Income shock

For the income shock, I start by considering a proportional change in market income of either -5% or +5% in 2020. That is, the income of all individuals goes either down or up by 5%. This income shock is applied to earnings alone and to both earnings and capital income, while unemployment benefit and social security remain unchanged during all income shocks.

In addition to proportional income changes, I also consider income changes that exacerbate inequality. The total change in income is the same as in the proportional income shock, either -5% or +5%. The change in inequality is such that the Gini coefficient of positive earnings increases by 3 Gini points (see Figure 2). According to Atkinson (2003), such a change constitutes an economically significant increase in inequality.[29] It leads, therefore, to a rather large change in inequality that is unlikely to materialise in only a single year. The change should, therefore, be interpreted as an upper bound of inequality changes. Capital income changes proportionally in all scenarios as the capital income tax is close to being proportional so that inequality has a negligible effect on the income stabilisation coefficient.

29. The Gini coefficient of positive earnings increases from 0.417 to 0.447. Bear in mind that this includes all individuals who receive any earnings in 2020. As many individuals only work part-time or part of the year, the Gini coefficient is quite large. In an international comparison, the earnings distribution of full-time earnings is compressed (see Eurostat, 2021). The post-shock income is MATEMATISK FORMULAR, where is pre-shock income and the average, and are parameters that are set such that overall income declines or increases by 5% and the Gini coefficient of positive income increase by 3 points.

Figure 2. The income shock scenarios.



4.3 Unemployment shock

I have modelled unemployment shocks in two separate ways. Firstly, I adopted the approach used by Dolls et al. (2012). This method of reweighting the proportion of unemployed people and symmetrically decreases the proportion in work. Individuals are defined as unemployed if they receive at least 10% of the basic unemployment benefit entitlement in 2019.[30] The advantage of this approach is that it controls for several characteristics that determine the risk of becoming unemployed. The underlying assumption is that the characteristics of unemployed people remain constant.

Secondly, I randomly make individuals of working age (24–69) unemployed and they receive unemployment benefit. Assuming their entitlement is 79% of the maximum, i.e. they receive 79% of the maximum unemployment benefit. This allows the income stabilisation coefficient to match the results obtained via the reweighting method. Increasing the entitlement percentage will increase the income stabilisation coefficient, as shown below. Individuals are assumed to be unemployed for the whole year, i.e. lose all earnings. Assuming that they only lose income for part of the year has a negligible effect on the income stabilisation coefficient.

30. For the reweighting approach I present results for 2019. In 2020, many individuals received proportional unemployment benefits (*hlutabætur*) due to reductions in their hours worked. This was part of the government's COVID-19 measures.

5 Results

5.1 Individual-level income stabilisation

Before presenting the aggregate automatic stabilisers for the entire tax-benefit system, I begin by showing the individual-level automatic stabilisers. Figure 3 illustrates individual-level income stabilisation for a 5% proportional income decline. The definition of individual-level income stabilisation is the same as that of the aggregate income stabilisation coefficient, i.e. the change in net tax payments divided by the change in market income.

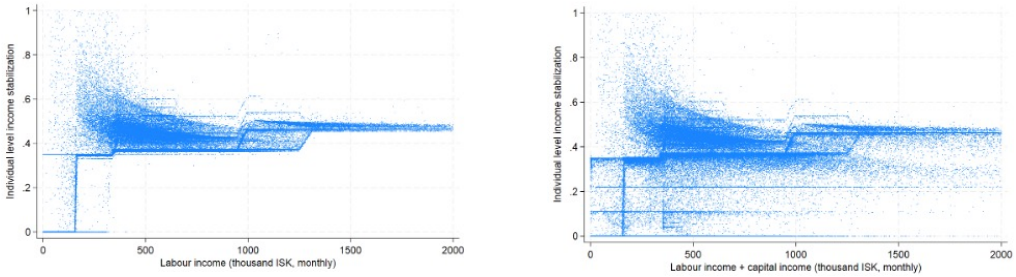
For most individuals, the individual-level income stabilisation coefficient closely follows the marginal tax rate schedule, which steps up incrementally at tax-bracket thresholds (at ISK 160, 340 and 950 thousand). However, there are deviations from the schedule, mainly driven by the joint taxation of cohabiting couples and joint income testing for child benefit.[31] As all income is increased in our calculations, a partner's income also rises, which has an impact on net tax payments. Therefore, Figure 3 cannot be interpreted as a marginal tax rate, which is defined as the change in tax payments when personal income increases while other factors remain constant. This does not hold true in Figure 3 because the partner's income also increases.

Joint income testing for child benefit can result in significant individual-level automatic stabilisers. When the income of a low-income individual falls by 5%, it leads to a minor change in child benefit in absolute terms. However, if the individual's partner has a high income, the absolute change in the combined income of the couple can be substantial, causing a marked shift in child benefit, which can result in a very high automatic stabiliser for the low-income individual.

In Iceland, joint taxation applies to both the tax allowance and the top tax bracket. If an individual's income falls below the first tax bracket (income below ISK 150 thousand), the personal allowance is not fully utilised and can be applied to the partner if the joint income exceeds the tax threshold. When the incomes of both partners rise, the unused tax allowance diminishes, further increasing the individual-level stabilisation coefficient, which would not happen in a tax system without joint taxation. This also applies to the joint taxation of the top tax bracket, where the reduction in tax liabilities decreases as both partners' incomes increase. This causes the income stabilisation both to increase and decrease (see further discussion in Section 5.2.).

31. Child benefit is income tested based on the sum of cohabiting couples' incomes.

Figure 3. Individual-level income stabilisation with a 5% proportional income decline.



(a) Earnings increase

(b) Earnings and capital income increase

Transfer income remains unchanged. Individuals who only receive transfer income tax payments do not change. These individuals have an income stabilisation value of 0.

Other factors also contribute to deviations from automatic stabilisers based on the marginal tax rate schedule. Firstly, income-tested child benefit amplifies automatic stabilisers. Secondly, the municipal tax rate (*útsvar*) varies between municipalities. Thirdly, some individuals do not receive the full personal allowance and have a positive automatic stabiliser below the tax threshold.

Figure 3b shows the individual-level income stabilisation when earnings and capital income increase proportionally. Now, the individual-level stabilisation coefficient is below the marginal labour tax rate. As both earnings and capital income increase at the same rate, the income composition of each individual matters. The higher the share of capital income, the lower the individual-level income stabilisation.

5.2 Baseline results

In my baseline scenario, income changes proportionally by 5%, either affecting earnings alone or both earnings and capital income. Table 1 displays both proportional changes to income and changes that exacerbate inequality.[32] Variations in the shock's magnitude have only a marginal impact on the automatic stabilisers, and those specific results have been left out.

Approximately 40% of a proportional income change is absorbed by the tax system. This percentage remains relatively consistent for both positive and negative earnings shocks. Since capital income remains unchanged during earnings shocks, labour income makes up 100% of the income growth, and the automatic stabiliser stems exclusively from labour income taxes and child benefit.

32. The aggregate size of the shock is approximately 5% in the inequality increasing shock.

The income stabilisation coefficient attributed to child benefit constitutes only a small proportion of the overall impact. Child benefit is subject to income testing, meaning it is reduced as income rises, which makes the automatic stabiliser larger. However, the benefit reduction rate is notably lower than the marginal tax rate, and not all individuals have dependent children. Consequently, the child benefit system absorbs a significantly smaller portion of the income shock than the labour income tax.

Income changes that increase inequality produce an asymmetric effect on the automatic stabilisers. Such changes lead to a lower (higher) income stabilisation coefficient in the case of an income decline (increase) of approximately 5 ppt. The more inequality increases, the greater the effect on the income stabilisation coefficient. When income declines and increases inequality, a relatively larger proportion of the income change is borne by those on lower incomes, for whom marginal tax rates are lower. The opposite is the case in the event of an increase in income.

Capital income is taxed at a marginal rate of 22%, whereas labour income is taxed at marginal rates ranging between 35% and 46%. Consequently, when both labour and capital income go up or down, the tax system absorbs a smaller portion of the income shock related to capital income.

The income stabilisation coefficient for the capital income tax quantifies the proportion of capital income tax changes absorbed by the tax system. This figure is approximately 19% for proportional income changes, slightly below the marginal tax rate of 22%, due to a tax threshold in the capital income tax system and to the lower rate on rental income.

The income stabilisation coefficient for the labour income tax remains unchanged compared to an income shock that only affects earnings. The overall coefficient is a weighted average, with the weight being the proportion of income growth attributable to labour income. Given that labour income represents the largest share of income growth, the difference in the automatic stabilisation is not large (less than 2 percentage points).

Table 1. Income stabilisation coefficients from an income shock

	Earnings change				Earnings and capital income change			
	Proportional change		Increases inequality		Proportional change		Increases inequality	
	Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease	Increase
Total	38.1%	38.3%	32.3%	44.0%	36.7%	36.9%	32.1%	42.0%
Labour income	36.7%	37.1%	31.4%	43.3%	36.7%	37.1%	31.4%	43.3%
Capital income	-	-	-	-	19.2%	19.3%	19.2%	19.3%
Labour income share	100.0%	100.0%	100.0%	100.0%	92.3%	92.3%	92.2%	91.9%
Child benefit	1.4%	1.3%	1.8%	0.7%	1.3%	1.2%	1.7%	0.7%

The labour income share is the share of total income growth due to labour income.

The results in Table 1 are based on calculations in which the share of income growth between labour and capital income is equal to its pre-shock status. Nevertheless, there is a substantial degree of variability in the proportion of income growth attributed to capital income. In recent decades, there have been many years when more than 50% of income growth has been attributable to capital income, although the share is much lower on average. Table 2 shows income stabilisation coefficients with different shares of labour income in income growth. The lower the share, the lower the income stabilisation coefficient.

Table 2. Income stabilisation income shock, different labour income shares in income growth

Labour income shares in income growth	Proportional income decrease
50%	28.0%
60%	29.7%
70%	31.5%
80%	33.2%
90%	35.0%
100%	36.7%

Two different methods of estimating the income stabilisation coefficient for an unemployment shock are presented in Table 2. Firstly, using a reweighting method, increasing the weight of unemployment. Secondly, a random increase in unemployment, so that earnings plummet to zero and unemployed people receive unemployment benefit instead. The results presented are for three different increases in the unemployment rate, ranging from 2.5 to 10 percentage points.

The stabilisation coefficients from the unemployment shock are significantly larger than for the income shock: roughly 60%. In other words, around 60% of the fall in market income when unemployment goes up is absorbed by the tax-transfer system.

Over half of the stabilisation from the tax-benefit system in the wake of an unemployment shock is down to the unemployment benefit system. From the total stabilisation coefficient of roughly 60%, around 30–40% is due to the unemployment benefit system. By contrast, stabilisation via the labour income tax is much lower in the event of an income shock. Unemployment benefits are taxable, so part of the increase in the benefits is taxed. This explains the low proportion of the stabilisation coefficient that is down to the labour income tax.

Table 3. Income stabilisation coefficients from an unemployment shock

	Random increase in unemployment			Reweighting unemployment share		
	2.5 ppt increase	5 ppt increase	10 ppt increase	2.5 ppt increase	5 ppt increase	10 ppt increase
Total	60.6%	60.8%	60.8%	60.8%	60.8%	60.8%
Labour income	22.9%	22.7%	22.7%	27.5%	27.5%	27.5%
Capital income	-	-	-	19.2%	19.2%	19.2%
Labour income share	100%	100%	100%	86.6%	86.6%	86.6%
Child benefit	1.1%	1.1%	1.1%	3.1%	3.1%	3.1%
Unemployment benefit	36.6%	37.0%	37.0%	31.3%	31.3%	31.3%

The estimates for income stabilisation coefficients are arrived at using the same methodology as Dolls et al. (2012). They estimated stabilisation coefficients for income and unemployment shocks for Europe and the USA. The stabilisation coefficients for an income shock are 26.3% for Europe and 24.4% for the USA. The coefficients are substantially larger, around 40% in Sweden and Finland and even higher in Denmark at 56%. The coefficients for Iceland are large by international comparison and in line with those of the Nordic countries.

Comparing the stabilisation coefficients for the unemployment shock, a similar picture emerges. The coefficient is substantially higher in Europe (48.5%) than in the USA (37.7%). The coefficients are substantially larger in the Nordic countries, ranging between 51.9% and 82.3%. This should come as no surprise as Iceland has a comparatively generous unemployment insurance system, like the Scandinavian countries.[33]

In Iceland, joint taxation slightly lowers the estimated income stabilisation coefficient, with a minimal difference of less than one percentage point (see Table 4). Joint taxation operates in two ways. Firstly, it allows the transfer of unused personal allowances between partners. As a result, when both partners' incomes rise, the unused portion of the allowance falls, which marginally increases the income stabilisation coefficient. Secondly, joint taxation is also allowed in the highest tax bracket. The tax relief from this depends on the combined incomes of both cohabitees. Under the current rules, an increase in both partners' incomes can either raise or lower the tax deduction.[34] Overall, this leads to smaller tax increases when incomes rise, thereby reducing the income stabilisation coefficient.

33. According to OECD data, the Nordic countries score rather highly in the proportion of previous income paid as unemployment benefit, depending on the length of time unemployed.
34. The tax deduction depends on the minimum of: (1) the difference between the income tax base of a higher-income individual and the upper threshold limits. (2) Half of the difference between the upper and lower threshold limits. (3) Half of the difference between the upper threshold limits and the income tax base of a lower-income individual. See Ministry of Finance and Economic Affairs (2019).

Table 4. Income stabilisation coefficients without joint taxation

	Earnings decrease		Earnings and capital income decrease		Unemployment increases (5 ppt)	
	Proportionall	Increases inequality	Proportionall	Increases inequality	Random	Reweight
Total	38.4%	32.8%	37.0%	31.7%	60.8%	61.2%
Labour income	37.0%	31.0%	37.0%	31.0%	22.7%	27.9%
Capital income	-	-	19.2%	19.2%	-	19.2%
Labour income share	100.0%	100.0%	92.3%	92.2%	100.0%	86.6%
Child benefit	1.4%	1.8%	1.3%	1.7%	1.1%	3.1%
Unemploy-ment benefit	-	-	-	-	37.0%	31.3%

5.3 Changes in nominal amounts

Under the Icelandic tax system, nominal income amounts, tax thresholds and the personal allowance increase by 1% in real terms at the turn of the year. In all of the shocks outlined above, tax thresholds remain unchanged. One interpretation of this is that the shock is greater than the threshold increases from year to year. As a result, a positive income shock shifts individuals from lower to higher tax brackets. As discussed in Section 3, the stabilisation coefficient depends on the average tax rate and progressivity, i.e. the change in the average rate when income changes. When changes to tax thresholds are proportional to the tax base, and there is a proportional change in all incomes, the average tax rate for all individuals remains unchanged.[35] In this scenario, there is no bracket creep, and the latter effect stemming from tax progressivity, is not present. Table 5 presents income stabilisation coefficients when the nominal amounts in the tax system change proportionally with the tax base. This reduces the stabilisation coefficient from an income shock by almost a third. In an income shock the coefficient reduces by approximately 11 percentage points.

The unemployment shock stabilisation coefficients change much less: they fall by 6-7 percentage points. Increasing the nominal amounts does not change the unemployment benefit payments. As the tax system accounts for a small share of the stabilisation coefficient in an unemployment shock, reducing automatic stabilisation by income tax has a smaller effect on the stabilisation coefficient.

35. If the tax base increases by 5%, all thresholds change by 5%.

Table 5. Income stabilisation coefficients, nominal amounts change proportionally to the tax base

	Earnings decrease		Earnings and capital income decrease		Unemployment increases (5 ppt.)	
	Proportional	Increases inequality	Proportional	Increases inequality	Random	Reweight
Total	26.8%	21.9%	26.2%	21.7%	53.9%	55.0%
Labour income	25.4%	20.1%	25.4%	20.1%	15.8%	20.8%
Capital income	-	-	19.2%	19.2%	-	19.2%
Labour income share	100.0%	100.0%	92.3%	92.2%	100.0%	86.6%
Child benefit	1.4%	1.8%	1.3%	1.7%	1.1%	3.1%
Unemployment benefit	-	-	-	-	37.0%	31.3%

5.4 Social security contributions and pension contributions

The sections above only refers to direct taxes paid by individuals. Here I add an income tax paid by employers, social security contributions. Mandatory pension contributions paid by employees and employers are also included here. Though they are not tax payments and generate rights to pensions, they are mandatory and are calculated in proportion to earnings just as tax payments. Assuming the incidence is borne by employees, social security and pension contributions increase the stabilisation coefficient. When social security contributions are included and pension contributions are not, the income stabilisation coefficient increases by less than 4 percentage points for an income shock even though the tax rate is 6.35%. Although the social security contribution absorbs part of the income shock, the contribution from other components falls because the market income is now defined as including the social security contributions.

When social security and pension contributions are both included, the effect on income stabilisation is larger. The income stabilisation increases by roughly 13 percentage points for an income shock and by 3-7 percentage points for an unemployment shock.

Table 6. Income stabilisation coefficients with social security and pension contributions

	Earnings decrease		Earnings and capital income decrease		Unemployment increases (5 ppt.)	
	Proportional	Increases inequality	Proportional	Increases inequality	Randoı	Reweig
Total	50.9%	46.7%	48.8%	44.9%	67.8%	64.1%
Labour income	31.2%	26.6%	31.2%	26.6%	20.0%	25.3%
Capital income	-	-	19.2%	19.2%	-	19.2%
Labour income share	100.0%	100.0%	93.4%	93.3%	100.0%	87.5%
Child benefit	1.2%	1.5%	1.1%	1.4%	0.9%	2.9%
Unemploy-ment benefit	-	-	-	-	32.5%	29.1%
Social security contr.	5.4%	5.4%	5.4%	5.4%	5.8%	6.1%
Pension contribution	13.2%	13.2%	13.2%	13.2%	8.6%	2.5%

When these results are compared with the income stabilisation coefficients in Dolls et al. (2012) for Europe and the USA, the difference between Iceland and other countries is less stark. This is because the share of social security contribution in tax revenues is high in Europe. The average income stabilisation coefficient in Europe is 49.7% and is 37.7% with social security contributions and 50.9% with social security and pension contributions. The income stabilization coefficient for an unemployment shock is however high in an international comparison, also when pension contributions are excluded.

5.5 Income stabilisation across the income distribution

In a progressive tax system, income stabilisation will be heterogeneous across the income distribution. Table 7 presents income stabilisation coefficients for individuals with below and above median income.

For an income shock, the stabilisation coefficient is higher above the median income due to higher marginal tax rates at higher income levels. The difference between the

income groups will be higher as the marginal tax rates increase more as income grows. The difference between the income groups is slightly higher for an income shock that increases inequality.

The stabilisation coefficient for an unemployment shock is slightly higher for individuals with below median income. There is, however, a substantial difference in the decomposition. For individuals with below median income, unemployment benefit explains almost all of the stabilisation coefficient. The tax has almost no automatic stabilisation below the median income. Above the median income, the tax is around 40% of the stabilisation coefficient, and the unemployment benefit is around 60%.

Table 7. Income stabilisation coefficients for individuals above and below the median income

	Earnings change				Earnings and capital income change				Unemployment increases (5 ppt.) Random increase	
	Proportional decrease		Increases inequality. decline		Proportional decrease		I Increases inequality decline			
	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above
Total	31.9%	39.1%	27.8%	36.8%	31.4%	37.5%	27.7%	34.8%	82.2%	58.3%
Labour income	29.7%	37.8%	26.9%	34.4%	29.7%	37.8%	26.9%	33.4%	9.7%	24.3%
Capital income	-	-	-	-	10.0%	19.7%	10.0%	19.7%	-	-
Labour income share	100.0%	100.0%	100.0%	100.0%	97.3%	91.6%	99.1%	88.2%	100.0%	100.0%
Child benefit	2.3%	1.3%	1.0%	2.4%	2.2%	1.2%	1.0%	2.1%	1.4%	1.0%
Un-employ-ment ben.	-	-	-	-	-	-	-	-	71.2%	33.0%

The median is defined on the basis of gross income.

5.6 Demand stabilisation

This section presents demand stabilisation for different assumptions about the marginal propensity to consume (MPC). The demand stabilisation coefficients are lower than the income stabilisation coefficient unless the MPC is 1. The results are sensitive to the assumption about the MPC and whether the MPC is constant or heterogeneous across the income distribution. Table 8 shows demand stabilisation coefficients with MPC ranging from ¼ to 1 and for MPCs that are constant and heterogeneous across the income distribution, where MPC is higher in the lower income

quintiles. Demand stabilisation coefficients are shown with and without the VAT.

Table 8. Demand stabilisation with different MPC

	Earnings decline (5%, proportional)		Unemployment increases (5 ppt., randomly)	
MPC	Without VAT	With VAT	Without VAT	With VAT
1, constant	38.1%	47.7%	67.1%	60.8%
1/2, constant	19.1%	25.3%	34.5%	30.4%
1/2, heterogeny.	7.6%	10.4%	15.0%	13.7%
1/4 constant	10.2%	13.0%	17.5%	16.2%
1/4, heterogeny.	3.8%	5.3%	7.6%	6.9%

Heterogeneous along the income distribution, with MPC=1/2 on average: MPC_1=1, MPC_2=3/4, MPC_3=2/4, MPC_4=1/4 and MPC_5=0, where 1 refers to the lowest income quintile and 5 the highest. Heterogeneous MPC=1/4 is: MPC_1=1/2, MPC_2=1.5/4, MPC_3=1/4, MPC_4=0.5/4, MPC_5=5. Quintiles are defined on the basis of gross income.

The results reveal that with a uniform MPC, the demand stabilisation coefficients decrease proportionally to the MPC. For example, the demand stabilisation at an MPC of ½ is roughly half that at an MPC of 1. When the MPC decreases across income levels, the demand stabilisation is about half that of scenarios with a constant MPC. Higher-income groups absorb more of the overall income change than lower-income groups. In situations where the MPC falls with income, groups with a larger portion of the total income change have the lowest MPC.

