Automatic Fiscal Stabilizers in Finland 1993–2021

VALTIONTALOUDEN TARKASTUSVIRASTO
NATIONAL AUDIT OFFICE OF FINLAND

WORKING PAPER

Working paper

Automatic Fiscal Stabilizers in Finland 1993–2021

Jenni Kellokumpu, Simo Pesola, Leena Savolainen and Jasmin Grünbaum

March 2023

National Audit Office of Finland
Fiscal Policy Monitoring Function

Abstract

D/685/04.04.01/2022

In this study, we analyse the size of the automatic fiscal stabilizers in Finland, a Nordic welfare state with relatively extensive social security and progressive income taxation. During the last decades, Finnish Governments have aimed at increasing the incentives to work by lowering earned income taxation and reforming social security. However, there is a trade-off between the so-called make-work-pay policies and the size of the automatic fiscal stabilizers. While incentives for work are improved by these reforms, the automatic stabilization of the economy through public spending and taxation may decrease, which calls for more discretionary fiscal policy during economic fluctuations. We estimate the size of Finland's automatic stabilizers over 1993–2021 using each year's tax and benefit codes and macro- and microdata of general government taxes and expenditures. As a measure of the automatic stabilizers, we estimate a budgetary semi-elasticity that captures the sensitivity of the general government budget balance to the economic cycle. We conclude that the estimate of the budgetary semi-elasticity for Finland has been close to 0.5 during the whole period of 1993–2021. This means that the deficit-to-GDP ratio changes by 0.50 percentage points with respect to a one percentage point change in the output gap. Our findings suggest that the automatic stabilizers have not altered significantly as a result of the policy decisions that have reformed the Finnish tax and benefit systems over the examined period, although some changes in the size of the automatic stabilizers can be observed. Broadening the estimate to include expenditure on general housing allowance, social assistance, and wage security has a moderately increasing effect on the semi-elasticity. Considering the uncertainty within the underlying regressions, some caution should be acknowledged when interpreting absolute semi-elasticity values.

Helsinki 23 March 2023

JEL codes: E62, H60, J30

Keywords: Automatic fiscal stabilizers, budgetary semi-elasticity, output gap, structural balance

Acknowledgements:
We would like to thank Antti Halmetoja, Sanni Hellman, Mikael Kirkko-Jaakkola, Mauri Kotamäki, Matti Okko, Jukka Pirttilä, Mika Sainio, Markus Sigonius and Jussi Tervola for their expertise and valuable comments.

The National Audit Office of Finland audits the management of central government finances and assets, monitors fiscal policy, and oversees political party and election campaign funding. The Fiscal policy monitoring function is responsible for monitoring compliance with fiscal rules as well as the setting and implementation of fiscal objectives. The aim of the monitoring is to promote the transparency and intelligibility of fiscal rules as well as stable and sustainable government finances. The fiscal policy monitoring function reports its assessments twice a year. All publications are available online. The opinions expressed in this paper do not necessarily reflect the official views of the National Audit Office of Finland.

Contents

1 Introduction

Automatic fiscal stabilizers refer to the parts of government expenditure and revenue that change automatically in response to business cycles. They act counter-cyclically by smoothing the effects of economic fluctuations. Automatic stabilizers work without explicit government interference; however, their size is affected by decisions regarding revenue and expenditure-related legislation. During the last decades, Finnish Governments have aimed at increasing the incentives to work by lowering earned income taxation and reforming social security. In this study, we estimate the size and development of automatic fiscal stabilizers in Finland in 1993–2021.

To capture the cyclically adjusting component of the general government budget balance, we follow the methodology applied first by Girouard and André (2005), according to which the size of the automatic stabilizers can be estimated by calculating a budgetary semi-elasticity using a disaggregated approach. 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 with respect to a one percentage point change in the output gap.[1] The overall budgetary semi-elasticity is formed as a combination of the elasticities of four tax categories (direct income tax, corporate income tax, payroll tax, indirect taxes) as well as primary expenditure. The methodology decomposes the different elasticities into structural and cyclical parts, where the former reflects the tax and benefit rules, and the latter examines how the tax and benefit aggregates respond to economic fluctuations.