5.7 Changes in unemployment benefit and tax rates

The main components of automatic stabilisation in Iceland are the income tax system and the unemployment insurance system. This section considers the effects of changes in the unemployment insurance system and tax system. Table 9 shows the effect of higher unemployment benefit, a higher entitlement ratio and higher marginal tax rates in all tax brackets. Changes in the unemployment insurance system will only affect automatic stabilisation for an unemployment shock. Increasing the marginal tax rate will affect automatic stabilisation both for income and unemployment shocks.

Table 9. Change in income stabilisation coefficient with changed unemployment benefit system and higher marginal tax rates

Higher unemployment benefit		Higher entitlement ratio		Higher marginal tax rate		
	Random unempl. incr. (5 ppt.)		Random unempl. incr. (5 ppt.)		Income shock (-5% prop.)	Random unempl. incr. (5 ppt.)
+10% PER 10%	+ 1.8 ppt.	+ 5 ppt. per 5 ppt.	+ 1.5 ppt.	+ 1ppt. per 1ppt.	+ 1.0 ppt.	+ 0.6 ppt.
+50% PER 10%	+ 1.6 ppt.	+ 10 ppt. per 5 ppt.	+ 1.5 ppt.	+ 5ppt. per 1ppt.	+ 1.0 ppt.	+ 0.6 ppt.
+100% PER 10%	+ 1.4 ppt.	+ 20 ppt. per 5 ppt.	+ 1.5 ppt.	+ 10ppt. per 1ppt.	+ 1.0 ppt.	+ 0.6 ppt.

In the baseline scenario, the entitlement ratio is 79%, i.e. unemployed people receive 79% of the maximum benefit. Effects of increasing unemployment benefits by 10-50%, entitlement ratio by 5-20 ppt. and the marginal tax rate by 1-10 ppt. on the income stabilization coefficient, measured per 10% increase in unemployment benefits, per 5 ppt. increase in entitlement ratio and per 1 ppt. increase in the marginal tax rate, respectively. For example, upon increasing unemployment benefits by 50%, the effects on the income stabilization coefficient are divided by 5.

Increasing the unemployment benefit by 10% increases the income stabilisation coefficient slightly more than increasing the entitlement ratio by 5 ppt. The cost of these reforms is very similar when measured in terms of higher income stabilisation coefficients. Increasing the income stabilisation coefficient by 1 ppt. costs in both reforms approximately 1.6% of the outlay on unemployment benefit in 2019, or 0.1% of income tax revenue.

Raising the marginal tax rate increases income stabilisation for both income and unemployment shocks. As income tax is a larger factor for an income shock stabilisation, it has a larger effect on the income stabilisation coefficient for an income shock than an unemployment shock. Increasing the marginal tax rate will, however, generate higher revenue – substantially more than the increase in expenditure caused by higher unemployment benefit.[36]

36. Labour supply and unemployment are assumed to remain unchanged under higher unemployment benefits and higher marginal tax rates.

6 Conclusion

The income stabilisation coefficient in Iceland is roughly 40% for an income shock and roughly 60% for an unemployment shock. These coefficients do not change dramatically when we consider different types of income and unemployment shocks. When income decreases in a way that changes inequality, income stabilisation coefficients are lower changes in inequality need however to be substantial for the effect to be significant. The higher stabilisation coefficient for unemployment shocks is explained by the unemployment insurance system. The capital income tax leads to a lower stabilisation coefficient because capital income is taxed at a lower and less progressive rate, but the overall effect on the automatic stabilisers is not large unless the proportion of the income growth made up of capital income is sufficiently large.

By international comparisons, Iceland has a relatively high income stabilisation coefficient. It is at a similar level to Denmark, Finland and Sweden, and higher than the European average. However, when social security and pension contributions are included, the coefficients in Iceland are similar to those in other European countries. When only social security contributions are included, and not pension contributions, the income stabilisation coefficients are smaller in Iceland than in the other Nordic countries.

When we analyse income stabilisation across income distribution, the difference between income groups is not large. However, there is a difference in the importance of the tax-transfer components. The tax system is more important at higher income levels, whereas the unemployment insurance system is more important at lower income levels. Finally, demand stabilisation coefficients are substantially smaller than income stabilisation coefficients unless the marginal propensity to consume is sufficiently large. Falling marginal propensity to consume from current income reduces demand stabilisation coefficients.

The effects of automatic stabilisation can be increased by changing the parameters of the unemployment system or the tax system. Raising unemployment benefits by 10% boosts the income stabilization coefficient in response to an unemployment shock from 60.8% to 62.6%. Implementing such a reform would approximately cost 0.2% of the income tax revenue collected in 2019.

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Appendix A

Market income Y^M is defined as the sum of labour and capital income,

$$Y^M = L + K$$

where L is earnings, wage income and self-employment income, and K is capital income, the sum of interest income, dividends, realised capital gains and rental income, K^R. Capital income other than rental income is denoted by K^O, where $K = K^O + K^R$.

Disposable income consists of market income minus net tax payments plus transfer payments,

$$Y^D = Y^M - T + B$$

where T are tax payments and $B = B^u + B^S$ are transfers, B^u is unemployment insurance, and B^S other transfers, social security and income-tested transfer payments.

There are separate tax schedules for labour and capital income. Tax payments on labour are denoted by $T^L\left(Y^T\right)$, where $Y^T = L + B - D$ is taxable income and D is deductions. Capital tax payments are denoted by $T^K\left(K^R, K^O\right)$.

Social security payments are paid by employers and are a linear function of earnings,

$$T^S = Lt_S,$$

where $t_s = 6.35\%$. Pension fund contributions in Iceland are paid by employees and employers. The total pension contribution is,

$$T^P = T^E + T^R$$

where T_E and T_R are the pension fund contributions of employees and employers, respectively,

$$T^E = Y^P t_E,$$
$$T^R = Y^P t_R,$$

where $Y^P = L + B^u$ is the income from which pension contributions are payable, roughly earnings plus unemployment benefits, and $t_E = 4\%$ and $t_R = 11.5\%$.

Government intervention is defined as net tax payments, i.e. $G = T - B$, which is a function of market income, socio-demographic characteristics (e.g. marital status, number of children and previous employment record), the parameters of the tax-transfers system and income.

For social security contributions and employers' pension contributions, it is assumed that the incidence is born by employees. In practice, this implies that social insurance contributions and employers' pension contributions are included in gross income, which is defined as,

$$Y^M = L + K + T^S + T^R.$$

Tax payments are then defined as,[37]

$$T = T^L + T^K + T^S + T^P$$

The income stabilisation coefficient is defined as the share of gross income change that the tax system absorbs,

$$\tau = \frac{\sum_i \Delta G_i}{\sum_i \Delta Y_i^M}$$

where $\Delta Y_i^M = \left(\lambda_i^L - 1\right) L_i + \left(\lambda_i^K - 1\right) K_i$ is the income shock for the individual, i as discussed in section 4, $\left(\lambda_i^L - 1\right)$ and $\left(\lambda_i^K - 1\right)$ is the relative size of the income shock on labour income and capital income, respectively. In the proportional income shock $\lambda_i^L = \lambda^L$ and $\lambda_i^K = \lambda^K$ are constants, whereas it depends on income in the inequality-changing income shock. In the unemployment shock, $\lambda^L \in \{0, 1\}$, individuals either lose all their employment income or it remains unchanged, capital income remains unchanged, i.e. $\lambda^K = 1$.

The income stabilisation coefficient can be decomposed into six terms,

$$\tau = \alpha\tau_L + (1 - \alpha)\,\tau_K + \alpha\tau_S + \alpha\tau_P + \tau_c + \tau_u,$$

where $\alpha = \frac{\sum_i \Delta L_i}{\sum_i \Delta Y_i^M}$ is the share of labour income in market income growth, and

- $\tau_L = \frac{\sum_i \Delta T_i^L}{\sum_i \Delta Y_i}$: income stabilisation coefficient for the labour income tax
- $\tau_K = \frac{\sum_i \Delta T_i^K}{\sum_i \Delta K_i}$: income stabilisation coefficient for the capital income tax
- $\tau_S = \frac{\sum_i \Delta T_i^S}{\sum_i \Delta L_i}$: income stabilisation coefficient for the employer's social security contribution
- $\tau_P = \frac{\sum_i \Delta T_i^P}{\sum_i \Delta L_i}$: income stabilisation coefficient for pension contributions
- $\tau_{cb} = -\frac{\sum_i \Delta CB_i}{\sum_i \Delta Y_i^M}$: income stabilisation coefficient for child benefit

37. Though pension contributions are tax payments, they are mandatory.

- $\tau_u = -\frac{\sum_i \Delta B_i^u}{\sum_i \Delta Y_i^M}$: income stabilisation coefficient for unemployment benefit.

The effect of automatic stabilisers on overall demand depends on the effects of disposable income changes on consumption, i.e. the size of the marginal propensity to consume,

$$\Delta C_i = a_i \Delta Y_i^D$$

where C_i is consumption and a_i is the marginal propensity to consume. VAT tax payments are a linear function of the tax rate,

$$T^c = Ct_c,\ \Delta T^c = a\left(\Delta Y^M - \Delta G\right),$$

where t_c is the VAT rate.[38] Similarly to the income stabilisation coefficient, the demand stabilisation coefficient is the share of market income that translates into a demand shock,

$$\tau_D = \frac{\sum_i a_i \Delta G_i}{\sum_i \Delta Y_i^M}$$

when the marginal propensity to consume is constant, i.e. $a_i = a \forall i$, then,

$$\tau_D = a\left[\alpha\tau_L + (1-\alpha)\tau_K + \alpha\tau_S + \alpha\tau_P + \tau_c + \tau_u ar + r_c\right],$$

where $\tau_c = \frac{\sum_i \Delta T_i^c}{\sum_i \Delta Y_i^M}$ is the income stabilisation coefficient from VAT.

38. The VAT rate is a weighted average of VAT rates. There are two VAT brackets in Iceland, 11% and 24%. Most goods are taxed at the higher rate, and some are VAT-exempt. The weighted average tax rate is the revenue from VAT as a proportion of consumption in the national accounts.

Appendix B

Figure A.1. Individual-level income stabilisation for a 5% proportional income decline without joint taxation.

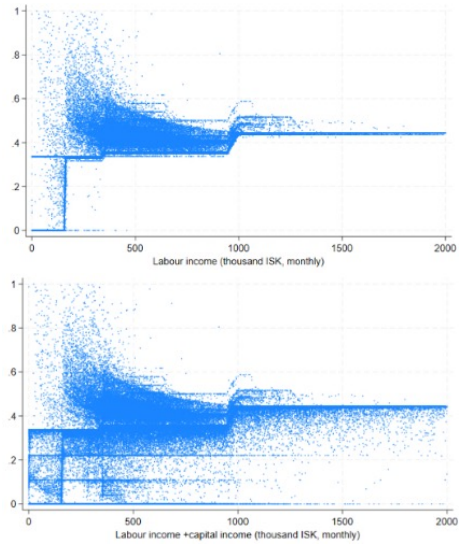


Figure A.2. Individual-level income stabilisation for a 5% proportional income decline without joint taxation. Only those without children.

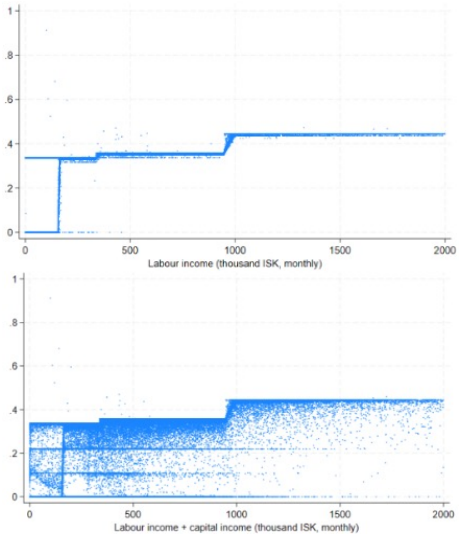


Figure A.3. Individual-level income stabilisation for a 5% proportional income decline, nominal amounts change proportionally to the change in income.

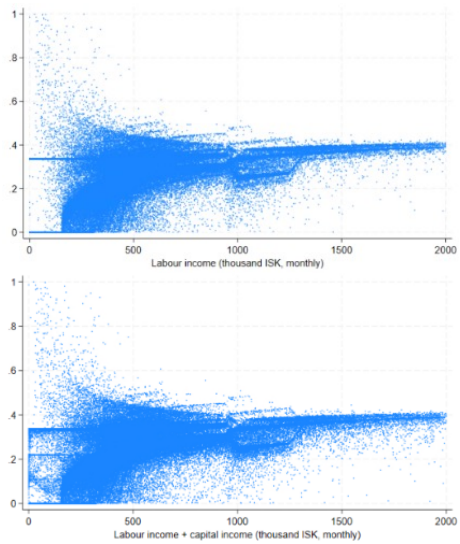
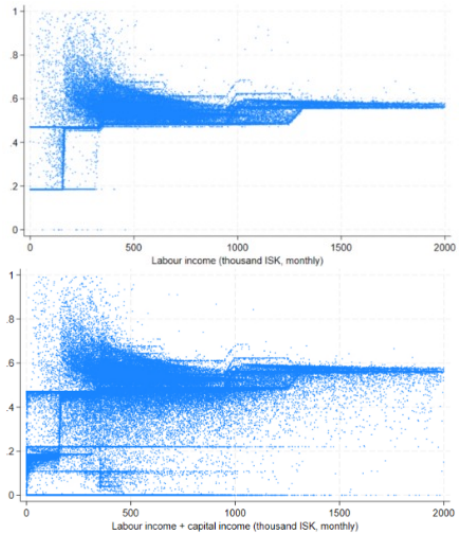


Figure A.4. Individual-level income stabilisation with social security and pension contributions for a 5% proportional income decline.



Comment on Arnaldur Sölvi Kristjánsson: Automatic stabilizers in Iceland

Katrin Olafsdottir

1 The importance of fiscal policy

There are two main tools in economic policy: fiscal policy and monetary policy. Fiscal policy allows changes to be made on either the expenditure side or the revenue side, and those actions can be discretionary or automatic. In general, tax and benefit systems are built in such a way that they reduce fluctuations in individuals' after-tax income. It is important for policy makers to know and understand the behaviour and magnitude of the automatic stabilisers, which is the topic of the article. It estimates the income stabilisation coefficient for Iceland in 2020 and, to my knowledge, does so for the first time, which makes the article an important contribution to policy discussion in Iceland.

2 Income stabilisation coefficient

The paper estimates the income stabilisation coefficient in the same way as Dolls et al. (2012), where

$$\frac{\textit{changes in net tax payments}}{\textit{changes in market income}}$$

The value of the coefficient can be interpreted as a measure of the income insurance provided by the government, where the higher (lower) the ratio, the higher (lower) the income insurance. In addition, according to Dolls et al. (2012), the definition of the income stabilisation coefficient is close to the definition of the average effective marginal tax rate.

The simulations in the paper clearly demonstrate the structure of the income tax system, and the results show that, as expected, the income stabilisation coefficient is in line with the tax brackets. The results also confirm that the Icelandic tax system does not differ significantly from the systems in the other Nordic countries.

3 Discussion

The results are highly interesting and will be helpful in the discussion and execution of fiscal policy. The Icelandic income tax system relies heavily on the use of tax credits: the personal tax credit, child benefits and the private housing interest payment subsidy. These are all geared towards lowering the tax burden on lower-income individuals and those with higher interest payments on their owner-occupied homes. It is, therefore, interesting and somewhat surprising that when income increases and decreases proportionally, the effects on the income stabilisation coefficient are largely symmetric, with the difference remaining within 0.4 percentage points (see Table 1).

One of the explanations has to do with the joint taxation of couples, which is a controversial issue in the Icelandic income tax system. If both partners have similar taxable incomes, the effects of joint taxation on their tax liability are negligible. However, if there is a significant difference in income between them, being taxed jointly reduces the liability, and the greater the income difference between the partners, the greater the reduction. In nearly 90% of cases where tax is levied jointly, the husband has a higher income than the wife (Fjármála- og efnahagsráðuneytið, 2019). In other words, joint taxation has a strong gender effect as it provides a negative incentive to work for married/cohabiting women. Let us take a simple example of a husband with a high income and a wife who does not work. If she took a job, the wife would pay a marginal tax rate of 46.2% on the first-earned króna instead of benefitting from the personal tax credit on her income. This will, of course, have an adverse effect on her willingness to take a job. Thus, joint taxation can have an adverse effect on the labour force participation rate for women. The effects of joint taxation are visible when comparing tables 1 and 4 in the article, where the income stabilisation coefficient is 0.3 percentage points higher without joint taxation when wages increase by 5%.

Table 7 shows the proportional effects of the tax credits on income distribution, where the income stabilisation coefficient is different depending on whether income is above or below the median. The difference is a staggering seven percentage points. The effect of a proportional decrease in wages is 31.9% if the income is below the median, compared to 38.1% for the population as a whole. On the other hand, with wages above the median, the income stabilisation coefficient measures 39.1%, which is close to the average of 38.1%. The redistribution of income due to the tax credits is, therefore, significant on wages below the median, while only mild effects are seen on wages above the median.

4 Next steps

The analysis in the article is static and based on the tax system and payments in 2020. The next step would be to estimate the behavioural effects of changes to the tax system. In their QMM model, the Central Bank of Iceland (2019) has estimated the size of the fiscal multiplier. For a government expenditure shock, the short-run fiscal multiplier has been estimated at 0.8, while for an income tax shock, the short-run multiplier has been estimated at 0.3.

5 Conclusion

In general, not much research has been conducted into the Icelandic income tax system. Interesting aspects can be identified from the estimates of the income stabilisation coefficient in this article, some of which I have discussed here. It provides important information that will enrich the discussion on fiscal policy in Iceland, and I hope further research will emerge in the years to come.

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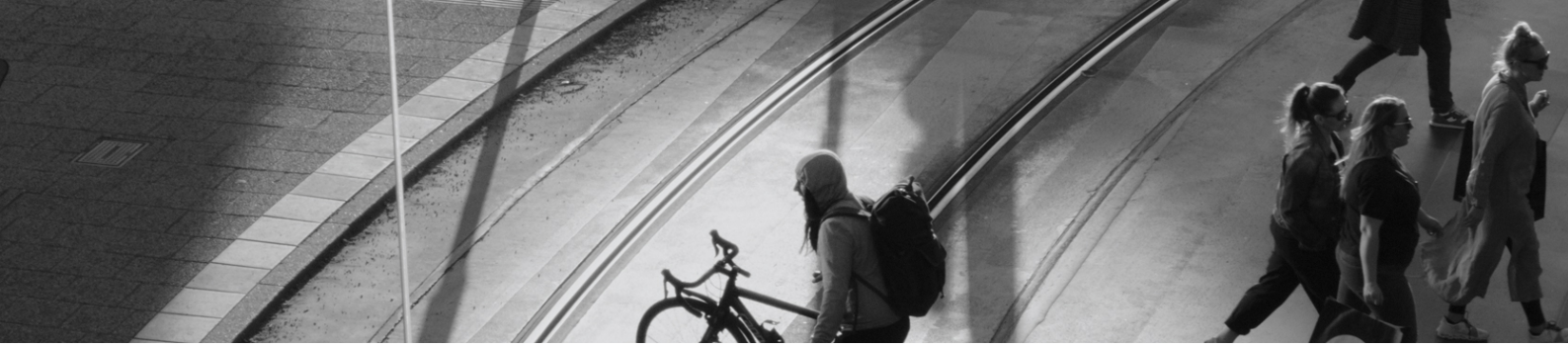

Nordic Economic Policy Review 2024

Inequality and Fiscal Multipliers: Implications for Economic Policy in the Nordic Countries

Hans A. Holter and Ana M. Ferreira

Abstract

This paper discusses recent research on the distribution of income and wealth as determinants of fiscal multipliers and the implications for economic policy in the Nordic countries. Economies with higher wealth inequality or lower income inequality have been shown to have more low-wealth and credit-constrained consumers. These consumers have less of an elastic labour supply response to fiscal policies that change their future income but more of an elastic response to policies that change their current income. The labour supply elasticity across the wealth distribution drives the fiscal multiplier. Nordic countries are characterised by high wealth inequality and low income inequality, two features associated with a large number of credit-constrained and low-wealth households. Thus, we expect fiscal stimulus programmes that increase consumers' current income to have more of an impact in the Nordic Region and programmes that increase future income to have less of an impact.

Keywords: fiscal multipliers; wealth inequality; income inequality, asymmetry

JEL Classification: E21, E62, H31, H50

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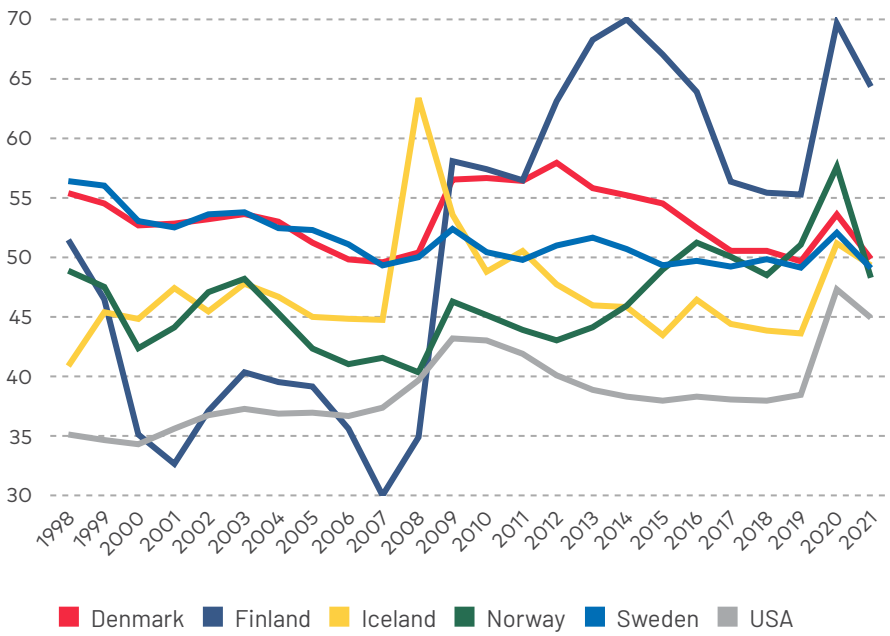
1 Introduction

Like other OECD countries, the Nordic nations use fiscal stabilisation policies to cushion the impact of business cycles and unforeseen events, such as the recent COVID-19 crisis. In response to the 2008 financial crisis, many countries pursued expansionary fiscal policies (see Figure 1), often financed by debt. Government deficits exceeded 10% in many of them, and this created an urgency for fiscal consolidation policies as soon as times returned to normal. Different policymakers and researchers appear to have had quite different expectations regarding the impact of the fiscal policies pursued, and the ensuing academic literature has actually broadened our views in this regard. As a result, the idea has emerged that there is no such thing as *a fiscal multiplier*. Instead, the multiplier now appears to be viewed as a function of national characteristics, the state of the economy, the type of fiscal instrument deployed and the size of the fiscal stimulus; e.g., Ilzetzki, Mendoza, and Vegh (2013), Brinca et al. (2016), Brinca et al. (2021), Brinca et al. (2023).

Figure 1. Government Spending as Percent of GD



Source: OECD (2023)

In this paper, we review some of the recent research on the determinants of fiscal multipliers and discuss the findings in light of the characteristics of the Nordic economies. Based on the results in Brinca et al. (2021), we also provide estimates of

fiscal multipliers for the Nordic countries in the context of fiscal consolidation. Brinca et al. (2016) found that countries with greater wealth inequality have larger fiscal multipliers when they finance higher government spending by means of current lumpsum taxes. Brinca et al. (2021) showed that the fiscal multipliers resulting from fiscal consolidation programmes in Europe after the financial crisis were larger in countries with higher income inequality. Brinca et al. (2023) found that fiscal multipliers are increasing in the spending shock, with more expansionary government spending shocks generating larger multipliers and more contractionary shocks generating smaller multipliers.

All three of the recent research papers by Brinca et al. (2016), Brinca et al. (2021) and Brinca et al. (2023) have emphasised the importance of low-wealth and credit-constrained households for fiscal multipliers. In all three papers, the mechanism works through the proportion of such households in the economy. As is well known in the economic literature, the elasticity of intertemporal substitution (EIS) is increasing in wealth[39], with constrained agents having the lowest EIS. Thus, the labour-supply elasticity of constrained and low-wealth agents in response to contemporaneous changes in income is higher. On the other hand, the hours worked by constrained and low-wealth agents are less responsive to future income shocks. Brinca et al. (2016) focus on a fiscal experiment in which higher government spending today is financed by a lumpsum tax, i.e., changes in transfers to households are used to finance the change in government spending. Under this fiscal policy, the labour supply of low-wealth consumers is highly elastic, and the fiscal multiplier proves to be more substantial in economies characterised by a higher prevalence of credit-constrained consumers. Letting heterogeneous discount factors be the source of wealth inequality and calibrating their model to match cross-country wealth distribution, the authors find that countries with greater wealth inequality have more credit-constrained households and, thus, larger fiscal multipliers.

In Brinca et al. (2021), the focus is on fiscal consolidation after the financial crisis. Various countries drew up plans to reduce debt over several years through austerity measures, tax hikes or a combination of the two. In this paper, the authors first show empirically that there is a positive correlation between higher income inequality and the size of fiscal multipliers induced by fiscal consolidation episodes. They then build a macro model with heterogeneous agents and incomplete markets to explain this observation. Also here, the mechanism works through the labour supply elasticity across the wealth distribution. In economies with more income risk, there is more precautionary saving and, thus fewer agents located close to the borrowing constraint. Fiscal consolidation programmes have a negative effect on output today through a future income effect. As government debt is paid down, the capital stock and thus the marginal product of labour (wage rate) rises, and thus expected lifetime income

39. See Domeij and Floden (2006) for the relationship between wealth and the EIS of labour and Vissing-Jørgensen (2002) for the relationship between wealth and the EIS of consumption.

increases. As a result, agents enjoy more leisure and cut their labour supply now, and output falls in the short term, despite the positive long-term effects of consolidation on output. Credit-constrained agents and agents with low wealth do, however, have a lower marginal propensity to consume goods and leisure out of future income. Economies with higher income risk have fewer credit-constrained consumers, and as a result, the effects of fiscal consolidation programmes are greater.

Finally, Brinca et al. (2023) argue that the fiscal multiplier is increasing in the spending shock, with more expansionary government spending shocks leading to larger multipliers and more contractionary shocks to smaller ones. They document that empirically, this holds true across time, countries and types of shocks. The mechanism again hinges on the elasticity of labour supply across the wealth distribution as well as a shift of the wealth distribution in response to shocks.

Nordic countries are characterised by a combination of high wealth inequality and low income inequality (both pre-tax and post-tax), which suggests there are large numbers of borrowing-constrained and low-wealth consumers in the Nordic economies. These are individuals or households who may have limited access to credit and financial resources and are more likely to increase their spending when they receive additional income from government programmes today. This, in turn, magnifies the fiscal multiplier effect of programmes that have an impact on income today (for example, the Bush tax credits[40]), as these consumers have a higher propensity to consume goods and leisure from contemporary income. At the same time, the fiscal multipliers from programmes that affect consumers' future income are reduced. We would, therefore, expect the fiscal multiplier from programmes providing direct transfers to households to be large in the Nordic countries. On the other hand, fiscal consolidation programmes that involve reducing government spending or increasing taxes to reduce government debt over time tend to affect consumers' future income, and we expect the fiscal multipliers from such programmes to be relatively small in the Nordic Region. In Section 4, we present different estimates of multipliers from fiscal consolidation programmes in OECD countries, in which the Nordic average ranges from 0.98–1.47 compared to an average of 1.20–1.77 for all of the countries in the sample.

The remainder of the paper is structured as follows. In Section 2, we present some stylised facts for the Nordic countries. We look at their fiscal systems as well as the distributions of earnings and wealth. In Section 3, we review recent research on the impact of the earnings and wealth distributions on fiscal multipliers and on the sensitivity of fiscal multipliers to the size of the fiscal shock. Section 4 discusses the implications of this research for the Nordic countries. We present our conclusions in Section 5.

40. All taxpayers received a check in the mail.

2 Stylised facts for the Nordic countries: Fiscal system, income and wealth distribution

Before diving into an analysis of fiscal multipliers in the Nordic countries, we will describe some features of their economies. In particular, we will look at their income and wealth distributions, but also their use of fiscal stabilisation policies and, to complete the picture, certain features of the Nordic welfare states which may have contributed to shape the income and wealth distributions.

Nordic economic policies are characterised by a combination of free market activity and government intervention, leading to the creation of a welfare state. All the countries that belong to the Nordic Council have targets or limits for fiscal balance and are committed to counter-cyclical fiscal policies (Gylfason et al., 2010). In some cases, it may be useful to distinguish the ones that belong to the European Union (EU) – Denmark, Finland and Sweden – and the ones that do not – Iceland and Norway – as the EU has its own guidelines for fiscal policy. The Nordic countries are known for their welfare states, consisting of various transfer and social insurance programmes. The Nordic welfare states were built up gradually in the years after World War II when the countries introduced high, progressive tax rates to finance welfare services.

For EU member states, the Union's fiscal rules include a ceiling for the nominal fiscal deficit of 3% of GDP, a structural balance and an expenditure benchmark requiring that higher government spending is matched by additional discretionary revenue measures. Denmark and Finland have incorporated these rules into their national policies, but Sweden has not. In 2000, Sweden introduced a new fiscal rule with a target of a government surplus of 1% of GDP on average over the business cycle. Iceland and Norway, which are outside the EU, set their own fiscal objectives. Iceland's target is that total liabilities must be under 30% of GDP. For Norway, the fiscal target is a structural budget balance for the central government after withdrawals from the oil fund. The structural non-oil deficit is allowed to vary over the business cycle and should, over time, be equal to the expected real return of the oil fund (Gylfason et al., 2010).

In the early 1990s, Sweden, Finland and Norway introduced the Nordic Dual Income Tax (DIT) system, which combines a flat tax on capital income with a progressive labour tax. Notably, labour taxes in the Nordic countries exhibit a higher degree of progressivity, especially compared to the United States but also to the European average, as shown in Table 1. Due to the implementation of the dual-income tax system, the Nordic countries tend to have very high and progressive tax rates on labour income in international comparisons but somewhat lower flat tax rates on capital income.

The Nordic countries are strongly committed to reducing income inequality by setting progressive tax rates that impose heavier burdens on higher earners. All the countries have a property tax and a value-added tax. The latter is quite high by international standards. In addition, Norway applies a tax on net wealth. Denmark abolished this tax in 1997, Sweden in 2007. In all of the countries, property tax is seen as a way to tax wealth. However, as this tax is levied on every household that owns its own home, it does not distinguish households with mortgages from those where the property is exclusively an asset. This means that it does not consider net household wealth.

Compared with other economies, the Nordic countries have high tax-to-GDP ratios, meaning that in these countries, a relatively large fraction of production goes to the government budget (see Table 2) and can be spent on health, education and other redistributive measures. These values have been relatively stable over time in the Nordic countries.

Table 1. Tax measures by country

Tax type	Norway	Sweden	Finland	Denmark	Iceland	USA	EU average (sample)
Average consumption tax		26%	27%	35%		5%	23%
Average labour tax		56%	49%	45%		28%	43%
Average capital tax		41%	31%	51%		36%	29%
Income progressivity tax index	0.169	0.223	0.237	0.258	0.204	0.137	0.183

Source: Average consumption, labour and capital tax are retrieved from Trabandt and Uhlig (2011). No data is available for Norway and Iceland. Income progressivity tax index data is retrieved from Holter et al. (2019).

Table 2. Total tax burden by country (2020)

Country	Tax-to-GDP ratio 2020 (as % of GDP)	Tax-to-GDP ratio 2021 (as % of GDP)
Denmark	47.11	46.88
Sweden	42.32	42.57
Finland	41.84	42.99
Norway	38.79	42.24
Iceland	36.1	35.1
USA	25.75	26.58
OECD	33.55	34.11

Source: OECD (2022)

As mentioned previously, the Nordic countries have a distinctive economic profile characterised by a notably low level of income inequality (see Table 3 for income inequality measures by country). The countries also have relatively high wealth Gini coefficients by international standards, indicating significant wealth disparities. As we will discuss below, this intriguing duality in income and wealth dynamics assumes paramount significance when considering the impact of fiscal policy on the nations' economies.

The low income Gini coefficients underscore that policies directed at income redistribution, such as progressive taxation and robust social welfare programmes, may be having the desired effect. The economic literature shows that progressive tax and transfer policies may even affect pre-tax income inequality in addition to their direct redistributive effect. However, other factors, such as strong trade unions, may also influence the pre-tax income Gini coefficients. An interesting point is that none of the Nordic countries have a statutory national minimum wage. Wages are negotiated by trade unions and the employers' organisations. Conversely, we observe that the wealth Gini coefficients are high in the Nordic countries. Fully understanding the drivers of wealth and income inequality is beyond the scope of this paper, but perhaps the fact that Nordic countries have relatively low flat tax rates on capital income and high and progressive tax rates on labour income is a reason why wealth inequality is particularly high. Another contributor may be the generous social security systems, which reduce the incentive for individuals to save, see Kaymak and Poschke (2016).

Table 3 provides data on the Gini coefficients for income and wealth in North America and Europe. The Nordic countries all have levels of income inequality well below the sample average. The average Gini coefficient for income is 0.32, for example, compared to 0.26 in Norway, 0.27 in Sweden and Iceland, 0.28 in Finland and 0.29 in Denmark.

Turning to the wealth Gini, the Nordic countries appear much more unequal. The differences between them are also greater, with Finland having one of the lower Ginis in the sample and Denmark having the highest. The average Gini coefficient for wealth is 0.67, compared to 0.61 in Finland, 0.63 in Norway, 0.66 in Iceland, 0.74 in Sweden and 0.81 in Denmark. This underscores the fact that, while income inequality is relatively low in the Nordic countries, wealth inequality remains comparatively higher. Both characteristics suggest the presence of numerous low-wealth and credit-constrained individuals, perhaps somewhat dependent on the underlying drivers of the distributions. Brinca et al. (2016) found that economies with more unequal wealth distribution had more credit-constrained individuals. In that paper taxes, social security and heterogeneous discount factors were allowed to vary between countries and shape the wealth distribution. Brinca et al. (2021) shows that income inequality caused by idiosyncratic income risk leads to more precautionary savings and fewer households close to the borrowing constraint.

Table 3. Income and wealth inequality by country

Country	Income Gini	Y20/Y80	Y10/Y90	Wealth Gini
Belgium	0.28	4.2	6.7	0.66
Brazil	0.53	17.4	41.8	0.78
Bulgaria	0.36	6.9	13.7	0.65
Canada	0.34	5.8	9.5	0.68
Czech Republic	0.26	3.8	5.7	0.62
Denmark	0.29	4.4	8.4	0.81
Finland	0.28	3.9	5.7	0.62
France	0.33	5.3	8.6	0.73
Germany	0.3	4.6	7	0.67
Greece	0.37	7.6	15.7	0.65
Hungary	0.31	4.9	8	0.65
Iceland	0.27	4	6	0.66
Ireland	0.33	5.3	8.3	0.58
Italy	0.35	6.7	13.8	0.61
Latvia	0.36	6.7	12.1	0.67
Netherlands	0.28	4.2	6.6	0.65
Norway	0.26	3.8	5.8	0.63
Poland	0.33	5.2	7.8	0.66
Portugal	0.36	6.6	12.6	0.67
Slovakia	0.26	4.1	6.6	0.63
Slovenia	0.26	3.7	5.7	0.63

Spain	0.36	7.2	15.2	0.57
Sweden	0.27	4.2	6.7	0.74
United Kingdom	0.33	5.4	8.5	0.70
USA	0.41	9.1	17.8	0.80
Sample average	0.32	5.8	10.6	0.67
EU sample average	0.31	5.24	9.21	0.65

Note: Gini coefficients for wealth are taken from Davies et al. (2007), and Gini coefficients for income are from Brinca et al. (2020). The retrieved values correspond to the year 2000.

3 What does recent research on the determinants of fiscal multipliers tell us?

The effects of different types of fiscal policy in different states of the world have been a topic of special interest to researchers and policy makers. The literature now seems to agree that there is no such thing as *a fiscal multiplier* but that the effects of fiscal policy depend on the fiscal instrument, the state of the economy and perhaps also the size of the fiscal stimulus, see among others Heathcote (2005), Auerbach and Gorodnichenko (2011), Ilzetzki, Mendoza, and Vegh (2013), Krueger, Mitman and Perri (2016), Brinca et al. (2016), Brinca et al. (2021), Ferriere and Navarro (2020), Brinca et al. (2023). In this section, we review some of the recent literature on the determinants of fiscal multipliers. We focus on three papers: Brinca et al. (2016), Brinca et al. (2021) and Brinca et al. (2023), and finish up with a brief summary of other related research.

3.1 Definition of the fiscal multiplier

The fiscal multiplier is the change in output resulting from a change in government expenditure. Often one is interested in the impact multiplier:

$$\textit{impact multiplier} = \frac{dY_0}{dG_0}$$

where dY_0 is the change in output from period 0 to period 1 and dG_0 is the change in government spending from period 0 to period 1. The cumulative multiplier at time T can be defined as:

$$\textit{cumulative multiplier}(T) = \frac{\sum_{t=0}^{t=T}\left(\prod_{s=0}^{s=t}\frac{1}{1+r_s}\right)dY_t}{\sum_{t=0}^{t=T}\left(\prod_{s=0}^{s=t}\frac{1}{1+r_s}\right)dGt},$$

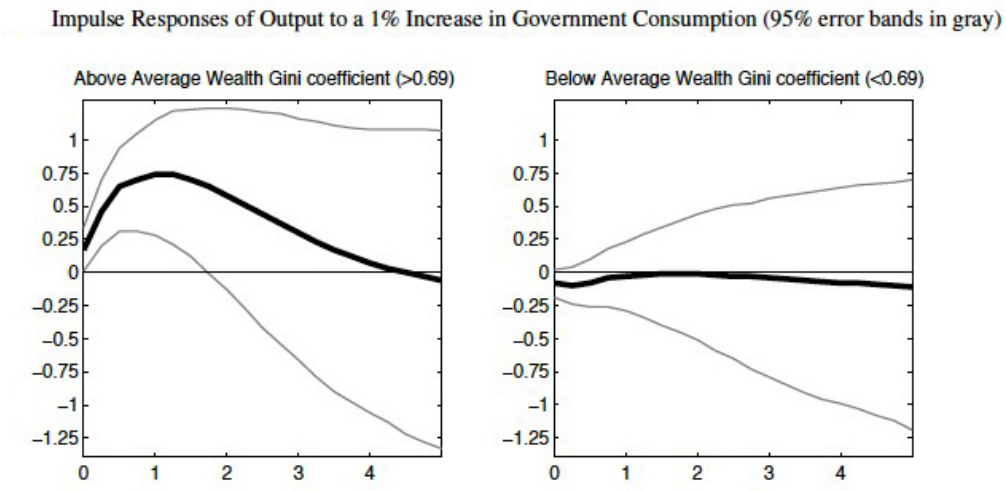
where dY_t is the change in output from period 0 to period t and dG_t is the change in government expenditure from period 0 to period t. There is considerable variation in

the estimates of fiscal multipliers across time, location and the method used to finance fiscal policies. Blanchard and Leigh (2013), for example, find that the International Monetary Fund's (IMF) average forecast of the fiscal multiplier prior to the fiscal consolidation programmes introduced after the 2008 financial crisis was about 0.5. They do, however, show that the IMF systematically underestimated the fiscal multiplier.

3.2 Fiscal Multipliers in the 21st Century; Brinca et al. (2016)

Brinca et al. (2016) study the impact of wealth inequality on the effectiveness of fiscal policy. They reveal that countries with greater wealth inequality tend to have more pronounced economic responses to increases in government spending. The starting point is an empirical analysis similar to the one performed by Ilzetzki et al. (2013) to identify the impact of different factors on fiscal multipliers across countries and time. Brinca et al. (2016) use their data and methods to study the impact of wealth inequality on fiscal multipliers. The metric for wealth inequality is the Gini coefficient, taken from Davies, Sandstrom, Shorrocks and Wolf (2007). The authors split the sample into two groups—countries with Gini coefficients above and below the sample mean—and run structural vector autoregressions (SVARs) for the two groups separately. They find that the group of countries with above-average Ginis have a significantly higher (and thus, by assumption, common) fiscal multiplier. Countries with greater wealth inequality have a statistically significant and positive response to an increase in government consumption up to almost two years after the shock, while the group of low-inequality countries does not exhibit this pattern. This can be seen in Figure 2, where a 1% increase in government consumption has a stronger effect on output in countries that have a wealth Gini coefficient above the average (left panel) than countries with one below it.

Figure 2. Fiscal multiplier by wealth inequality



Note: Impulse responses of output to 1% increase in government consumption.
Source: Brinca et al., 2016

Motivated by this stylised fact, Brinca et al. (2016) then develop a model based on modern, quantitative macroeconomic theory with heterogeneous consumers to ask whether differences in the distribution of wealth across countries can lead to differences in their respective aggregate responses to fiscal policy. They focus on a classic fiscal-policy scenario: a one-period unexpected increase in government expenditures financed by a one-period increase in lumpsum taxation (see, e.g., Baxter and King (1993)). Their model is a life-cycle, overlapping-generations (OLG) economy with uninsurable labour market risk, i.e., a life-cycle extension of Aiyagari (1994). The authors calibrate the model to match data from a number of OECD countries along the relevant dimensions such as the distribution of income and wealth, taxes, social security and the level of government debt.

Brinca et al. (2016) find that the size of the fiscal multiplier is highly sensitive to the fraction of liquidity-constrained individuals in the economy. Importantly, it also depends on the average level of wealth. Agents who are liquidity-constrained have a higher marginal propensity to consume goods and leisure, and they respond more strongly to fiscal shocks that change their current income. Larger labour-supply responses, in particular, lead to larger output responses. The marginal propensity to consume is also higher for relatively wealth-poor agents since they have a precautionary savings motive. Finally, relatively wealth-poor economies have a higher real interest rate, and the net present value of an otherwise equally large fiscal shock today is larger when the interest rate is higher. We should, therefore, expect fiscal multipliers to be high in countries with high inequality, a low savings rate and/or a high debt.

In a multi-country exercise, in which they calibrate the model to country-specific data from 15 OECD countries, the authors find that countries with greater wealth inequality have more credit-constrained and low-wealth consumers and, therefore, larger fiscal multipliers. They obtain raw correlations between the fiscal multipliers generated by their model and the wealth Ginis and capital-output ratios of 0.62 and -0.68, respectively. The regression coefficients when the fiscal multiplier is regressed on the Gini or on K/Y are, moreover, highly statistically significant. They find that an increase of one standard deviation in the wealth Gini coefficient for the countries in their sample raises the multiplier by about 17% of the average multiplier value. This finding leads to an expectation of higher multipliers in countries with high wealth inequality – as is the case of the Nordic countries.

3.3 Fiscal Consolidation Programs and Income Inequality; Brinca et al. (2021)

Brinca et al. (2021) study the fiscal multipliers resulting from empirically plausible fiscal policies that have been at the centre of the recent policy debate, namely the debt consolidation events that took place after the 2008 financial crisis. They argue that the recessive impacts of fiscal consolidation programmes are stronger when income inequality is greater. They begin by documenting a strong positive empirical relationship between greater income inequality and the fiscal multipliers resulting from fiscal consolidation programmes across time and place. They use data and methods from two recent, state-of-the-art empirical papers: i) Blanchard and Leigh (2013) and ii) Alesina et al. (2015).

They then study the effects of fiscal consolidation programmes financed through both austerity and taxation in a neoclassical macro model with heterogeneous agents and incomplete insurance markets. They show that such a model is well-suited to explain the relationship between income inequality and the recessive effects of fiscal consolidation programmes. The mechanism works through idiosyncratic income risk. In economies with lower income risk, there are more credit constrained households and households with low wealth levels due to less precautionary saving. Importantly, these credit-constrained households have less elastic labour supply responses to increases in taxes and decreases in government expenditure.