Almenberg and Sigonius (2021) apply this methodology as they estimate the size of automatic fiscal stabilizers in Sweden. We replicate their study using Finnish data and compare their results with ours as Finland and Sweden are similar Nordic countries with relatively generous unemployment benefits and progressive taxation. We also reflect on our results in relation to other estimates of budgetary semi-elasticity for Finland. Especially in the context of the European Union's fiscal surveillance, the cyclically adjusted budget balance has played an essential role. We use data from the national accounts, and for unobservable variables, such as potential output, output gap, and equilibrium unemployment, we use the estimates by the Finnish Ministry of Finance. In addition, we utilize the Finnish microsimulation model SISU, which has detailed information on tax and benefit codes for each year from 1993 to 2021.

We find that during the examined period, the budgetary semi-elasticity peaked at 0.50 in the mid-1990s, after which it declined continuously until reaching 0.42 in 2007. From there on, the semi-elasticity has gradually increased, and in recent years it has remained close to the 2021 estimate of 0.47. The developments have occurred in conjunction with changes in average earned income tax rates and progressivity of taxation as well as fluctuation in unemployment expenditure.

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 the budget semi-elasticity of Finland was 0.5. This estimate was revised to 0.63 when the 1996 tax code information was 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 of 2001 and further 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).

Almenberg and Sigonius (2021) find that in Sweden, the so-called make-work-pay policies have increased the progressivity of taxes and decreased the overall income tax revenue in relation to GDP. At the same time, government spending on unemployment benefits has fallen. They estimate that the budgetary semi-elasticity decreased in the first half of their sample period of 1998–2019 but come to a conclusion that policies to make work pay have not impaired the automatic stabilizers. The budgetary semi-elasticity in Sweden has been roughly 0.5 throughout the sample period.

We conclude that the estimated budgetary semi-elasticity for Finland has been close to 0.5 in previous literature as well as in our calculations during the whole period of 1993–2021. Our findings suggest that the automatic stabilizers have not altered significantly as a result of the policy decisions that have reformed the Finnish tax and benefit systems over

[1] 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)

the period of 1993–2021, although some changes in the level of budgetary semi-elasticity can be observed. Our calculations point to a slightly lower level of budgetary semi-elasticity than the other estimates, which can be due to several reasons, including differences in sample, methodology, and household composition. Nevertheless, this study makes several contributions to existing literature. It is, to our knowledge, the first one to estimate the budgetary semi-elasticity for Finland with longitudinal data over the period 1993–2021. By reviewing previous estimates and their methodology, it shows that the budgetary semi-elasticity estimate used by the European Commission in fiscal surveillance is tilted towards the higher end of the range. It also provides up-to-date information on the budgetary semi-elasticity by using the latest available tax and benefit codes.

1.1 Previous literature

In the empirical literature, different methods are used to estimate the size of automatic stabilizers and their responsiveness to economic fluctuations. Microsimulation methods are used to simulate taxes, benefits, and disposable income under different assumptions for a representative sample of households (see for example Auerbach, 2009, or Dolls et al., 2019). Typically, microsimulation methods create a shock affecting household income while holding everything else constant, after which the immediate stabilizing effects of taxes and social security benefits on household disposable income and consumption are estimated. The measure of automatic stabilization is calculated through how direct taxes, social insurance contributions, and transfers change in response to the simulated income change. Dolls et al. (2019) find that the resulting amount of automatic stabilization highly depends on the type of income shock. Moreover, they find that the stabilization effect in the euro area is higher for unemployment than for income shocks, although there is a considerable deviation in the results between EU countries.

In macroeconomic methods, behavioural responses are taken into account more broadly, and they utilize general equilibrium models of the economy (see McKay & Reis, 2016). In addition, compared with microsimulations, macroeconomic methods provide information on the indirect effects of stabilization. Much like in microsimulations, the estimated size of the automatic stabilizers depends on the type of shock affecting the economy. The most noticeable stabilization effects occur mainly because of a demand shock directly affecting tax revenues (Maravalle & Rawdanowicz, 2020). In contrast, shocks affecting investments, exports, or aggregate supply create less need for stabilization due to their lower impact on tax revenues and employment. As a result, the estimates of the size of automatic stabilizers are slightly smaller than in microsimulations, averaging roughly 55% compared with 68% in microsimulations. This is mainly caused by behavioural effects on labour supply, capital accumulation, and other macroeconomic influences such as monetary responses (Mohl et al., 2019).