The first empirical exercise is a replication of the recent studies by Blanchard and Leigh (2013) and Blanchard and Leigh (2014), which find that the International Monetary Fund underestimated the impacts of fiscal consolidation in European countries. Brinca et al. (2021) reproduce the exercise conducted by Blanchard and Leigh (2013), now augmented with different metrics for income inequality. They find that during the consolidation in Europe in 2010 and 2011, the forecast errors are larger for countries with greater income inequality, implying that inequality amplified the recessive impacts of fiscal consolidation. For example, a one standard deviation increase in income

inequality, measured as Y10/Y90,[41] leads the IMF to underestimate the fiscal multiplier in a country by 66%.

In the second independent analysis, Brinca et al. (2021) use the Alesina et al. (2015) fiscal consolidation dataset from 12 European countries covering the period 2007–2013. Alesina et al. (2015) expand the exogenous fiscal consolidation dataset, known as IMF shocks, from Devries et al. (2011), who use Romer and Romer's (2010) narrative approach to identify exogenous shifts in fiscal policy. Again, Brinca et al. (2021) document the same strong amplifying effect of income inequality on the recessive impacts of fiscal consolidation. A one standard deviation increase in inequality, measured as Y25/Y75, increases the fiscal multiplier by 240%.

To explain these empirical findings, the authors develop an overlapping generations economy with heterogeneous agents, exogenous credit constraints and uninsurable idiosyncratic risk. They calibrate the model to match the data from a number of European countries along dimensions such as the distribution of income and wealth, taxes, social security and debt level. Then, they study how these economies respond to a gradual reduction in government debt, either by cutting government spending or increasing labour income taxes.

When debt is reduced by cutting government spending, households will shift their savings to physical capital, leading to an increase in the future marginal product of labour and, consequently, in future wages. This positive lifetime income shock leads to a decrease in labour supply and output in the short run. However, in the long run, the economy will converge to a point with more capital and higher output. Credit-constrained agents and agents with low wealth do, however, have a lower marginal propensity to consume goods and leisure out of future income (for constrained agents, the marginal propensity to consume out of future income is zero). Constrained agents have a lower intertemporal elasticity of substitution and do not consider changes to their lifetime budget, but only changes to their budget in the current period.

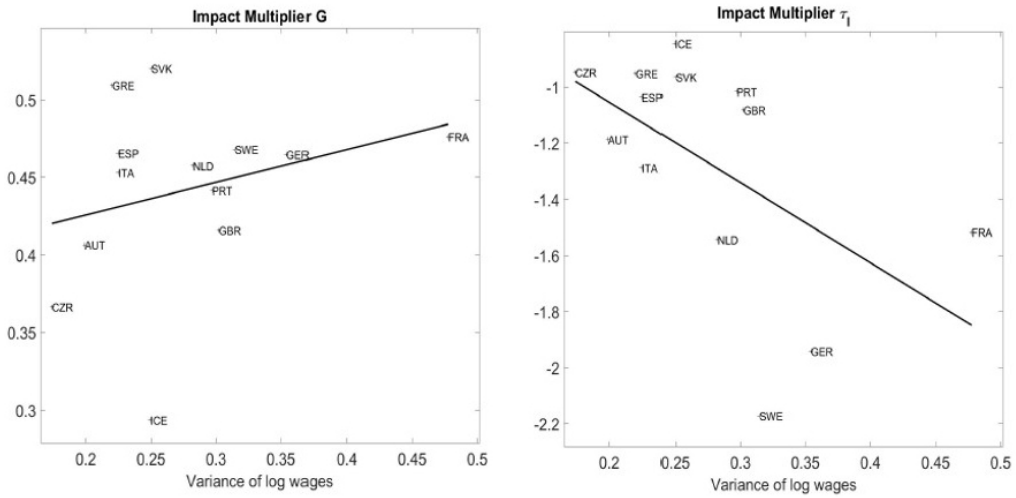
When fiscal consolidation involves raising taxes on labour income, it has a dual impact on labour supply. On the one hand, there is an income effect that can be positive or negative, depending on whether higher taxes or higher future wages dominate. For constrained agents, the income effects are positive because they do not take the future wage increase into consideration. On the other hand, the tax also induces a negative substitution effect from lower current net wages, which leads to a drop in labour supply. Unconstrained individuals prefer to decrease their labour supply today and utilise their savings or even borrow to maintain a consistent level of consumption. However, constrained individuals do not have the luxury of smoothing consumption in that way. They are compelled to increase their labour supply to avoid a significant drop in consumption. The drop in labour supply will thus be smaller for constrained agents or can even be positive if the income effect dominates.

41. The ratio of the top 10% income share over the bottom 10% income share.

When higher income inequality reflects more uninsurable income risk, there is a negative relationship between income inequality and the number of credit-constrained agents. Greater risk leads to more precautionary saving, which decreases the share of agents with binding liquidity constraints and low wealth. Since unconstrained agents have a higher intertemporal elasticity of substitution of labour and, thus, more elastic labour-supply responses to both tax-based and austerity-based consolidation, labour supply and output will respond more strongly in economies with higher inequality. This creates a correlation between fiscal multipliers and income inequality.

Brinca et al. (2021) conduct a cross-country analysis for 13 OECD countries in which they calibrate their model to match a wide range of different country characteristics, where, in addition to the distribution of income and wealth, they match data on taxes, social security and government debt. They show that even when introducing substantial country heterogeneity, they are able to reproduce the cross-country relationship between both tax-based and spending-based fiscal consolidation and income inequality.

Figure 3. Impact multiplier and variance of log wages



Note: Impact multiplier and variance of log wages. On the left, the cross-country data for a consolidation implemented by decreasing government expenditure, and on the right the cross-country data for a consolidation implemented by increasing the labour tax. Source: Brinca et al. (2021).

Although the mechanism in Brinca et al. (2016) and Brinca et al. (2021) is ultimately the same, it is relevant to highlight that low income inequality does not imply low wealth inequality, as can be seen in Table 3. In fact, Brinca et al. find close to zero cross-country correlation between wealth and income inequality. An important message from these two papers is that both wealth and income inequality can be determinants of the transmission of fiscal policies.

3.4 The Nonlinear Effects of Fiscal Policy; Brinca et al. (2023)

More recently, Brinca et al. (2023) introduced the concept of nonlinear fiscal multipliers. Most of the literature on fiscal policy treats the fiscal multiplier as one number: small and large shocks are assumed to have the same relative effects. Brinca et al. (2023) argue that fiscal multipliers from government spending shocks are increasing in the shock. In other words, large negative shocks yield smaller multipliers, while large positive shocks yield larger multipliers. They first present empirical evidence of this pattern and then show that it can be generated by a standard calibrated neoclassical model with incomplete markets and heterogeneous agents. The key mechanism, which hinges on the differential response of labour supply across the wealth distribution, is robust to assumptions about the form of financing and survives the introduction of nominal rigidities in the context of a Heterogeneous Agents New Keynesian (HANK) model. This type of model serves as a standard framework for examining fluctuations in aggregate demand in the literature.

The authors empirically motivate their paper by borrowing data and methodology from two well-known empirical studies (Alesina et al. (2015)[42] and Ramey and Zubairy (2018)). They find evidence of the size dependence of fiscal multipliers across time periods, countries and types of shocks. In their first empirical exercise, they adapt the methodology and data from Alesina et al. (2015), who use annual data on exogenous fiscal consolidation shocks identified via a narrative approach in 15 OECD countries during the period 1981–2014. They find the multiplier to be significantly — both quantitatively and statistically — larger for smaller fiscal consolidation shocks, with the effect being stronger for unanticipated rather than for anticipated shocks. They also find the results to be similar in the event of both spending-based and tax-based consolidations.

In the second empirical exercise, Brinca et al. (2023) borrow the data and methodology from Ramey and Zubairy (2018), who use quarterly data for the US economy going back to 1889 and an identification scheme for government spending shocks that combines news about forthcoming variations in military spending and the identification assumptions of Blanchard and Perotti (2002). Using the projection method in Jorda (2005), the authors find evidence that the fiscal multiplier increases with the size of the shock. This confirms the finding that the multipliers of larger consolidations are smaller than those of smaller negative fiscal shocks.

A standard neoclassical macro model with incomplete markets and heterogeneous agents can account for these empirical findings. The model is calibrated to match key features of the US economy, such as the income and wealth distributions, hours

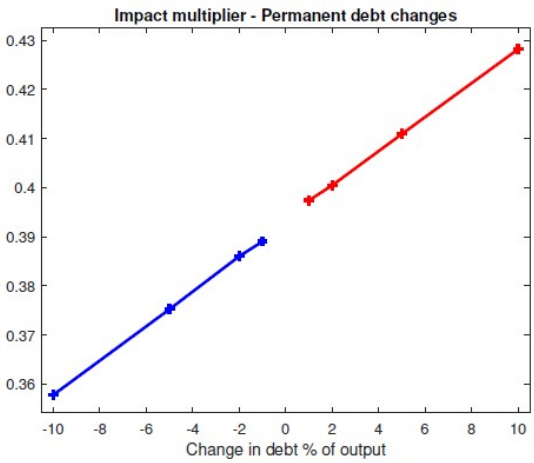
42. The same data set as in Brinca et al (2021).

worked and taxes. The equilibrium features a positive mass of agents who are borrowing-constrained. As discussed previously, the elasticity of intertemporal substitution (EIS) is increasing in wealth, with constrained agents having the lowest EIS. Thus, the labour supply elasticity of constrained and low-wealth agents is higher, and their work hours are more responsive to contemporaneous changes in income. At the same time, the hours worked of constrained and low-wealth agents are less responsive to future income shocks. This feature of the model, combined with shifts of the wealth distribution, drives the nonlinearity of fiscal policy.

A decrease in government spending that leads to a reduction in government debt generates a positive future income effect, as capital crowds out government debt and increases real wages. This positive shock to future income induces agents to reduce savings today, raising the mass of agents at or close to the borrowing constraint. Since wealthier agents react more to shocks to future income, their labour supply falls relatively more in response to this government spending shock. Combining these two forces delivers the following result: larger debt consolidations lead to a bigger increase in the mass of constrained agents, and these are the agents whose labour supply is less responsive to the shock. Therefore, larger fiscal consolidations (negative shocks to government spending) elicit a relatively smaller aggregate labour supply response, which results in a smaller fiscal multiplier. For increases in government spending financed by debt, the opposite is true: larger positive shocks induce larger labour supply responses and, thus, larger fiscal multipliers.

Balanced-budget government spending shocks also result in the same pattern for the size dependence due to the same mechanism. Consider the case of a fiscal contraction that is accompanied by a contemporary increase in transfer payments so that public debt is kept constant: the contemporary positive income effect elicits a much larger labour supply response by constrained and low-wealth agents. This positive income effect increases agents' wealth and pushes some of them away from the borrowing limit. This rightward shift in the wealth distribution decreases the aggregate labour supply response, as agents further away from the constraint respond less than those closer to it, resulting in a smaller response of output and a smaller fiscal multiplier. The larger the change in the transfer payments, the larger the shift in the wealth distribution and the larger the reduction in the aggregate labour supply elasticity and the fiscal multiplier. The opposite is true for fiscal expansions contemporaneously financed by a decrease in lumpsum transfers: the negative income effect decreases agents' wealth and shifts the wealth distribution to the left, where agents have a stronger labour supply response, leading to a larger multiplier, the larger the government spending shock.

Figure 4. Impact multiplier – permanent debt changes



Note: Impact of the fiscal multiplier for the permanent change in debt experiment as a function of the size of the variation of government expenditure (as a % of GDP). The blue line corresponds to government expenditure contractions; the red line represents expansions.
Source: Brinca et al. (2023).

Finally, Brinca et al. (2023) show that the key mechanism, which relies on the differential response of labour supply across the wealth distribution as well as on movements of that same distribution, survives the introduction of nominal rigidities. They repeat the experiments in a state-of-the-art HANK model as in Auclert et al. (2021) and find the same pattern of fiscal multipliers that are increasing with the size of the government spending shock. The results and mechanism are the same for both deficit and balanced budget fiscal experiments.

3.5 Other recent studies

A number of studies relate to the work done by Brinca et al. (2016), Brinca et al. (2021) and Brinca et al. (2023). Carroll et al. (2017) study the impact of the wealth distribution on the marginal propensity to consume. They measure marginal propensities to consume for a large panel of European countries and then calibrate a model for each country using net wealth and liquid wealth. The authors find the same type of relationship as documented by Brinca et al. (2016) for output multipliers: the higher the proportion of financially constrained agents in an economy, the higher the consumption multiplier.

Among empirical studies of fiscal multipliers, Ilzetzki et al. (2013) argue that multipliers are: (i) larger in developing countries than developed ones, (ii) larger under fixed exchange rates but negligible otherwise, and (iii) larger in closed economies than in open ones. The results in Auerbach and Gorodnichenko (2011) indicate that for a large

sample of OECD countries, the response of output is large in recessions but insignificant during normal times. Anderson, Inoue, and Rossi (2016) find that in the context of the US economy, individuals respond differently to unanticipated fiscal shocks depending on age, income level and education. Blanchard and Leigh (2013) and Blanchard and Leigh (2014) find that during the sovereign debt crisis in Europe, the implemented fiscal consolidation programmes had a recessive effect on output and show that this effect is underestimated by the IMF. Alesina et al. (2015) find that tax-based consolidations lead to longer and deeper recessions than spending-based consolidations. Huidrom et al. (2020) find that the fiscal position plays a crucial role in shaping the magnitude of fiscal multipliers. Specifically, the estimated multipliers are consistently lower when government debt levels are elevated[43] [44].

Among quantitative macro papers studying the determinants of fiscal multipliers, Heathcote (2005) studies the effects of changes in the timing of income taxes and finds that tax cuts can have large real effects and that the magnitude of the effect depends crucially on the degree of market incompleteness. Hagedorn et al. (2019), in a New Keynesian model, present further evidence of the relevance of market incompleteness in determining the size of fiscal multipliers. Ferriere and Navarro (2020) provide empirical evidence showing that in the post-war U.S., fiscal expansions are only expansionary when financed by increases in tax progressivity. Finally, Krueger, Mitman, and Perri (2015) conduct a case study of the recent U.S. recession in a business-cycle model with infinite horizon. They find that the presence of wealth-poor individuals is important for the response of macroeconomic aggregates to the business-cycle shock.

43. Brinca et al. (2016) points out that in closed economies, government debt has the effect of crowding out physical capital, leading to a rise in the real interest rate. This elevation of the real interest rate causes an increase in the net present value of shocks affecting current income and thus larger fiscal multipliers from current income shocks. Conversely, it leads to a decrease in the net present value of shocks impacting future income and, thus, to smaller fiscal multipliers from these shocks. In small open economies, we may not see the same effect. However, there are reasons to believe that even in small open economies, debt would affect prices. For example, Chakraborty et al. (2017) document that, across countries, a disproportionate amount of commercial debt is held by nationals, and in the presence of some form of home-equity bias, a reduction in government debt could have real effects in the economy.
44. See Table 6 in the appendix for a comparison of debt and wealth levels in advanced economies.

4 Implications for fiscal policy in the Nordic countries

In this section, we discuss the implications of the recent economic literature on the determinants of fiscal multipliers for fiscal policy in the Nordic countries, taking their economic characteristics into consideration. We conclude by using the results in Brinca et al. (2021) to obtain estimates of fiscal multipliers from fiscal consolidation in the Nordic countries.

Fiscal multipliers are significantly affected by income and wealth inequality due to their effect on low-wealth and credit-constrained consumers. The Nordic countries are notable for their significant levels of wealth inequality but low income inequality, see Table 3[45]. The implication of this, perhaps somewhat dependent on the underlying reasons for the low income inequality and high wealth inequality, is that there will be a large fraction of low-wealth and credit-constrained consumers in the economy. Brinca et al. (2016) find that when they calibrate their model to match the wealth distribution of different OECD economies and allow, among other factors, the pension system and heterogeneous discount factors to vary across countries, the countries with more unequal wealth distributions have more low-wealth consumers. If higher income inequality is at least partially driven by idiosyncratic income risk, then the implication is that greater income inequality leads to more precautionary savings and fewer low-wealth consumers close to the borrowing constraint. Since the Nordic countries have high wealth inequality and low income inequality, both of these features point in the direction of large numbers of low-wealth consumers. Indeed, Table 4, which is reproduced from Brinca et al. (2016), shows that in a sample of 15 OECD countries, Sweden stands out as the single country with the lowest cumulative share of wealth in the bottom deciles. Finland also has a relatively low share of wealth in the bottom wealth deciles[46].

45. See also Guvenen et al. (2022) for measures of income inequality across countries and changes over time. Many developed countries have recently experienced large increases in inequality. Notably, Norway, Denmark and Sweden stand out as countries with low income inequality and relatively modest growth in income inequality over time.
46. For comparison, Table 7 in the appendix displays cumulative wealth distributions from Davies et al. (2017). In a sample of 15 OECD countries, Denmark and Norway have the least wealth concentrated in the bottom deciles of the wealth distribution.

Table 4. Cumulative distribution of net wealth

	10%	20%	30%	40%	50%	60%	70%	80%	90%	Gini
HFCS sample										
Austria	-1.3	-1.1	-0.7	0.2	2.2	6.5	13.5	23.9	40.6	0.732
Finland	-1.2	-1.1	-0.7	1.1	5.2	11.9	21.5	35.1	55.0	0.646
France	-0.2	-0.1	0.4	1.8	5.4	11.6	20.4	32.3	49.7	0.655
Germany	-0.6	-0.5	-0.1	0.8	2.7	6.4	12.7	23.5	40.4	0.729
Greece	-0.2	0.3	2.4	6.5	12.5	20.3	30.4	43.6	61.6	0.545
Italy	0.0	0.4	1.7	4.9	10.2	17.4	26.7	38.5	55.2	0.590
Nether-lands	-3.0	-2.8	-2.0	0.4	5.0	12.3	23.2	38.4	59.8	0.638
Portugal	-0.2	0.1	1.4	4.1	8.2	13.9	21.4	31.9	47.1	0.644
Spain	-0.3	0.6	3.3	7.3	12.9	19.9	28.7	40.1	56.6	0.562
Other sources										
Canada	-1.8	-2.1	-2.1	-1.5	1.0	6.0	14.2	27.0	46.7	0.725
Japan	-3.3	-3.3	-2.9	-1.1	2.9	9.4	19.1	33.1	53.8	0.685
Sweden	-8.3	-9.8	-10.0	-9.7	-7.8	-3.2	5.2	19.0	41.7	0.866
Switzer-land	0.2	0.6	1.2	2.1	3.6	6.0	9.8	16.1	28.5	0.764
UK	-0.8	-0.8	-0.5	1.2	5.4	11.7	21.0	34.0	54.3	0.649
US	-1.2	-1.4	-1.4	-1.0	0.4	3.2	8.1	15.8	29.6	0.796

Note: Cumulative distribution of net wealth (variable: DN3001) from HFCS. For Canada, Japan, Sweden, the UK and the US, data is from the Luxembourg Wealth Study (LWS) Database (2015). For Switzerland, Davies, Sandstrom, Shorrocks, and Wolff (2011).

Having established that the Nordic economies have a large fraction of low-wealth consumers, the implication is, according to Section 3, that the fiscal multipliers from programmes that affect consumers' current income will be high, and the fiscal multipliers from programmes that affect their future income will be low in the Nordic countries. This means that the effect of policies such as the Bush tax rebate cheques of 2001 and 2008, when taxpayers received cheques in the mail, should be large in the Nordic countries. On the other hand, the effects of a fiscal consolidation programme running over many years should be smaller in the Nordic economies than in the average OECD economy. We can use the empirical study by Brinca et al. (2021) to obtain estimates for the fiscal multipliers from fiscal consolidation in the Nordic countries after the 2008 financial crisis.

Brinca et al. (2021) take the seminal study by Blanchard and Leigh (2013) and show that the IMF forecast error for the fiscal multiplier from fiscal consolidation

programmes was strongly correlated with income inequality. Using the regression results in Table 1 in Brinca et al. (2021), along with their inequality measures, we can obtain estimates of the fiscal multiplier in the Nordic countries (see the Appendix for a more detailed explanation of the approach). Table 5 shows the estimated fiscal multipliers for the Nordic countries, using different inequality measures, as well as the sample average.

Table 5. Calculations of fiscal multipliers

	Y10/Y90	Y2/Y98	Y5/Y95	Y25/Y75	Y20/Y80	Income Gini
Average	1.20	1.25	1.26	1.34	1.31	1.77
Denmark	0.78	0.89	0.93	1.03	0.93	1.21
Norway	0.86	1.04	1.02	1.03	0.95	1.35
Sweden	0.88	0.93	0.98	1.10	1.02	1.41
Finland	1.15	1.25	1.21	1.28	1.25	1.69
Iceland	1.21	1.63	1.33	1.21	1.18	1.69

Note: Authors' calculations.

We observe that the average estimate of the fiscal multiplier for 26 European economies is between 1.2 and 1.77, depending on which income inequality measure is used to augment the regression in Blanchard and Leigh (2013). These estimates are generally quite high, and it seems like the fiscal consolidation in Europe had a strong negative impact on the economy. By comparison, Brinca et al. (2016) find that the fiscal multiplier is in the 0.5–0.75 range for economies with high wealth inequality and close to 0 for economies with low wealth inequality when they replicate the SVAR exercise in Ilzetzki et al. (2013). Generally, the variation in fiscal multipliers has been observed to be quite large across time and place. However, the impact of fiscal consolidation in the Nordic countries is generally below the average due to low income inequality (the only exceptions are Iceland in the cases of the Y10/Y90 and Y2/Y98 shares). In Denmark, the multiplier is estimated to be in the 0.78-1.21 range, in Norway 0.86-1.35, in Sweden 0,88-1.41, in Finland 1.15-1.69, and in Iceland 1.18-1.69.

5 Conclusions

Recent research on the determinants of fiscal multipliers has established that they are highly state dependent, policy instrument dependent and size dependent. In particular, the income and wealth distributions are important for the effects of fiscal policy. In economies with high wealth inequality, we can expect to see larger fiscal multipliers from programmes that change consumers' current income (such as direct transfers) and lower fiscal multipliers from policies that change their future income (such as debt consolidation programmes). In economies with higher income inequality, we can expect to see smaller fiscal multipliers from programmes that change consumers' current income and larger multipliers from programs that change their future income. The mechanism goes through the labour supply elasticity across the wealth distribution. Low-wealth consumers are more responsive to current income shocks and less responsive to future income shocks. Economies with high wealth inequality or low income inequality are found to have many low-wealth consumers, and the aggregate labour supply elasticity is thus high with respect to current income shocks and low with respect to future income shocks.

The fiscal multiplier of government purchases is increasing in the spending shock, with more expansionary government spending shocks generating larger multipliers and more contractionary shocks generating smaller multipliers. This pattern is also caused by low-wealth consumers being more responsive to current income shocks and less responsive to future income shocks combined with the movement of the wealth distribution in response to current and future income shocks. An increase in government spending, financed by a negative shock to current income (lumpsum tax), shifts the wealth distribution to the left and increases the aggregate labour supply response to current income shocks. This leads to a fiscal multiplier that is increasing in the government spending shock. On the other hand, an increase in government spending, financed through a negative shock to future income (uptake of debt) shifts the wealth distribution to the right and thus increases the aggregate labour supply elasticity in response to future income shocks. This again leads to a fiscal multiplier that is increasing in the government spending shock.

The Nordic countries exhibit low income inequality but comparatively high wealth inequality. This duality in income and wealth distribution has important implications for the size of fiscal multipliers. The combination of high wealth inequality and low income inequality leads to a large fraction of low-wealth households. This implies that the fiscal multipliers from programmes that increase consumers' current income, such as direct transfers, will be high, but the fiscal multipliers from programmes that change consumers' future income, such as long-lasting fiscal consolidations, will be low in the Nordic countries.

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Appendix A: Calculation of Country-specific Fiscal Multipliers

To calculate the fiscal multipliers in Section 4 we proceed as follows. Brinca et al. (2021) estimate the below regression:

$$\Delta Y_{i;t:t+1} - \hat{E}\{\Delta Y_{i;t:t+1}|\Omega_t\} = \alpha + \beta \hat{E}\{F_{i;t:t+1|t}\Omega_t\} + \gamma I_{i,t-1} + l\left(\left(\hat{E}\{F_{i;t:t+1|t}\Omega_t\}\right)(I_{i,t-1} - \mu_I)\right) + \epsilon_{i,t:t+1}$$

where $\Delta Y_{i;t:t+1} - \hat{E}\{\Delta Y_{i;t:t+1}|\Omega_t\}$is the forecast error in GDP growth from Blanchard and Leigh (2013), $F_{i;t:t+1|t}$ is the planned fiscal consolidation from time t to $t+1$, $I_{i,t-1}$is the inequality measure for country $i$and μ_I represents the mean of I. They use lagged inequality measures to guarantee that it is not influenced by the GDP growth rate or the fiscal consolidation measures. Their regression results are reproduced below:

Table 6

Coefficients	(1) Blanchard-Leigh	(2) Y25/Y75	(3) Y20/Y80	(4) Y10/Y90	(5) Y5/Y95	(6) Y2/Y98	(7) Income Gini
β	-1.095***	-0.841***	-0.806***	-0.697**	-0.759***	-0.750***	-1.267***
	(0.255)	(0.227)	(0.234)	(0.252)	(0.240)	(0.238)	(0.275)
γ		-0.194	-0.144	-0.065	0.008	0.018	0.273**
		(0.385)	(0.291)	(0.120)	(0.036)	(0.032)	(0.121)
ι		-0.251	-0.238	-0.154***	-0.071***	-0.066***	-0.085
		(0.208)	(0.153)	(0.054)	(0.021)	(0.019)	(0.084)
Constant	0.775*	2.150	2.041	1.812	0.805	0.558	-9.344**
	(0.383)	(2.632)	(2.422)	(1.758)	(0.928)	(0.597)	(4.463)
Observations	26	26	26	26	26	26	26
R-squared	0.496	0.545	0.559	0.612	0.600	0.610	0.624

[a] *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.
[b] The table displays the results from augmenting the regression in Blanchard and Leigh (2013) with different measures of income inequality and an interaction term between income inequality and planned fiscal consolidation.
[c] Y25/Y75, Y20/Y80, Y10/Y90, Y5/Y95 and Y2/Y98 represent the share of income of the top 25%, 20%, 10%, 5% and 2% divided by the share of the bottom 25%, 20%, 10%, 5% and 2%.

The IMF's forecasted fiscal multiplier in Blanchard and Leigh (2013) is 0.5. It was, however, underestimated, and Brinca et al. (2021) find that the forecast error is correlated with income inequality. Thus, to obtain estimates of the country-specific fiscal multipliers, we simply add $\beta$and $l\,(I_{i,t-1} - \mu_I)$ to 0.5, the value that was estimated as the average multiplier for all the countries prior to the 2008 crises by the IMF.

Appendix B: Additional Tables

Table 7. Debt and wealth by country

	Adults	Debt per adult - USD	Wealth per capita – USD	Wealth per adult - PPP
2014				
Austria	6 160	14 777	70 273	114 118
Belgium	7 803	12 274	113 163	186 900
Canada	22 764	21 093	80 460	134 477
Denmark	4 069	41 006	79 980	110 522
Finland	3 902	9 957	59 237	87 914
France	44 066	14 446	77 224	125 122
Germany	64 614	21 804	70 672	110 891
Greece	8 535	2 962	57 659	122 217
Iceland	194	30 490	160 945	213 118
Italy	45 895	8 523	96 242	169 367
Norway	3 320	31 874	82 041	135 986
Portugal	7 885	11 336	37 018	84 580
Spain	31 695	10 032	50 790	105 061
Sweden	6 720	18 020	55 403	76 036
United Kingdom	44 072	24 851	121 950	163 036
United States	205 439	33 800	147 109	206 116
Europe	550 184	9 730	45 951	
2000				
Austria	6 794	29 516	169 577	210 985
Belgium	8 423	33 419	215 393	277 328
Canada	27 514	58 076	205 004	245 149
Denmark	4 209	105 273	198 884	208 989
Finland	4 216	40 381	120 618	138 289
France	48 343	34 120	195 247	260 286
Germany	67 081	28 457	155 759	201 388
Greece	9 123	16 039	93 807	152 401
Iceland	257	58 529	268 950	335 613
Italy	49 210	22 293	175 160	235 464
Norway	3 770	103 772	248 788	272 351

Portugal	8 632	20 630	65 095	51 607
Spain	37 458	25 850	97 326	150 837
Sweden	7 348	58 867	181 343	210 294
United Kingdom	48 543	54 137	234 603	279 290
United States	242 017	55 683	247 215	336 522
Europe	583 929	22 681	103 384	

Note: Data from Davies et al. (2017).

Table 8. Cumulative wealth distributions

Country	Year	10%	20%	30%	40%	50%	60%	70%	80%	90%
Austria	2010	-0.7	-0.6	-0.2	0.7	2.7	6.7	13.3	77.1	61.7
Canada	2012	-0.2	-0.1	0.5	2.2	5.6	11.3	20	67.2	47.7
Denmark	2009	-15.3	-18.9	-20.2	-20.2	-19	-15	-6.8	92.8	69.3
Finland	2010	-1.2	-1.1	-0.7	1.1	5..2	11.9	21.5	64.9	45
France	2010	-0.2	-0.1	0.4	1.8	5.4	11.6	20.5	67.5	50
Germany	2010	-0.6	-0.5	-0.1	0.8	2.8	6.5	12.9	76.3	59.2
Greece	2009	-0.2	0.3	2.3	6.4	12.4	20.2	30.2	56.7	38.8
Italy	2010	-0.1	0.1	1	4.1	9.4	16.5	25.6	62.6	45.7
Japan	2009	0.4	1.3	3.3	6.9	12.5	20.2	30.7	55.3	34.3
Nether-lands	2009	-3.5	-3.3	-2.4	0	4.9	12.4	23.5	61.3	40.2
Norway	2013	-5	-5.4	-5.1	-3.2	1.1	8.1	17.9	68.6	49.5
Portugal	2010	-0.2	0.1	1.3	4.1	8.3	13.9	21.5	67.9	52.7
Spain	2008	-0.4	0.3	2.8	6.7	12	18.9	27.5	61.3	45
US	2013	-0.7	-0.5		0	1.1	3.2	6.9	87	75
UK	2014	-1	-0.8	-0.1	1.6	5	10.8	19.4	67.8	48

Note: Cumulative distribution of net wealth from Davies et al. (2017).

Comments on Hans A. Holter and Ana M. Ferreira: Inequality and Fiscal Multipliers: Implications for Economic Policy in the Nordic Countries

Juha Junttila

1 Introduction

The article by Hans Holter and Ana Ferreira draws together previous studies that have analysed the role of income and wealth distribution as the determinants of fiscal multipliers. Based on these findings, they outline implications for fiscal stimulus policies in the Nordic countries. The main outcomes from the papers studied are that, first of all, fiscal multipliers vary significantly over time and space. Second, the previous studies show that countries with high wealth and income inequality have larger fiscal multipliers, and the multiplier is larger in the event of a spending shock. Hence, expansion/contraction of government spending results in larger/smaller multipliers. Furthermore, the intertemporal substitution of labour increases with wealth, resulting in a situation where credit-constrained and low-income agents have less elastic labour supply responses to fiscal policies that change future income but more elastic labour supply responses to fiscal policies that change current income. One key result for the Nordic countries is that they are characterised by high wealth inequality but low income inequality, both of which are associated with large numbers of credit-constrained and low-wealth households. Hence, it is legitimate to expect fiscal stimulus programmes to have a significant impact and increase consumers' current income and less of an impact on future income. In empirical results based on a sample of OECD countries, the estimates of fiscal multipliers from consolidation programmes range from 0.98 to 1.47 in the Nordic countries but from 1.20 to 1.77 for the sample as a whole, indicating quite a remarkable difference in absolute terms.

2 More details about the paper and main comments about the content

The main suggestions in this paper are based on three papers by Pedro Brinca and a varying set of his co-authors, one of whom, for each paper, is Hans Holter. In Brinca et al. (2016), the main focus is on a case where an increase in current government spending is financed by a lump-sum tax. In this specific situation, the authors find that the fiscal multiplier is larger in economies with more credit-constrained consumers and that countries with greater wealth inequality have more credit-constrained households and, therefore, larger fiscal multipliers. On the other hand, in Brinca et al. (2021), the authors find that during periods of fiscal consolidation, there is a positive correlation between higher income inequality and the size of fiscal multipliers (negative effect on current output through a future income effect) and that the effects of fiscal consolidation are greater in economies with higher income risk and fewer credit-constrained consumers. Finally, Brinca et al. (2023) find that the fiscal multiplier is larger during spending shocks (expansive/contractionary shocks result in larger/smaller multipliers), and this holds true across time, countries and types of shocks.

In terms of content, one of the most interesting tables in the paper is Table 3: 'Income and wealth inequality by country', which clearly highlights the fact that in Nordic countries, the income inequality (Gini) is much smaller on average than in the other countries, but that the wealth Gini is clearly higher in some cases (especially in Denmark and Sweden). One of the questions that naturally arises from this finding is what the time variation is in the inequality measures, especially for wealth inequality, and how might that affect the results? Another interesting question might be the role of household debt, which has been an increasing long-term problem, at least in Finland. In any further analyses, it would, therefore, be interesting to look at the role played by controlling the share of housing market wealth in the overall (gross) wealth, and in the case of net wealth, also the role of mortgage debt, i.e., housing loans.

As a more general suggestion for further studies, the role of the level of general government debt may be relevant to be taken into account as well because recent studies have found it to be very important in determining the size of fiscal multipliers. For example, Eminidou et al. (2023) find that the effects of fiscal policy shocks vary depending on the level of public debt in an economy. Furthermore, according to their results, it is essential to control for both the cross-sectional and time-serial high-debt and low-debt states when analysing the size of fiscal multipliers. To put it more precisely, in their analyses of the euro area economies, cross-sectional debt variation is more important than time-serial debt variation in driving the differences in how macroeconomic variables respond to government spending shocks. Other recent studies on the role of public debt in fiscal policy efficiency include the papers by Geiger et al. (2022), Gornicka et al. (2020), and Huidrom et al. (2020).

3 Proposals for policy discussions based on the article

The results in the Holter and Ferreira paper suggest that more detailed practical policy initiatives, especially in the Nordic countries, could be based on the following proposals: First, policy makers could perhaps devote more discussion to targeted government spending, i.e., increasing government spending in the areas that directly benefit credit-constrained consumers, as this could lead to larger fiscal multipliers. This could include an even closer focus on social welfare programmes, affordable housing and access to credit facilities. A second possibility could be to make the tax system at least a bit more progressive – especially for capital income taxes – in order to address wealth inequality. This could also affect the number of credit-constrained households and potentially affect the fiscal multiplier, especially in the long term. A third possibility would be to consider the timing of fiscal consolidation more carefully. In other words, when implementing fiscal consolidation, the time frame and the income inequality. If income inequality is high, the negative effects on output may be larger. Thus, consolidating during a period of lower income inequality might be more favourable. This is also related to the importance of income risk mitigation by, for example, drawing up policies to reduce income risk in order to lessen the adverse effects of fiscal consolidation in economies with higher income risk.

Two other important implications from these results related to the theme of NEPR2024 are that policy makers should pay close attention to both shock responsiveness and cross-country collaboration, especially in the Nordic context. In other words, they should be more prepared to adjust fiscal policies in response to the size and type of consumption/spending shocks. Expansive shocks may require different fiscal responses than contractionary ones, and international collaboration on fiscal policy could be beneficial since the effect of the fiscal multiplier varies across countries and time. Sharing best practices and learning from different countries' experiences might lead to more effective policies. These suggestions could perhaps help optimise the fiscal multiplier's impact while paying due heed to the economic conditions when designing fiscal policy and measures.

4 Conclusions

The NEPR2024 paper by Holter and Ferreira provides excellent insight into recent research about the distribution of income and wealth as determinants of fiscal multipliers and the implications for economic policy in the Nordic countries. As the Nordic countries are characterised by high wealth inequality and low income inequality, two features that are both associated with large numbers of credit-constrained and low-wealth households, it is expected that fiscal stimulus programmes will have a

significant impact when consumers' current income is increased and less of an impact when future income is increased. However, as highlighted in this discussion note, it might be relevant in future studies to focus on questions such as the roles of both household and government debt and how they vary in countries over time since there are big differences between the Nordic countries.

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Comments on Hans A. Holter and Ana M. Ferreira: Inequality and Fiscal Multipliers: Implications for Economic Policy in the Nordic Countries

Tord Krogh

1 Introduction

The paper deals with a key question fiscal policymakers around the world constantly face: How much do changes in government spending, tax levels, or government debt (or a combination of these factors) affect economic activity? The answer is usually quantified in terms of "fiscal multipliers", i.e. the percentage change in output relative to the percentage change in spending or taxes.

Fiscal multipliers play an important role in conducting fiscal policy in Norway despite our large sovereign wealth fund. The Norwegian fiscal guideline, which limits withdrawals from the fund to finance non-oil budget deficits, explicitly states that fiscal policy must focus on smoothing out economic fluctuations to ensure sound capacity utilisation and low unemployment. This pushes the effects of fiscal policy on economic activity to the forefront of policy discussions, and the national budget has contained such estimates for several years now. A good understanding of this issue hinges on reliable estimates of fiscal multipliers and modelling of what factors affect them.

2 The paper in a nutshell

The paper provides a good overview of selected research on fiscal multipliers. It reviews several articles, focusing on three papers co-authored by the authors of this survey: Brinca et al. (2016), Brinca et al. (2021) and Brinca et al. (2023), all of which present stylised empirical facts about fiscal multipliers and show how a neoclassical heterogeneous agent model might explain these.

The models presented in the three main papers reveal a close link between the size of fiscal multipliers and the aggregate elasticity of labour supply. In different ways, they show how the distributions of wealth and income affect this link. Here are two examples to exemplify this:

- In a fiscal experiment with temporarily higher government spending financed by lump-sum taxation, it is the labour supply of credit-constrained agents that is affected most. Hence, the fiscal multiplier is large when wealth inequality is high (or when income equality is low) since that gives rise to fewer credit-constrained agents.

- In a fiscal experiment with temporarily lower government spending to reduce government debt permanently ("fiscal consolidation"), it is the labour supply of agents who are not credit-constrained that is affected most. Hence, the fiscal multiplier is large when wealth inequality is low (or income inequality is high) since that gives rise to fewer credit-constrained agents.

This quote from the paper summarises it well: "[Credit-constrained] consumers have less of an elastic labour supply response to fiscal policies that change their future income but more of an elastic response to policies that change their current income."

The authors argue that these mechanisms explain why countries with above-average wealth Gini coefficients appear to have higher "traditional" fiscal multipliers, while those with high income inequality appear to have larger fiscal multipliers during periods of debt consolidation.

The authors do not just review the literature; they also make the results more relevant for the Nordic countries by applying the regression results from Brinca et al. (2021) to measure the fiscal multiplier of debt consolidation periods for various European countries. These calculations imply lower-than-average fiscal multipliers for most of the Nordic countries as a result of their low levels of income inequality.

3 Alternative mechanisms and factors

My discussion of the paper revolves around three questions. Since the literature review is, to a large extent, a survey of three papers co-authored by the authors of the summary, it inevitably becomes a mix of comments on the paper itself and on the three main papers in the survey.

First, are there other, more relevant, fiscal experiments? The papers surveyed (and the models described) tend to assume that higher government spending is financed either by debt or by lump-sum taxation. Unfortunately, lump-sum taxes are rarely available in "real life". I would welcome an investigation of how the link between inequality and fiscal multipliers changes if spending is financed by distortionary taxes, e.g. a progressive tax scheme. If this means credit-constrained households are affected less by higher government spending in the experiment, the link between the fiscal multiplier and wealth inequality might be weaker.

Second, is the distinctiveness of the Nordic countries exaggerated? The paper states that Nordic countries are characterised by high wealth inequality and low income inequality, making them ideal countries to draw implications in the light of the research surveyed. This seems to be a stretch, considering the statistics reported in the paper itself. While it is clear from Table 3 in the paper that the Nordic countries have a low level of income inequality, the picture is less clear for wealth inequality. The wealth Gini coefficients reported show that Denmark and Sweden have relatively high levels of inequality, while Iceland is close to the EU average, and Norway and Finland are below it. This means that it may be harder to draw an exact conclusion from the literature survey regarding the size of fiscal multipliers in the Nordic countries as a group than the impression given by the paper.

Third, are there other factors that make the Nordics more distinct? This paper focuses on how distributions of income and wealth may matter for the size of fiscal multipliers. The mechanism proposed for the stylised empirical facts presented is that the aggregate elasticity of labour supply is sensitive to the distributions of wealth and income. However, many interesting characteristics of the Nordic countries that may play a significant role in determining fiscal multipliers are left unexplored. For one thing, all of the Nordic countries have relatively open economies. Ilzetzki et al. (2013) show that the degree of openness may make the fiscal multiplier drastically smaller. Further, the Nordic countries have generous welfare states and, thus, a high level of income protection, which should reduce the need for precautionary savings. This could potentially alter the key mechanism in the main articles surveyed in the paper. Finally, the Nordic countries are also relatively highly unionised, which could change how the labour market functions and the aggregate labour supply elasticity.

4 Conclusion

The paper gives a nice and efficient review of selected research on fiscal multipliers but with a somewhat limited perspective. The Nordic countries share many characteristics, such as openness to trade, generous welfare states, high levels of unionisation and low levels of income inequality, all of which may matter for the size of fiscal multipliers. This paper summarises research that analyses the impact of income and wealth inequality on fiscal multipliers in neoclassical overlapping generations models. In these, the size of the multiplier depends critically on the elasticity of labour supply. Given other credible dimensions that could be explored, it is not clear that the levels of income and wealth distribution are the key dimensions that make fiscal multipliers in Nordic countries different from the international average. Future research on this topic would be highly appreciated by myself and, I am sure, other policymakers.

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Nordic Economic Policy Review 2024

Developments of automatic stabilisers in Sweden 1998–2022

Markus Sigonius

Abstract

We use data from Sweden to shed some light on the trade-off between policies to make work pay and the size of automatic (fiscal) stabilisers. We use standard methods to estimate the size of Sweden's automatic stabilisers in the period 1998–2022. Taxes on labour income were reduced by about 5% of GDP over the course of this period. We find that the implementation of policies to make work pay did not substantially impair automatic stabilisers. The size of the automatic stabilisers decreased slightly, but mainly in the first half of the sample, and they are currently slightly less than 0.5. Furthermore, we conclude that the stabilisers were unaffected by the COVID-19 pandemic and that if they had been allowed to operate freely during the period 2020-2021, they would have transferred approximately SEK 110 billion to households and firms. The soaring inflation in 2022-2023 is not captured by our estimates. However, we judge that the net of the different effects of inflation is negligible. Therefore, the stabilisers remain the same size.

Keywords: Automatic fiscal stabilisers, earned income tax credit, make work pay, COVID-19 pandemic, inflation.

JEL Classification: E64, E62, H31

The article builds upon the working paper "Automatic Stabilizers in Sweden 1998-2019", written jointly with Johan Almenberg. The author is grateful for support and comments by Johan Almenberg. Insights from Karl Harmenberg and Erik Höglin at the Nordic Economic Policy Review conference, as well as from the editors Juha-Pekka Junttila and Jouko Vilmunen, improved the article. Sebastian Ankargren, David Domeij, Erik Glans, Jesper Hansson, Martin Flodén, Erika Färnstrand Damsgaard, Rickard Sandberg and seminar participants at the Swedish Ministry of Finance and at the National Institute of Economic Research, as well as colleagues at the Swedish Fiscal Policy Council, have also contributed valuable comments.

Summary

We use data from Sweden to shed some light on the trade-off between policies to make work pay and the size of automatic (fiscal) stabilisers. Sweden is an interesting case study because it is a welfare state that has undertaken sizeable reforms to strengthen incentives to work. We use standard methods to estimate the size of Sweden's automatic stabilisers in the years 1998–2022. Taxes on labour income were reduced by about 5% of GDP during the same period. We find that the implementation of policies to make work pay did not substantially impair automatic stabilisers. An important driver of this result is the design of the earned income tax credit. The size of the automatic stabilisers decreased slightly, but mainly in the first half of the sample period, and they are currently slightly lower than 0.5. Furthermore, we conclude that the stabilisers were unaffected by the COVID-19 pandemic and that if they had been allowed to operate freely in 2020–2021, they would have transferred approximately SEK 110 billion to households and firms. However, this was partly replaced with discretionary support. If discretionary fiscal policy is to continue to work as well in the future as it did during the pandemic, the need for large automatic stabilisers might not be as great as previously thought. There is a lag between inflation and its effects on the automatic stabilisers, so the soaring inflation of 2022–2023 has not been captured by our estimates. However, we judge that the net of the different effects of inflation is negligible. Therefore, the stabilisers remain the same size despite the high inflation.