In the statistical method, the size of automatic stabilizers is estimated using budget semi-elasticity, which describes the percentage point change in the general government's budget balance in relation to a 1% change in GDP (see for example Mourre et al., 2019, Price et al., 2015 and Girouard and André, 2005). Budget semi-elasticity measures the sensitivity of the budget balance to the business cycle, and fiscal semi-elasticities are a combination of revenue and expenditure components. Thus, automatic fiscal stabilizers are estimated as changes in cyclical budgetary items. Compared with microsimulations and macro estimates, where stabilizers are estimated based on household income and demand, the statistical approach treats automatic stabilizers as a cyclical part of the general government's budget balance. Therefore, one of the advantages is that statistical methods can be utilized to observe revenue and expenditure items that affect the cyclical balance.

One typical method is the extension of a statistical model where the budget semi-elasticity is estimated using a disaggregated approach. In this method, cyclical components are identified separately as budget balance components and weighted by their respective shares in GDP. Therefore, the semi-elasticity is more significant for countries where budget components are more sensitive to cyclical fluctuations. In this framework, the semi-elasticity indicates how much the budget balance-to-GDP ratio changes in relation to a given change in the output gap in the absence of discretionary fiscal measures.

This method has been applied previously by Giorno et al. (1995), van den Noord (2000), Girouard and André (2005), and Price et al. (2015) for OECD countries, and by Flodén (2009) and Almenberg and Sigonius (2021) for Sweden. Giorno et al. (1995) find that the budgetary semi-elasticity of Finland is 0.5 when the 1991 tax code information is applied to the 1991 distribution of income and the representative household is taken to consist of a full-time male worker, a working spouse with gross earnings equalling half of those of her husband, and two children. Van den Noord (2000) finds that the budgetary semi-elasticity of Finland is 0.63 when the 1996 tax code information is applied to the 1992 distribution of income and the representative household is the same as in Giorno et al. (1995). Girouard and André (2005) evaluate the budgetary semi-elasticity for Finland to be 0.48 based on the tax/benefit position of households in 2003 and the income distribution data of the year 2001 when the representative household is defined as a full-time, two-earner married couple with two children, with the secondary earner receiving 50% of the wage of the principal earner. Price et al. (2015) found based on more informative and up-to-date income distribution data and tax and benefit codes (of the year 2011) that the budgetary semi-elasticity was 0.55 for Finland based on three household types: i) single persons, ii) married couples with a single earner and no children, and iii) married couples with two children, one of the earners receiving two-thirds of average income.[2]

In addition, the European Commission estimates the budgetary semi-elasticities for all EU member states using the disaggregated approach. Their budgetary semi-elasticity estimate for Finland was 0.574 in 2014 (Mourre et al., 2014) and revised to 0.582 in 2019 (Mourre et al., 2019). In the revised estimates, the weights of the revenue and expenditure categories in relation to GDP is an average over the period 2008–2017 and the tax revenues and expenditures of the year 2018. They also proxy the progressivity of the tax system by the top statutory tax rates of personal income tax and corporate income tax, which were 51.1% and 20% in 2018.

Flodén (2009) and Almenberg and Sigonius (2021) evaluate the automatic stabilizers in Sweden using a disaggregated approach. They find that the so-called make-work-pay policies have increased the progressivity of taxes while decreasing the overall income tax revenue. Similarly, they find that government spending on unemployment benefits in relation to GDP has fallen. While the personal income tax and unemployment benefit reductions decrease automatic stabilizers, increasing the progressivity of the income tax system has lowered the overall negative impact on automatic stabilizers. Hence, the budgetary semi-elasticity has not changed significantly during the entire period of 1998–2019. The authors conclude that the make-work pay policies in Sweden have been designed and implemented in a way which does not affect the budgetary semi-elasticity.

The estimates of the automatic stabilizers vary due to differences in estimation methods and the periods used in the estimations, differences in taxation and social security between countries, and differences in how taxation and social security in different countries react to shocks. Generally, countries with high public spending, comprehensive unemployment insurance, and tax systems have higher budget-elasticity and, thus, large automatic stabilizers. Similarly, budgetary semi-elasticity tends to be much lower in countries with relatively small public expenditures, such as some Central and Eastern European countries. (Dolls et al., 2012, Bouabdallah et al., 2020.)

Compared with the overall average of the euro area, the US estimates for budgetary semi-elasticity are slightly lower, at around 0.3–0.4 (Dolls et al., 2012, Russek and Kowalewski, 2015). The differences compared to the EU countries are mainly due to the less comprehensive unemployment insurance and less progressive income tax structure. In addition, the states in the US have stricter budget balance regulations, resulting in automatic stabilizers being unable to operate freely during downturns. Therefore, the income stabilization in the US after an unemployment shock is more minor, and in general, the US relies more on discretionary fiscal stimulus, a significant part of which goes to households, compared with the euro area.