1 Introduction

The role of fiscal policy in stabilising the economy has been a topic for discussion for the last decade (see, for example, Furman and Summers (2020) and Blanchard (2022)).[47] One reason for this is that monetary policy has been constrained by the effective lower bound. More recently, discretionary fiscal policy supported the macroeconomy during the COVID-19 pandemic, as well as when households and firms

47. Swedish Fiscal Policy Council (2021) relates this discussion to the Swedish context.

were confronted with soaring electricity prices following Russia's war on Ukraine. The Swedish central government's discretionary policy during the pandemic amounted to SEK 330 billion for 2020–2022, and support for high energy prices in 2022 and 2023 amounts to approximately SEK 70 billion.[48]

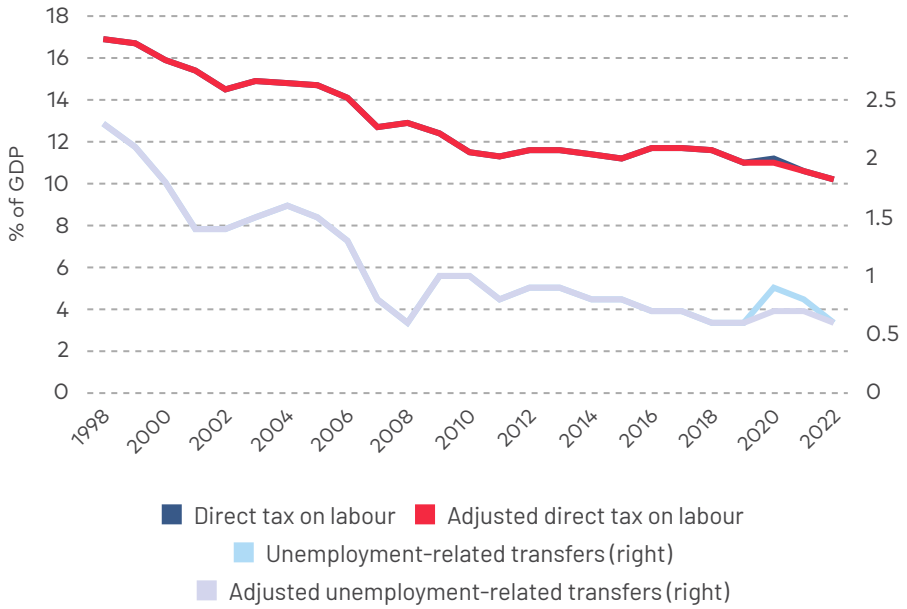
Fiscal policy can also reduce macroeconomic fluctuations through automatic stabilisers: rules and regulations that determine public sector revenue and expenditure and automatically soften the impact of the business cycle on households and firms. For example, income taxes and social security benefits reduce the volatility of households' disposable income over the business cycle. When economic activity declines, tax revenue declines, but unemployment may rise, causing an increase in rule-based unemployment-related expenditure. When economic activity increases, the reverse may be the case. These changes in public revenue and expenditure are automatic to the extent that they are rule-based and result in smaller variations in disposable income for households and firms and, therefore, smaller variations in private sector aggregate demand. By contrast, the government's budget balance will vary more as a result.

Another topic that has been prominent position in debates on labour market policy in recent decades is policies designed to make work pay, for example, through lowering taxes on earned income and reducing benefits to the unemployed (see, for example, Blundell (2006)). These policies aim to improve attachment to the labour market and alleviate poverty. This points to a potential conflict between stabilisation policy – where high automatic stabilisers generally mean high taxes and generous unemployment insurance – and policies designed to make work pay.

The purpose of this article is twofold. First, we use the most recent data from Sweden to shed more light on the trade-off between policies to make work pay and the size of automatic fiscal stabilisers.[49] Sweden is an interesting example because it is a welfare state that has undertaken sizeable reforms to improve incentives to work. As shown in Figure 1, taxes on labour income were reduced by about 5% of GDP over two decades. About half of this is due to an earned income tax credit introduced in 2007 and expanded several times, most recently in the budget for 2024. Expenditure on unemployment-related transfer payments has also decreased, from more than 2% of GDP at the beginning of the period to under 1% at the end.

48. Statistics Sweden and Swedish Fiscal Policy Council (2023).
49. Almenberg and Sigonius (2021) focus on this question but analyse the period 1998–2019.

Figure 1. Tax on labour income and unemployment-related transfer payments 1998–2022



Note: The adjustments made are for the temporary discretionary support introduced during the COVID-19 pandemic.
Source: Statistics Sweden and own calculations.

The size of the automatic fiscal stabilisers in Sweden is estimated for the period 1998–2022 using the same approach as Girouard and André (2005), which breaks down the elasticity of the fiscal balance to the business cycle into a structural part reflecting tax and benefit rules and a cyclical part reflecting how tax bases and benefit-related aggregates respond to the state of the economy. The structural component can be assessed using the rules that apply in a given year. The cyclical component can be estimated using time series data.

A limitation of this approach is that it does not model the behaviour of agents in the economy and is, therefore, subject to the Lucas critique. Nor does it take into account what type of shock is affecting the economy. Simply put, it is an unconditional expectation of the fiscal balance for a given change in GDP. However, even this simple measure is informative, and it is commonly used as a rule of thumb in fiscal policy.

Flodén (2009) uses the same approach and finds that the automatic stabilisers decreased from close to 0.6 in 1998 to only slightly above 0.5 in 2009. This would imply that a 1 percentage point change in the GDP gap would be expected to change the government fiscal balance (as a share of GDP) by approximately 0.6 percentage points

in 1998, and by 0.5 percentage points in 2009. We extend the analysis in Flodén (2009) with over a decade of additional data, during which the earned income tax credit was expanded several times.

The findings show that automatic stabilisers in Sweden declined slightly 1998–2022, but mainly in the first half of the period. This confirms the findings in Almenberg and Sigonius (2021), which looked at 1998–2019. Direct taxes on labour have decreased considerably since 1998, in particular because of the earned income tax that was introduced in 2007 and gradually scaled up. However, the average tax rate declined more than the average marginal tax rate, making the income tax more progressive. This partly offsets the effect of lower taxes on the automatic fiscal stabilisers. Expenditure on unemployment benefit also fell during the first half of the period covered. The contribution to the automatic stabilisers from income tax and unemployment-related transfer payments decreased from 0.26 to 0.16, meaning that a 1 percentage point change in the GDP gap would be expected to change the government fiscal balance (as a share of GDP) by approximately 0.1 percentage points less in 2022 than in 1998. However, the size of the automatic stabilisers also depends on other taxes, which remained relatively unchanged during this period. The total size of the automatic stabilisers remained at 0.46 in 2022, compared to 0.55 in 1998. The reduction in the size of the automatic stabilisers is modest, considering the scope of the reforms carried out. The findings show that it is possible to increase the incentives to work without substantial impairment of the automatic stabilisers.

The article also discusses how recent crises have affected the size of the automatic stabilisers and what role they have played in stabilisation policy. Several support measures were introduced by the government to aid households and firms during the COVID-19 pandemic in 2020 and 2021. Many of those measures were subsequently extended, and the total support is estimated to have been SEK 170 billion in 2020 and SEK 120 billion in 2021. Our calculations show that if the automatic stabilisers had been allowed to operate freely, the public sector would have automatically distributed approximately SEK 110 billion to households and firms in those two years. However, this was in part replaced with discretionary support to protect people and labour market matches. These policies broke the link between the output gap and the usual effects from the automatic stabilisers on the public sector.

The CPI with fixed mortgage interest rate was 7.7% in 2022 and 6.0% in 2023. Unexpected changes in the inflation rate led to a change in the composition of GDP, as the wage share decreased and the profit share increased. Tax on corporate profits has a higher elasticity than direct taxes on wages, so this shift is expected to make the automatic stabilisers bigger. Expenditure on unemployment insurance decreases as a share of primary expenditure, which makes the stabilisers smaller. We find that these effects are similar in size, so cancel out each other. Therefore, the automatic stabilisers in Sweden are still slightly below 0.50.

The rest of this paper is organised as follows: Section 2 presents the baseline results of our study of developments of the size of the automatic stabilisers in Sweden. Section 3 discusses how the stabilisers were affected during the crises of recent years and section 4 presents our conclusions.

2 Estimating the size of the automatic stabilisers 1998–2022

2.1 Methods and data

As per Girouard and André (2005), we use the budget elasticity, which describes the response of the fiscal balance to fluctuations in GDP around its trend[50], as a measure of the size of the automatic fiscal stabilisers.[51] The budget elasticity is calculated using a disaggregated approach[52], estimating separate elasticities for four categories of tax revenue as well as for primary expenditure. The elasticities are added using GDP shares as weights. Letting α be the budget elasticity with respect to changes in the GDP gap, ϵ_i the elasticity of revenue from tax $i$with respect to the GDP gap, $\frac{T_i}{Y}$tax $i : s$ share of GDP, γ the elasticity of primary expenditure with respect to the GDP gap and $\frac{G}{Y}$ primary expenditure (expenditure net of interest payments) as a share of GDP, we can write

$$\textbf{(1)}\ \alpha = \sum_i \epsilon_i \frac{T_i}{Y} - \gamma \frac{G}{Y}$$

The elasticities ϵ_i and γ show how public revenue and expenditure respond to changes in the GDP gap and can be separated into two constituent parts. On the revenue side, the first part is how tax revenue changes in response to changes in the tax base, ϵ_{τ_i}, and the second part is how tax bases change in response to changes in the GDP gap, ϵ_{β_i}. On the expenditure side, a similar calculation is performed by looking at how primary expenditure changes in response to changes in unemployment and how unemployment changes in response to changes in the GDP gap.

50. The budget elasticity can be used along with the GDP gap and the public sector budget balance to calculate the cyclically-adjusted budget balance, which shows the underlying fiscal position when cyclical movements are removed. This approach is used by the EU, IMF, and OECD.
51. Almenberg and Sigonius (2021) provides more details about the estimation, as well as several robustness tests.
52. A disaggregated approach is used by Van den Noord (2000); Girouard and André (2005); Flodén (2009); Price et al. (2015). The benefit of using a disaggregated approach is that longer time series can be used to estimate the relationship between the business cycle and the tax bases while elasticities that depend on political decisions, e.g. the elasticity between tax revenue and the tax base, can be modelled explicitly. Another method is micro simulations, as deployed by Auerbach and Feenberg (2000); Auerbach (2009), or macro simulations, as in NIER (2015); McKay and Reis (2016). The advantage of macro simulations is that they can capture how the size of the automatic stabilisers depends on the type of shocks that hit the economy.

In sum, for the different tax categories and for primary expenditure, there are three factors that determine their contribution to the overall budget elasticity. First, how tax bases and unemployment respond to changes in the GDP gap. Second, how tax revenue and primary expenditure respond to changes in the tax bases and unemployment. Third, the relative size of the respective tax categories and the primary expenditure in relation to GDP.

We correct for the discretionary policy during the COVID-19 pandemic in several ways. First, we choose to use 2019 as the final year when estimating how tax bases and benefit-related aggregates respond to the state of the economy. Secondly, we exclude temporary tax cuts such as a temporary earned income tax deduction and temporary lower payroll taxes. Similarly, we exclude a temporary increase in unemployment benefit. Thirdly, the primary expenditure is adjusted for pandemic-related discretionary policies, such as support for firms affected by the pandemic. We also take into consideration how such support measures affect the tax bases and adjust the taxes accordingly.

The study uses annual data from the national accounts and published by Statistics Sweden in February 2023. Our macroeconomic time series starts in 1980. To exclude the effects of the COVID-19 pandemic, we use 2019 as the final year when determining firms' share of the total value added to the economy, as well as when estimating the elasticity between how the tax bases and unemployment rates respond to changes in the GDP gap. For public expenditure and tax revenue, we use data from 1998 to 2022. The wage income distribution is used to calculate the elasticity of direct taxes on labour with respect to its tax base, and we use the distribution from 2016 based on microdata from Statistics Sweden. The distribution for 2016 is used as a proxy for the true distribution for the remaining years but scaled using the median income for each year. Some variables used in the analysis are not observable and are not reported in the national accounts. We use the GDP gap as a measure of the business cycle, i.e. the deviation of GDP from its long run equilibrium trend. We use assessments of this GDP gap and of equilibrium unemployment published by the National Institute of Economic Research (NIER) in March 2023 (NIER, 2023a).[53]

53. The NIER calculates potential GDP by adding up different components such as potential labour force, equilibrium unemployment and potential productivity. Historically, the GDP gap presented by the NIER has been similar to the GDP gap presented by the OECD, see Figure 2 in NIER (2018).

2.2 Estimating revenue elasticities

As outlined above, the budget elasticity is constructed using separate estimates for tax revenue and expenditure. The revenue side is constructed from separate estimates for four tax categories: direct taxes on labour[54], payroll tax, corporate income tax and indirect taxes[55]. First, we estimate the elasticity of the tax base to the GDP gap using time series data. Next, we calculate, year by year, the elasticity of tax revenue to changes in the tax base using year-specific tax rules.

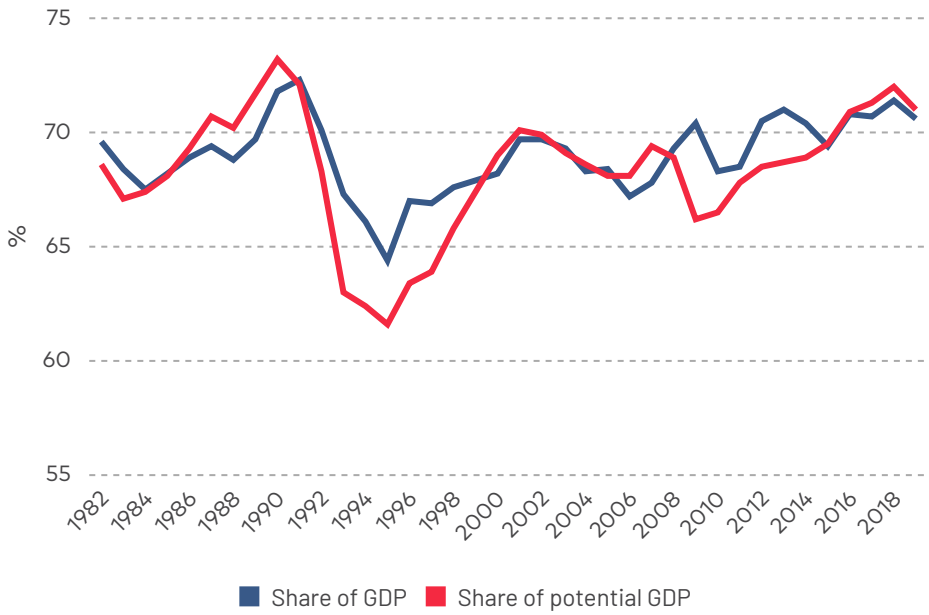
2.2.1 The labour cost share

The labour cost share of GDP plays an important role in the calculations since it serves as a proxy for the tax bases for direct taxes on labour as well as payroll taxes. We define the labour cost broadly as all output that is not allocated to firms as gross profits. We define profits as the product of (i) gross surplus as a share of the value added by firms, and (ii) firms' share of the total value added to the economy. This measure is broader than in the national accounts.[56]

As per Girouard and André (2005), we assume, based on their cross-country analysis, that the labour cost share is 72% of GDP in equilibrium and, therefore, that the profit share is 28% of GDP. This is in line with the Swedish data (see Figure 2).

54. The tax that households pay on their labour income, net of tax reductions such as the earned income tax credit.
55. This category mainly includes VAT but also tax on household capital income.
56. For an alternative approach, see Price et al. (2015).

Figure 2. Labour cost share in Sweden 1980–2019



Note. The labour cost share is calculated as the share of GDP that is not allocated to firms as gross profit.
Sources: Statistics Sweden, NIER and own calculations.

The elasticity of the labour cost share of potential GDP with respect to the GDP gap, ϵ_{β_w}, is estimated with a regression where changes in the labour cost share are explained by changes in the GDP gap.[57] The estimates are for the period 1982–2019 and calculate elasticity to be 0.83, which is in line with earlier estimates by the OECD.[58] A number smaller than one means that the labour cost share decreases and the profit share increases when an economy enters a boom.

2.2.2 Direct taxes on labour

The elasticity of direct taxes on labour with respect to the labour cost share depends on both the level and the progressivity of income taxes. Sweden has high taxes on labour income, but the level has been reduced in the last 20 years, mainly through the introduction of a tax reduction for the workers' contribution to the state pension and the introduction of an earned income tax credit.[59] In total, these two reforms, which were similar in magnitude and phased in gradually, reduced taxation of labour income

57. See Almenberg and Sigonius (2021) for details about the regression.
58. See Girouard and André (2005).
59. The state pension in Sweden is financed by both firms and workers. Workers must contribute and before 2000 their contributions were tax deductible. In 2000, the system changed so 25% of the contribution allows for a tax reduction whereas the remaining share was tax deductible. The share that triggered a tax reduction gradually increased and from 2006 the entire contribution allows for one.

by about 5% of GDP. The reforms targeted low-wage and average-wage earners, lowering marginal tax rates at lower income levels but not at higher income levels. Hence, the effect (on the elasticity) of lower taxes was offset by an increase in progressivity.

If an individual worker earns wage W with the marginal tax rate $m(W)$ and average tax rate $a(W)$ the elasticity between the tax and the wage can be calculated as the ratio between the marginal tax and the average tax, $m(W)/a(W)$. This relationship is used when calculating the elasticity between direct taxes on labour and the labour cost share, $\epsilon_{\tau w}$. The calculations are performed year by year in two steps. First, the marginal and average tax rates are evaluated at different income levels. Next, the elasticity is calculated as the ratio of the weighted average of the marginal and average tax rates. As mentioned earlier, the temporary earned income tax credit for 2021 and 2022 is disregarded.

The distribution of wage income is based on micro data from Statistics Sweden for 2016. The distribution has its starting point around the median wage $\overline{W}$ and shows how large a share of the population has income $\{0.01\overline{W}, 0.02\overline{W}, \ldots, 8.00\overline{W}\}$. The income distribution is assumed to have the same shape for all the years but is adjusted with the median wage of each year.[60]

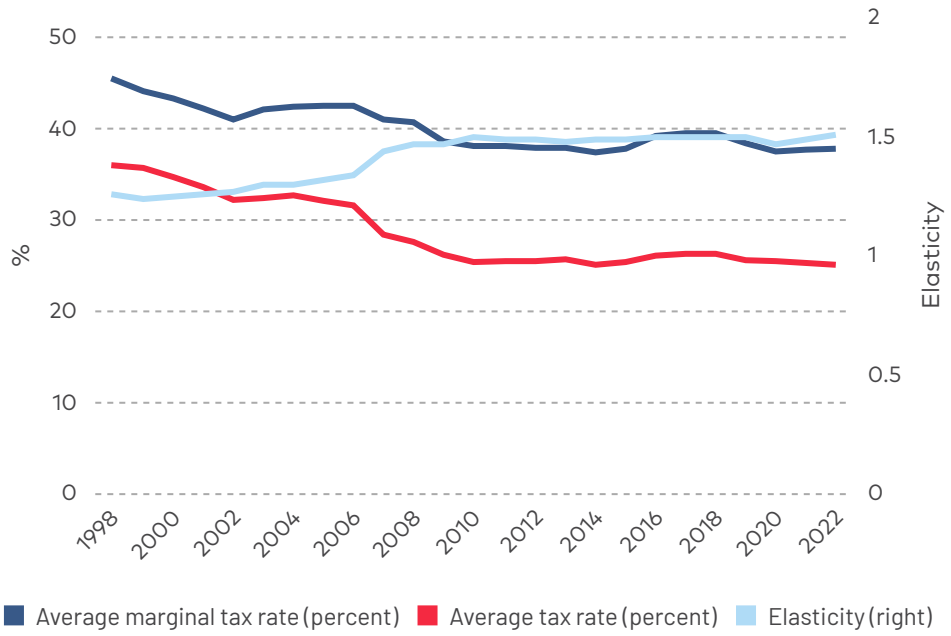
The calculations make an implicit assumption that when labour costs increase, all wages increase proportionally. But labour costs are also affected by workers moving in and out of employment. Low-paid workers may be over-represented in this category. Since they face lower marginal and average tax rates, this might affect the elasticity. Also, the introduction of the earned income tax credit has changed the tax for an employed worker compared to an unemployed worker with unemployment insurance, which also affects the elasticities. These concerns are addressed later.

The calculations show that the marginal tax rate was reduced, on average, by 8 percentage points between 1998 and 2014 (see the dark blue line in Figure 3). After 2014, it increased slightly. Meanwhile, the average tax rate was also reduced on average across the wage distribution (see the red line in Figure 3). As a share of the tax rate, the reduction in the average tax rate exceeds the reduction in the marginal tax rate. Hence, the elasticity of direct taxes on labour to the labour cost share increased between 1998 and 2022.

The elasticity of direct taxes on labour was at its lowest in 1999 and has increased by almost 0.3 since then, from 1.24 to 1.51 in 2022 (see the light blue line in Figure 3). The biggest increase between consecutive years was between 2006 and 2007, when the first step of the earned income tax credit was introduced.

60. The income distribution for 2016 is used for all years, but it is adjusted according to the evolution of the median income. This means that the same share of the population is assumed to have, for example half the median wage, each year. To ensure that our results are not affected by this assumption we have also calculated the elasticity using the income distributions from 2004 and 2010 without any significant effects on the results; see NIER (2018). The median wage for 2022 is approximated by increasing the median wage in 2021 by the change in the average hourly wage.

Figure 3. The elasticity of direct taxes on labour with respect to the labour cost share ($\epsilon_{\tau w}$)



Source: Own calculations.

The elasticity of direct taxes on labour with respect to the labour cost share, as shown by the grey line in Figure 3, is multiplied by the elasticity of the labour cost share with respect to the GDP gap, previously estimated to be 0.83, to arrive at the elasticity of direct taxes on labour with respect to the business cycle.

2.2.3 Payroll taxes

The elasticity of payroll taxes with respect to the business cycle is the product of (i) the elasticity of the labour cost share and the GDP gap (estimated to be 0.83; see above) and (ii) the elasticity of payroll taxes with respect to the payroll (here proxied by the labour cost share), which is 1.0 since payroll taxes are not capped in Sweden. Multiplying (i) and (ii) gives an elasticity of payroll taxes with respect to the business cycle of 0.83.

2.2.4 Corporate income tax

The elasticity of corporate income tax with respect to the business cycle is the product of (i) the elasticity of corporate profits and the GDP gap, ϵ_{β_c}, and (ii) the elasticity of the corporate income tax with respect to corporate profits.

As a proxy for corporate profit's share of GDP, we use the gross profits as the share of GDP, which, as mentioned earlier, is the same as one minus the labour cost share. While in theory this is the part of added value that accrues to firms, it differs from taxable profits that allow for deductions for depreciation, interest and other items. Taxable profits amount to about 10% of GDP, whereas the profit share, defined as above, is about 25–30%. However, we use this approximation because we are estimating elasticities and not levels.[61] This approach, which is in line with previous research, implies that all additional added value that accrues to firms during a boom is taxable, which means that the elasticity of profits with respect to the GDP gap is 1.45.[62] The Swedish corporate income tax is proportional to profits, so as an approximation the corporate income tax revenue responds one-to-one to changes in profits (but since losses can be offset against future profits, this is only an approximation, albeit a reasonable one). As a result, the elasticity of the corporate income tax with respect to the business cycle is also 1.45.

2.2.5 Indirect taxes

Indirect taxes consist of consumption taxes in the form of value-added taxes and excise duties, as well as taxes on household capital income. It is hard to assess how these tax bases correlate with the GDP gap. As per Girouard and André (2005), we have assumed an elasticity of 1. Since these taxes are largely proportional, the elasticity of tax revenue to the tax bases is also set to 1. Hence, the elasticity between tax revenue from these indirect taxes and the GDP gap, which is the product of the two elasticities, is 1.0.

2.2.6 Summary of revenue elasticities

The calculations above are summarised in Table 1. Column (iii) shows how the elasticity of direct labour taxes to the GDP gap has increased over time, driven by an increase in the elasticity of direct taxes on labour with respect to the labour cost, as shown in column (ii). The other three revenue elasticities (payroll taxes, corporate income tax and indirect taxes) are, by design of the chosen method, constant.

61. Almenberg and Sigonius (2021) also show that using taxable profits instead provides a slightly higher contribution to the automatic stabilisers from corporate income tax.
62. The formula for calculating the elasticity of the profits with respect to the business cycle is presented in the appendix.

Table 1. Tax elasticities with respect to the GDP gap.

	ϵ_{β_w}	ϵ_{τ_w}	Direct taxes on labour	Payroll tax	Corporate income tax	Indirect taxes
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
1998	0.83	1.26	1.04	0.83	1.45	1.00
1999	0.83	1.24	1.02	0.83	1.45	1.00
2000	0.83	1.25	1.03	0.83	1.45	1.00
2001	0.83	1.26	1.04	0.83	1.45	1.00
2002	0.83	1.27	1.05	0.83	1.45	1.00
2003	0.83	1.30	1.07	0.83	1.45	1.00
2004	0.83	1.30	1.07	0.83	1.45	1.00
2005	0.83	1.32	1.09	0.83	1.45	1.00
2006	0.83	1.34	1.11	0.83	1.45	1.00
2007	0.83	1.44	1.19	0.83	1.45	1.00
2008	0.83	1.47	1.22	0.83	1.45	1.00
2009	0.83	1.47	1.22	0.83	1.45	1.00
2010	0.83	1.50	1.24	0.83	1.45	1.00
2011	0.83	1.49	1.23	0.83	1.45	1.00
2012	0.83	1.49	1.23	0.83	1.45	1.00
2013	0.83	1.48	1.22	0.83	1.45	1.00
2014	0.83	1.49	1.23	0.83	1.45	1.00
2015	0.83	1.49	1.23	0.83	1.45	1.00
2016	0.83	1.50	1.24	0.83	1.45	1.00
2017	0.83	1.50	1.24	0.83	1.45	1.00
2018	0.83	1.50	1.24	0.83	1.45	1.00
2019	0.83	1.50	1.24	0.83	1.45	1.00
2020	0.83	1.47	1.22	0.83	1.45	1.00
2021	0.83	1.49	1.23	0.83	1.45	1.00
2022	0.83	1.51	1.25	0.83	1.45	1.00

Note. Columns (i) and (ii) show the elasticity of the labour cost share with respect to the GDP gap and the tax income with respect to the labour cost. The product of the two columns gives the elasticity of direct taxes on labour with respect to the GDP gap and is displayed in column (iii). Column (iv) to (vi) shows the elasticities for each tax with respect to the GDP gap.
Source: Own calculations.

2.3 Estimating the expenditure elasticity

2.3.1 Elasticity of unemployment with respect to the GDP gap

The elasticity of the unemployment gap with respect to the GDP gap is estimated with a regression where changes in the unemployment gap are explained by changes in the GDP gap.[63] The estimation is for the period 1982–2019, and we use the estimate of equilibrium unemployment published by NIER. The NIER defines equilibrium unemployment as the unemployment rate that would prevail if the GDP gap were zero and the economy progressed along a balanced growth path. The elasticity is –6.08, which implies that when the equilibrium unemployment level is, for example, 7 percent, a 1 percentage point increase in the GDP gap lowers the unemployment rate by 0.4 percentage points.

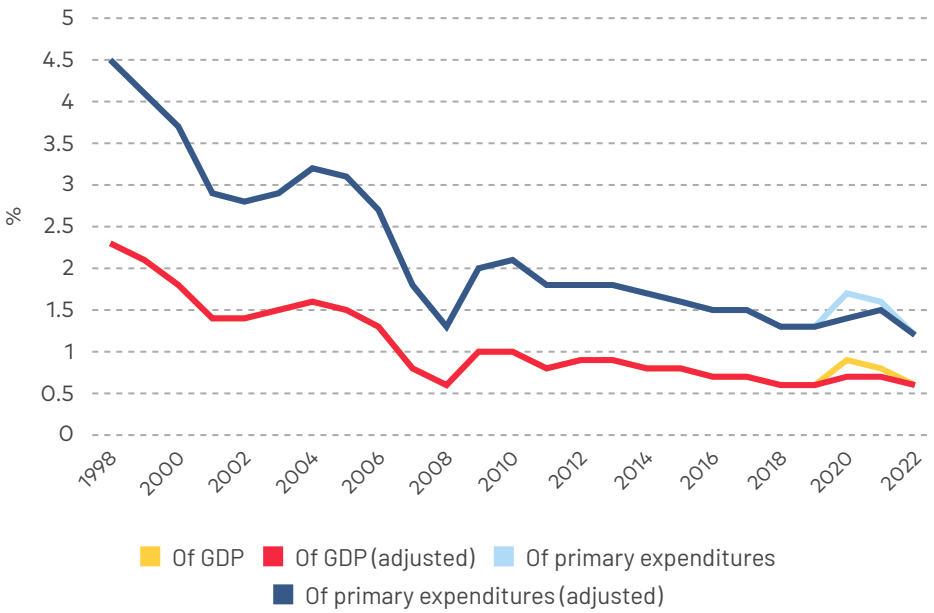
2.3.2 Primary expenditure

Primary expenditure, G, is divided into two parts: unemployment-related transfers (unemployment insurance and compensation for participants included in labour market programmes) and other expenditure. It is assumed that unemployment-related transfer payments are the only expenditure that varies with the business cycle and proportionally with unemployment. Unemployment-related transfer payments are taxable in Sweden and the variable that matters for the automatic fiscal stabilisers is expenditure net of tax. The elasticity of net primary expenditure with regard to the unemployment gap, γ_g, is a function of the net expenditure unemployment-related transfers as a share of primary expenditure, corrected for the unemployment gap.[64]

Expenditure on unemployment-related transfer payments has varied considerably over time and has declined as a share of GDP and as a share of primary expenditure (see Figure 4). Three factors drive this trend: (i) unemployment declined, (ii) unemployment benefits increased at a slower rate than nominal GDP, and (iii) a declining proportion of the workforce has been eligible for these benefits.[65] The calculations are corrected for the temporary increase in unemployment-related transfer payments, as well as primary expenditure, during the COVID-19 pandemic. We subtract SEK 10, 6 and 1 billion during 2020–2022 for the unemployment-related transfer payments and SEK 97, 91 and 33 billion from the primary expenditure.

63. See Almenberg and Sigonius (2021) for details about the regression.
64. See Almenberg and Sigonius (2021) for details about how to derive the formula for the elasticity of primary expenditure with respect to the unemployment gap.
65. OECD reports in their tax-benefit data portal that the Swedish net replacement rate in unemployment has fallen from 82% in 2001 to 70% in 2019 for a worker unemployed for two months with a previous wage 67% of the average wage. According to the Swedish Public Employment Service, the proportion of unemployed people who received unemployment benefit fell from 69% in 1999 to 45% in 2019.

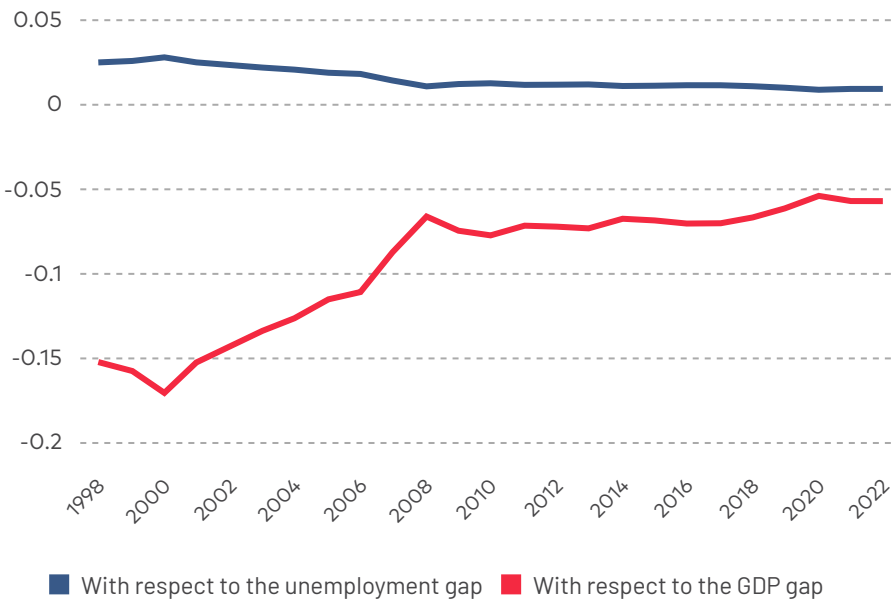
Figure 4. Expenditure on unemployment-related transfer payments 1998–2022



Note. The expenditure in the figure consists of gross expenditure, i.e. before tax. The adjustments made are for the temporary discretionary support introduced during the COVID-19 pandemic.
Source: Statistics Sweden and own calculations.

The elasticity of expenditure with respect to the unemployment gap is shown in Figure 5. This shows that the elasticity of primary expenditure with respect to the unemployment gap has decreased over time. The driver is the decrease in unemployment-related transfer payments, from about 4.5% of primary expenditure at the outset of the period to about 1.5% at the end. The elasticity is small, approximately 0.03 at the beginning of the period and 0.01 at the end, reflecting the fact that most primary expenditure is not affected by the unemployment rate.

Figure 5. Elasticity of primary expenditure 1998–2022



Note. Table 4 in the appendix shows the different factors that determine the elasticity of expenditure with respect to the unemployment gap, as well as the elasticity of primary expenditure with respect to the GDP gap.
Source: Own calculations.

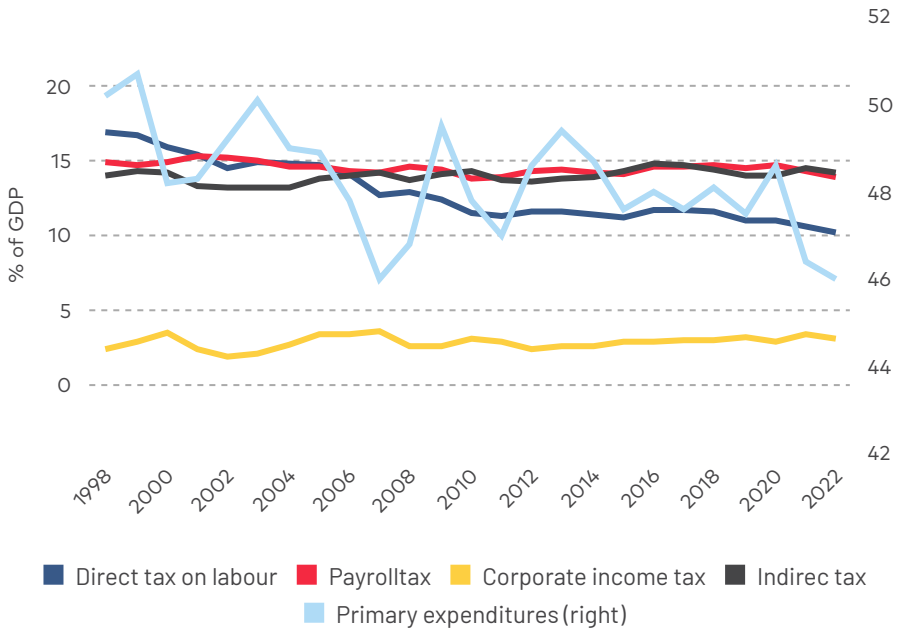
2.3.3 The expenditure elasticity

To arrive at the elasticity between primary expenditure and the GDP gap, the elasticity of the unemployment gap and the GDP gap (estimated to be –6.06; see above) is multiplied by the elasticity of primary expenditure with respect to the unemployment gap. The results are reported in Figure 5. As shown, the elasticity of expenditure to the GDP gap is about one-third of the size in 2022 compared to 1998, namely -0.06 compared to -0.15. The driver for this, as mentioned earlier, is the decrease in unemployment-related transfer payments. A negative elasticity means that the public sector supports the private sector during a downturn, but the fact that it is close to zero means that the effect is minor. However, that the vast majority of public spending is not affected by the business cycle is in itself something that stabilises the economy.

2.4 Combining the estimates

To arrive at an estimate of the overall budget elasticity – and hence of the automatic stabilisers –the estimated elasticities reported above are aggregated and weighted for GDP shares. Figure 6 shows that direct taxes on labour have decreased as a share of GDP between 1998 and 2010 and have remained flat since 2010. The lower share is mainly a consequence of the tax credit for the employee pension contribution phased in from 1998 and the introduction of the earned income tax credit from 2007 onward. Other taxes have remained relatively unchanged as a share of GDP. Primary expenditure has varied more over time with a modest downward trend. The numbers in the calculations are corrected for the discretionary support 2020–2022. The taxes are adjusted for the tax cuts (both the temporary earned income tax credits and the temporary cuts in the payroll tax amounting to SEK 46 billion during the period) but also for the fact that some forms of support, such as the furlough schemes, increased the tax base. For direct tax on labour, the tax rate for the median income in Sweden is used to deduct the expected tax from the furlough scheme. The corporate income tax rate is used to calculate how much of the support to firms is paid back as taxes.

Figure 6. GDP shares of taxes and primary expenditure 1998–2022



Note: The series are adjusted for the temporary discretionary support introduced during the COVID-19 pandemic.
Sources: Statistics Sweden and own calculations.

Payroll taxes, corporate income taxes and indirect taxes have been relatively stable as a share of GDP. This, combined with the method we use, in which their elasticities with respect to the GDP gap are constant over time, means that their contributions to the automatic stabilisers are about the same throughout the period.

Meanwhile, the contributions to automatic stabilisers from direct taxes on labour and primary expenditure have changed (see Table 2). The elasticity of direct taxes on labour with respect to the GDP gap has increased during the period studied, in particular during the first half of it. At the same time, direct taxes on labour as a share of GDP have decreased. The latter effect dominates, leading to an overall reduction in the contribution made by direct taxes on labour to the automatic stabilisers. This reduction occurred prior to 2010, and since then, there has not been any significant change, even though a slight downward shift can be observed.

The contribution from primary expenditure to the automatic stabilisers has decreased, mainly due to a decrease in the elasticity during the first half of the period studied, but also because primary expenditure as a share of GDP has shown a modest downward trend (see Table 2).

Table 2. Weighted elasticities and contributions to automatic stabilisers. Elasticity and share, respectively

	Direct taxes on labour			Primary expenditure		
	Elasticity	GDP share	Contribution	Elasticity	GDP share	Contribution
1998	1.04	0.17	0.18	-0.15	0.50	-0.08
1999	1.02	0.17	0.17	-0.16	0.51	-0.08
2000	1.03	0.16	0.16	-0.17	0.48	-0.08
2001	1.04	0.15	0.16	-0.15	0.48	-0.07
2002	1.05	0.15	0.15	-0.14	0.49	-0.07
2003	1.07	0.15	0.16	-0.13	0.50	-0.07
2004	1.07	0.15	0.16	-0.13	0.49	-0.06
2005	1.09	0.15	0.16	-0.12	0.49	-0.06
2006	1.11	0.14	0.16	-0.11	0.48	-0.05
2007	1.19	0.13	0.15	-0.09	0.46	-0.04
2008	1.22	0.13	0.16	-0.07	0.47	-0.03
2009	1.22	0.12	0.15	-0.07	0.50	-0.04
2010	1.24	0.12	0.14	-0.08	0.48	-0.04
2011	1.23	0.11	0.14	-0.07	0.47	-0.03
2012	1.23	0.12	0.14	-0.07	0.49	-0.04
2013	1.22	0.12	0.14	-0.07	0.49	-0.04
2014	1.23	0.11	0.14	-0.07	0.49	-0.03
2015	1.23	0.11	0.14	-0.07	0.48	-0.03
2016	1.24	0.12	0.15	-0.07	0.48	-0.03
2017	1.24	0.12	0.15	-0.07	0.48	-0.03
2018	1.24	0.12	0.14	-0.07	0.48	-0.03
2019	1.24	0.11	0.14	-0.06	0.47	-0.03
2020	1.22	0.11	0.13	-0.05	0.49	-0.03
2021	1.23	0.11	0.13	-0.06	0.46	-0.03
2022	1.25	0.10	0.13	-0.06	0.46	-0.03

Note. The contributions to the total size of the automatic stabilisers are calculated by multiplying each elasticity for a given year with its weight (GDP share) in the same year.

Sources: Statistics Sweden and own calculations.

Table 3 summarises how the different taxes and forms of primary expenditure contribute to the overall budget elasticity (i.e., to the size of the automatic stabilisers), and how these contributions have evolved over time.

Table 3. Automatic stabilisers 1998–2022. Elasticity

	Direct taxes on labour	Payroll tax	Corporate income tax	Indirect taxes	Primary expenditure	Automatic stabilisers
	(i)	(ii)	(iii)	(iv)	(v)	**(vi)**
1998	0.18	0.12	0.04	0.14	-0.08	**0.55**
1999	0.17	0.12	0.04	0.14	-0.08	**0.56**
2000	0.16	0.12	0.05	0.14	-0.08	**0.56**
2001	0.16	0.13	0.04	0.13	-0.07	**0.53**
2002	0.15	0.13	0.03	0.13	-0.07	**0.51**
2003	0.16	0.12	0.03	0.13	-0.07	**0.51**
2004	0.16	0.12	0.04	0.13	-0.06	**0.51**
2005	0.16	0.12	0.05	0.14	-0.06	**0.52**
2006	0.16	0.12	0.05	0.14	-0.05	**0.52**
2007	0.15	0.12	0.05	0.14	-0.04	**0.50**
2008	0.16	0.12	0.04	0.14	-0.03	**0.48**
2009	0.15	0.12	0.04	0.14	-0.04	**0.49**
2010	0.14	0.11	0.04	0.14	-0.04	**0.48**
2011	0.14	0.11	0.04	0.14	-0.03	**0.47**
2012	0.14	0.12	0.04	0.14	-0.04	**0.47**
2013	0.14	0.12	0.04	0.14	-0.04	**0.47**
2014	0.14	0.12	0.04	0.14	-0.03	**0.47**
2015	0.14	0.12	0.04	0.14	-0.03	**0.47**
2016	0.15	0.12	0.04	0.15	-0.03	**0.49**
2017	0.15	0.12	0.04	0.15	-0.03	**0.49**
2018	0.14	0.12	0.04	0.14	-0.03	**0.48**
2019	0.14	0.12	0.05	0.14	-0.03	**0.47**
2020	0.13	0.12	0.04	0.14	-0.03	**0.46**
2021	0.13	0.12	0.05	0.14	-0.03	**0.47**
2022	0.13	0.12	0.05	0.14	-0.03	**0.46**

Note. Column (vi) shows the size of the automatic stabilisers calculated as the sum of columns (i)-(iv) minus column (v).
Source: Own calculations.

The calculations show that the size of the automatic stabilisers decreased slightly up until 2011, from 0.55 in 1998 to 0.47 in 2011, and has remained relatively unchanged since then. The reduction in the automatic stabilisers prior to 2011 was due to a lower contribution from direct taxes on labour and from primary expenditure. The lower contribution from direct taxes on labour is due to a reduction in these taxes as a share of GDP. The effect of lower taxes on labour on the automatic stabilisers has, in part, been counteracted by greater progressivity in the taxation of labour income, in particular because of the way the earned income tax credit is designed.[66] The lower contribution from primary expenditure is mainly due to lower unemployment benefits as a share of GDP.

Although the contribution to the automatic stabilisers from direct taxes on labour and primary expenditure has decreased, from 0.26 in 1998 to 0.16 in 2022, the overall reduction in the size of the automatic stabilisers is modest since the other taxes were unaffected by the reforms; the automatic stabilisers have been around 0.5 throughout the period. The findings show that it is possible to increase the incentives to work without substantial impairment of the automatic stabilisers. Furthermore, the findings show that the discretionary policy during the COVID-19 pandemic did not affect the size of the automatic stabilisers. The stabilisers were 0.47 in 2019, before the pandemic, and 0.46-0.47 during the pandemic years.

Almenberg and Sigonius (2021), who use the same method as above to calculate the size of the automatic stabilisers for 1998–2019, apply two important robustness tests to validate the method used. The earned income tax credit is designed in a way that increases the incentives for low-paid workers to take jobs. Many of those workers are in sectors that are sensitive to the business cycles, such as construction. Therefore, Almenberg and Sigonius assessed whether the assumption that the entire income distribution is affected by the business cycle affects the result. They concluded that truncating the income distribution that is affected by the business cycle only has a marginal effect on the automatic stabilisers. Assuming that only those workers who have an income up to 50% of the median income are affected by the business cycle, their calculations show that the stabilisers are slightly lower in the first years of the period studied, compared to the results presented above, and slightly higher in the final years. For 2019, this means that the automatic stabilisers are 0.50, compared to the 0.47 that we reported above. In addition, the size of the automatic stabiliser is virtually identical throughout the period studied.

The earned income tax credit creates a tax shield when individuals are made redundant that decreases the tax take once they find new jobs. Almenberg and Sigonius (2021) allow these workers to be unemployed for part of the year. After the introduction of

66. If the elasticity between direct taxes on labour with respect to the labour cost had been the same in 2022 as in 1998, but direct tax on labour as share of GDP had decreased from 17% to 10%, the size of the automatic stabilisers would have been 0.43 instead of 0.46 in 2022.

the earned income tax credit, the marginal tax rate decreases with the assumed duration of the unemployment because the tax credit, in relation to the wage earned, is larger for low wages. Hence, an unemployed worker who receives a lower wage and higher unemployment benefit, faces a lower marginal tax rate. This results in a smaller elasticity of direct taxes on labour with respect to the labour cost share. However, the difference compared to the baseline estimates is relatively small. Assuming that the change to the direct tax on labour income comes from unemployed workers with an income up to 50% of the median income finding new jobs after six months, we arrive at automatic stabilisers of 0.44 in 2019 instead of 0.47.

Almenberg and Sigonius (2021) use four additional robustness tests. They explore how assessments of the automatic stabilisers are affected by (i) shortening the sample to only include data from 1998 onwards, (ii) a different definition of wage sum and profit share as well as unemployment-related transfer payments, (iii) the inclusion of expenditure that may (rightly or wrongly) be deemed to function as semi-automatic stabilisers, and (iv) the uncertainty that stems from the regressions used when estimating how the labour cost share and the unemployment rate respond to the state of the economy. The overall conclusion from the extensions and robustness test is that the method used in this article gives a reliable estimate of the current size of the automatic stabilisers. Hence, the result presented above, where the current size of the automatic stabilisers in Sweden is slightly less than 0.5, holds true.

3 Automatic stabilisers in times of crises

In recent years, Sweden, like the other Nordic countries, has been hit by two crises. The COVID-19 pandemic in 2020–2022, together with the measures introduced to prevent the spread of the infection, led to a sharp decline in GDP, which prompted discretionary fiscal support measures on a scale never seen before. The inflationary crisis, which started in 2022 and is not over yet, has meant a sharp tightening of monetary policy and that the Swedish economy has entered a recession. The fiscal stance has been fairly moderate in order to not counteract monetary policy. We discuss how the two crises affected the size of the automatic stabilisers and how the automatic stabilisers functioned during them.

3.1 The COVID-19 pandemic, 2020–2022

When the COVID-19 pandemic hit Sweden in the spring of 2020, the forecasts were gloomy, to say the least. For example, the NIER predicted that GDP would fall by 7% that year.[67] Due to the spread of the infection and the difficult macroeconomic

67. NIER (2020).

situation, the government brought in a number of support measures to support businesses and households. Several of these measures were subsequently extended several times. During 2020–2022, pandemic measures are estimated to have cost SEK 330 billion.[68] Furlough schemes, under which an employee works fewer hours, wages are reduced and the government pays part of the wage, cost a total of SEK 68 billion. Payroll taxes were temporarily reduced at a cost of SEK 46 billion. The unemployment insurance ceiling was temporarily raised, and it became easier to qualify for unemployment insurance, which cost SEK 17 billion. Direct support for firms amounted to approximately SEK 64 billion. Those were the biggest expenses.

The size of the discretionary measures can be contrasted with the support the automatic stabilisers provided. The calculations in Section 2 show that the automatic stabilisers were slightly less than 0.5 during the years studied, which means that the risk in the event of an economic downturn is shared approximately equally between the public sector and the private sector if the stabilisers are allowed to operate freely. The GDP gap in 2020 was estimated to have been -4%.[69] Along with GDP in current prices of SEK 5,039 billion and an automatic stabiliser of 0.47, this means that SEK 95 billion was transferred to households and firms. The corresponding figures for 2021 are -0.7%[70] in GDP gap and a GDP in current prices of SEK 5,487 billion, which means that SEK 18 billion was transferred to households and firms. This means that the automatic stabilisers would have added slightly more than SEK 110 billion to the private sector in 2020 and 2021 if they had been allowed to operate freely.[71]

The calculation above shows the maximum amount the automatic stabilisers could contribute. However, for this to happen, the unemployment rate needed to increase, while the labour income, direct tax on labour and payroll taxes needed to decrease. Firm profits and the corporate income tax needed to be lower, as well as the indirect taxes. However, this scenario was prevented by the discretionary support designed to protect people and labour market matches. These policies broke the link between the output gap and the usual effects on the public sector through the automatic stabilisers. In other words, the discretionary policy prevented the automatic stabilisers from operating.

For stabilisation policy to be effective, it needs to be implemented promptly. Otherwise, there is a risk of the business cycle changing, and it needs to target the parts of the economy where it is expected to have the greatest impact. In addition, the measures should – if they are introduced exclusively to stabilise the economy – be temporary and reversed when the economy recovers. These principles are sometimes summarised by saying that the discretionary measures should be *timely*, *targeted* and *temporary*.

68. Statistics Sweden.
69. The first assessment of the GDP gap for 2020 after the actual GDP for 2020 had been presented (NIER, 2021).
70. The first assessment of the GDP gap for 2021 after the actual GDP for 2021 had been presented (NIER, 2022).
71. The economy was expected to expand slightly in 2022 and the year is therefore disregarded in the calculations (NIER, 2022).

It has been a common belief – but not a self-evident truth – that there is a risk of the political process around fiscal policy going awry since it can take a relatively long time to decide on and implement measures, the risk of short-term political considerations leading to the wrong measures, as well as the temptation to make temporary measures permanent. It is against this background that automatic fiscal stabilisers have been considered the safest way for fiscal policy to conduct stabilisation policy.

However, the COVID-19 pandemic showed that discretionary fiscal policy could be timely, targeted and temporary. Many support schemes were implemented just weeks after the pandemic started in Sweden. The aim was to protect matches in the labour market, and they were prolonged as the pandemic continued but eventually abolished again. A conclusion is that discretionary fiscal policy is better at stabilising the economy than its reputation suggests. This implies that the need for large automatic stabilisers might be exaggerated.

A change that took place after the pandemic, and which in the long run could affect the size of the automatic stabilisers, is the introduction of a new furlough scheme for individual firms when they face a temporary downturn.[72] These firms can then choose to lower the hours worked by employees instead of making redundancies. So far, the uptake has been negligible and has only cost SEK three million.[73] If firms were to start using the new furlough scheme to a greater extent, it would stop workers ineligible for unemployment insurance from becoming unemployed, and the scheme would increase the size of the automatic stabilisers. Evaluating the effect of the new furlough scheme on the automatic stabilisers is a job for future research.

3.2 Soaring inflation in 2022 and 2023

Inflation was high in Sweden in 2022 and 2023. The CPI with fixed mortgage interest rate was 7.8% in 2022 and 6.0% in 2023. The Swedish central bank, the Riksbank, tightened monetary policy to bring down inflation, and the tightening contributed to the Swedish economy entering a recession in 2023 which will last for the next few years.[74] The fiscal stance has been fairly moderate in order not to counteract the Riksbank's interest rate increases.[75]

The effects of inflation on the size of the automatic stabilisers lag slightly. Parts of the tax system and welfare system are automatically adjusted according to the inflation rate, but the adjustments for 2022 depend on inflation between June 2020 and June 2021. As mentioned earlier, the automatic stabilisers depend on rules and regulations

72. As a contrast to the system used during the pandemic which was introduced when the entire economy was in a downturn. In order for a firm to be able to apply for the new support, it must demonstrate (i) temporary and serious financial difficulties, (ii) that the difficulties have been caused by circumstances beyond the firm's control, (iii) that the difficulties could not have been foreseen or avoided, and (iv) that the firm has done everything possible to reduce the cost of labour. Firms can only be approved for support on the condition that they are competitive in the long run.
73. This can be set against the cost of the unemployment-related transfer payments, which amounted to SEK 34 billion in 2022.
74. According to the forecast by the NIER (2023b).
75. See, for example, the Swedish Fiscal Policy Council (2023) for a discussion of the budget for 2023.

that determine public sector revenue and expenditure, but the high inflation in 2022 did not affect the tax system and welfare system for 2022. Hence, we are not able to use the calculations from earlier periods to understand quantitatively the effects of inflation. Instead, we will discuss a few effects qualitatively.

Unexpected changes to inflation can lead to changes in the composition of GDP. In 2022, the wage share decreased, and the profit share increased. The forecast is that this will continue in 2023[76] and since corporate profits have a higher elasticity than taxes on wages, this shift is expected to increase the automatic stabilisers. Higher inflation means higher nominal GDP and more tax revenue. At the same time, many forms of public expenditure increase. However, since expenditure on unemployment insurance depends on the wage level and the ceiling for unemployment insurance, which is not increased with the inflation rate, unemployment insurance will account for a slightly smaller share of primary expenditure, and this will decrease the size of the stabilisers. In our judgement, these two effects will be similar in size and cancel out each other. Therefore, the automatic stabilisers in Sweden will still be at the same level as in 2022, i.e. 0.46, or as we stated earlier, slightly less than 0.50.

One effect of inflation is that it has a detrimental effect on the budget balance of Swedish local authorities. Their income is mainly direct tax on wages and support from central government, two sources not directly affected by inflation. Municipal expenditure, such as purchasing goods and paying rent, do increase with inflation, which, all other things being equal, forces municipalities to cut costs to stick to the fiscal framework. There is a risk that municipalities will cut consumption during the downturn in 2024, which will counteract the effects of the automatic stabilisers. A decade ago, a new system, which allows municipalities to even out their budget balance and consumption over the business cycle came into force. As pointed out by Portes and Wren-Lewis (2015), the way fiscal frameworks are designed can affect automatic stabilisers. Hence, the option for municipalities to even out their results might affect the fiscal stabilisers even though it does not affect the budget elasticity. The slight decline in the automatic stabilisers indicated by the budget elasticity is partly offset by this new system. To what extent the system hinders the municipalities from cutting costs will probably become clear in 2024 and will be another job for future research to evaluate.

76. See NIER (2023b).

4 Concluding remarks

The calculations above show that the automatic stabilisers in Sweden were 0.55 in 1998 and 0.46 in 2022. One finding is that policies to make work pay have not impaired automatic fiscal stabilisers to any great extent, reflecting the way these reforms, such as the earned income tax credit, were designed and the fact that many taxes and their contributions to the automatic stabilisers were not affected by the reforms. The method used treats the budget elasticity with respect to the GDP gap as a measure of the size of automatic stabilisers. In addition, the discretionary support during the COVID-19 pandemic prevented the automatic stabilisers from working freely. If not, they would have contributed approximately SEK 110 billion SEK to households and firms. The recent surge in inflation may affect the automatic stabilisers, but in our judgement, the effect will be negligible.

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Appendix A: The elasticity of profits with respect to the GDP gap

Using gross profits as a proxy for corporate profits makes it possible to calculate the elasticity of profits with respect to the business cycle by using the profit share, the elasticity of the labour cost share and the GDP gap, as per this equation:

$$\textbf{(2)}\ \epsilon_{\beta c} = \frac{1-(1-\theta)\,\epsilon_{\beta_w}}{\theta}$$

where θ is the profit share in the economy. As mentioned above, we assume the profit share to be 0.28 in equilibrium, and the elasticity of the labour cost share to the GDP gap, ϵ_{β_w}, is estimated to be 0.83. Plugging these values into equation (2) gives an elasticity of profits to the GDP gap, ϵ_{β_c}, of 1.45.

Appendix B: Derivation of the elasticity of primary expenditure with respect to the GDP gap.

Table 4 shows the different factors that determine the elasticity of expenditure with respect to the unemployment gap, as well as the elasticity of primary expenditure with respect to the GDP gap.

Table 4. Elasticity of expenditure to the GDP gap. Elasticity and %, respectively

	γ_u	$\tau_{\dot{w}}$	$\frac{\sigma}{G}$	$(1-\tau_{\dot{w}})\frac{\sigma}{G}$	U	U^*	$\frac{U^*}{U}$	γ_g	γ
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
1998	-6.08	32.7	0.05	0.03	9.5	7.7	0.8	0.03	-0.15
1999	-6.08	32.8	0.04	0.03	8.1	7.7	0.9	0.03	-0.16
2000	-6.08	31.9	0.04	0.03	6.8	7.6	1.1	0.03	-0.17
2001	-6.08	30.8	0.03	0.02	6.0	7.5	1.2	0.03	-0.15
2002	-6.08	29.5	0.03	0.02	6.1	7.3	1.2	0.02	-0.14
2003	-6.08	29.4	0.03	0.02	6.8	7.2	1.1	0.02	-0.13
2004	-6.08	29.7	0.03	0.02	7.6	7.1	0.9	0.02	-0.13
2005	-6.08	29.0	0.03	0.02	8.0	7.0	0.9	0.02	-0.12
2006	-6.08	28.3	0.03	0.02	7.3	6.9	1.0	0.02	-0.11
2007	-6.08	24.7	0.02	0.01	6.3	6.9	1.1	0.01	-0.09

2008	-6.08	23.7	001	0.01	6.4	6.8	1.1	0.01	-0.07
2009	-6.08	22.6	0.02	0.02	8.5	6.8	0.8	0.01	-0.07
2010	-6.08	21.7	0.02	0.02	8.8	6.8	0.8	0.01	-0.08
2011	-6.08	21.8	0.02	0.01	8.0	6.8	0.9	0.01	-0.07
2012	-6.08	21.8	0.02	0.01	8.1	6.8	0.8	0.01	-0.07
2013	-6.08	22.0	0.02	0.01	8.2	6.9	0.8	0.01	-0.07
2014	-6.08	21.4	0.02	0.01	8.1	6.9	0.8	0.01	-0.07
2015	-6.08	21.7	0.02	0.01	7.6	6.9	0.9	0.01	-0.07
2016	-6.08	22.0	0.02	0.01	7.1	6.9	1.0	0.01	-0.07
2017	-6.08	22.2	0.01	0.01	6.9	6.9	1.0	0.01	-0.07
2018	-6.08	22.3	0.01	0.01	6.5	7.0	1.1	0.01	-0.07
2019	-6.08	21.6	0.01	0.01	7.0	7.0	1.0	0.01	-0.06
2020	-6.08	21.7	0.01	0.01	8.5	7.1	0.8	0.01	-0.05
2021	-6.08	21.4	0.01	0.01	8.8	7.2	0.8	0.01	-0.06
2022	-6.08	21.1	0.01	0.01	7.5	7.3	1.0	0.01	-0.06

Note. The elasticity of the unemployment gap with respect to the GDP gap is reported in column (i). Column (ii) shows the average tax rate at the median income. Column (iii) shows the unemployment-related transfer payments as a proportion of primary expenditure. Column (iv) shows the unemployment-related transfer payments net of taxes as a proportion of primary expenditure. Column (v) shows unemployment and column (vi) equilibrium unemployment. Column (vii) shows the inverted unemployment gap. Column (viii) shows the elasticity of primary expenditure net of taxes and the unemployment gap, which is obtained by multiplying columns (iv) and (vii), i.e. correcting the net expenditure for the unemployment gap. The expenditure elasticity with respect to the GDP gap is reported in column (ix) and obtained by multiplying columns (i) and (viii).
Sources: Statistics Sweden, NIER, and own calculation

Comments on Markus Sigonius: Developments of automatic stabilisers in Sweden 1998–2022

Karl Harmenberg

1 Overview

The paper sets out to quantify the size of automatic stabilisers in Sweden by applying the Girouard and Andre (2005) method to estimate how much the fiscal balance is affected by the business cycle. Sigonius arrives at a headline number of 0.5, meaning that if GDP increases by SEK 100, the fiscal balance increases by SEK 50. The government thus dampens roughly half of the swings in disposable income. Further, Sigonius shows that this number has been relatively stable over time, despite significant changes to Sweden's tax-and-transfer system.

It is careful work on an important topic. Although the focus of the paper is the fiscal size of automatic stabilisers, not their potency, the paper serves as useful input to a broader literature on the efficacy of fiscal policy as a stabiliser of the business cycle.[77] For example, it is beyond the scope of the paper to study whether the automatic stabilisers adequately target households with a high marginal propensity to consume.

In my comments, I first ask how we should think about the statement that there is, evidently, no trade-off between 'make work pay' and automatic stabilisers. Second, I argue that 'worker betas' provide a nice reduced-form way to embrace heterogeneity.

77. The literature includes research on the size of the fiscal multiplier (see, e.g., Ramey (2016) on the empirics, Auclert et al. (2023) and Hagedorn et al. (2019) for recent quantitative theory), the role of automatic stabilizers (e.g., McKay and Reis (2016)) and which fiscal policies most effectively stimulate output (e.g., Broer et al. (2023)).

2 The trade-off between incentives to work and automatic stabilisers

Despite a large decrease in taxes on labour (direct taxes on labour fell from 17% of GDP in 1998 to 10% in 2022), the size of the automatic stabilisers remained stable. Sigonius provides an interpretation of this result: "The findings show that it is possible to increase the incentives to work without substantial impairment of the automatic stabilisers." To contextualize this interpretation, I introduce a simple model where the progressivity of the tax system is the sole determinant of both labour supply and business-cycle stabilisation. In the simple model, there is a direct trade-off between incentives to work and automatic stabilisers, which appears to conflict with Sigonius' interpretation.

2.1 Model

Consider the following simple model of labour supply. In the long term, a household faces the labour-leisure problem:

$$\max_{c,n} \log c - v(n)$$

$$s.t.\ c = wn - T(wn)$$

where c is consumption, n is hours worked, w is the wage and $T(\cdot)$ is taxes paid as a function of pre-tax income. The solution to this problem is given by

$$\nu'(n)\, n = \frac{1 - T'(wn)}{1 - T(wn)/(wn)} = \epsilon$$

Note that ϵ is a measure of the progressivity of the tax system: it is the ratio of one minus the marginal tax rate to one minus the average tax rate. In this simple model, we see, therefore, that labour supply n is determined by the progressivity of the tax system as summarised by ϵ.

Assume that in the short term, labour supply is fixed and think of the business cycle as a shock to w. It is then easily verified that the elasticity of disposable income to the business cycle is also ε. In this simple model, we thus conclude that incentives to work and the business-cycle stabilisation of disposable income are determined by the progressivity of the tax system. As a result, policy makers face a direct trade-off: providing incentives to work makes disposable income less stable over the business cycle.

Of course, the model outlined above is highly stylised. Nevertheless, it points to a fundamental trade-off between incentives to work (an effect of low progressivity) and business-cycle stabilisation (an effect of high progressivity). Heterogeneity may blur this trade-off but probably does not fundamentally alter it. For example, low-income

marginally attached workers have a high labour-supply elasticity so labour-market reforms may have more of an effect on them. This was the motivation behind the series of earned income tax credit reforms in Sweden. At the same time, these workers are also highly exposed to the business cycle, which motivates stabilising their disposable income.

The findings provided by Sigonius are thought-provoking – how much did incentives to work actually change? Sigonius points out that the earned income tax credit reforms actually increased the progressivity of the tax system, which suggests that incentives to work were reduced. One avenue for exploring this question further would be to set up a quantitative macroeconomic model with realistic extensive-margin frictions to study jointly both the incentives to work and automatic stabilisation.

3 The incidence of the business cycle

When computing the response of tax revenue to the business cycle, Sigonius in effect assumes that when labour costs increase, all wages increase proportionally. As he points out, this is not entirely innocent. "Labour costs are also affected by workers moving in and out of employment. Low-paid workers may be over-represented in this category. Since they face lower marginal and average tax rates, this might affect the elasticity." (p. 13) Here, I want to suggest an easily implementable way to improve the analysis in this aspect.

3.1 Worker betas

Guvenen et al. (2017) and Kramer (2022) run the following regression for the US and Germany respectively,

$$\Delta \log y_t^q = \alpha + \beta_Y^q \Delta \log Y_t + controls + \epsilon_t$$

for recent-earnings quantiles q where Y_t is GDP and y_t^q is the income of the quantile. The coefficient of interest, β_Y^q, is the "beta"/elasticity of a quantile q's earnings with respect to GDP. A higher β_Y^q indicates that the earnings quantile is more exposed to the business cycle. If $\beta_Y^q = 1$, then a 1% increase in GDP translates into a 1% increase in earnings for the quantile.

Guvenen et al. (2017) and Kramer (2022) provide beta estimates for the entire earnings distribution and find that low-income workers are much more exposed to the business cycle, with the bottom quintile having a beta of approximately 3. The numbers from their regressions can be directly plugged into the methodology used by Sigonius and would improve the estimate of the size of the automatic stabiliser since it would correctly account for the fact that poor workers are more exposed to the business cycle.

As a side remark, it would be useful if someone ran this very regression for the Nordic countries. I suspect that the qualitative features from Germany and the US are transferable, but there may be some quantitative differences.

4 Conclusion

Sigonius has presented a careful and well-written paper on an important topic. In addition, it contains many other interesting results (e.g., an analysis of the effect of COVID-19 policies). The paper highlights the importance of a deeper understanding of the trade-off (or lack of one) between incentives to work and automatic stabilisers in the design of policy.

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