Astarita et al. (2018) find that progressive income taxation plays a crucial role in stabilizing the disposable income of high and middle-income earners. On the other hand, social security contributions and unemployment benefits stabilize demand and consumption mainly for lower-income households. Furthermore, according to EUROMOD simulations conducted in 2018, on average, the more progressive taxes are, the more significant the size of income stabilization is (Astarita et al., 2018).

To increase the effectiveness of automatic fiscal stabilizers, underlying systems associated with the stabilizers can be modified so that they react more robustly to cyclical fluctuations. However, measures that alter non-cyclical items must be taken carefully since changing the tax or spending parameters permanently could lead to undesirable side effects and economic inefficiency. On the revenue side, influencing the automatic stabilizers could mean increasing the progressivity of income taxes without increasing the overall tax rate, simultaneously minimizing the adverse effects related to work incentives. (Debrun et al., 2008.)

Another approach is to temporarily change tax and spending parameters during recessions, i.e. to extend unemployment insurance, allow corporate tax losses to offset against past profits, or implement a tax reduction in VAT or personal

[2] Although an arithmetical average of the three types is used due to data availability. (Price et al., 2015, p. 12.)

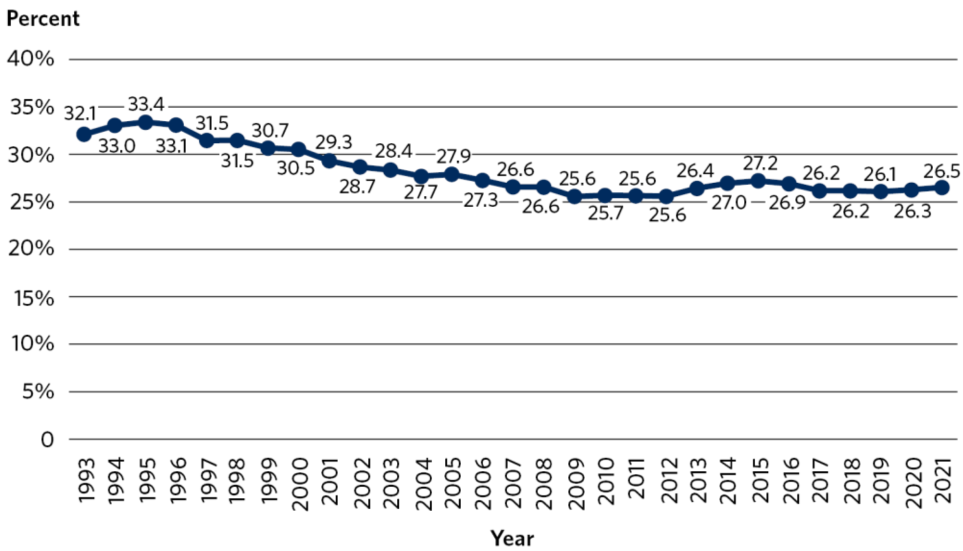
income tax. However, linking a temporary fiscal stabilizing measure to prevalent macroeconomic indicators can be difficult since it would require timely data with minimal lag or errors to prevent it from delaying or distorting the budgetary response. In addition, introducing temporary increases in unemployment benefits would require scaling back the baseline benefit level during normal economic conditions to maintain sustainable public finances. (Baunsgaard & Symansky, 2009.)

There are indications in the empirical literature that although automatic stabilizers operate counter-cyclically, discretionary fiscal policy actions can be pro-cyclical (Fatas, 2019). The counter-cyclical effects of the stabilizers have been reversed in some euro area countries due to pro-cyclical budgetary policy measures, such as benefit cuts and tax increases, which have made the automatic stabilizers unable to operate freely in a downturn (Mohl et al., 2019). Automatic stabilizers were constrained by fiscal consolidation measures, for example, during the euro area's debt crisis in the early 2010s (Dolls et al., 2020). It is essential to note that a sustainable public economy strengthens the cyclical effect of fiscal policy. According to Burriel et al. (2020), in a crisis, high-debt economies are prone to losing more output and have a less effective counter-cyclical fiscal policy, and their potential output is further negatively impacted. Hence, building fiscal buffers through automatic stabilizers during economic upswings helps in mitigating debt sustainability risks.

1.2 Institutional background

Taxation

Wage income taxation was raised significantly during the recession of 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 was increased. Additionally, the earned income tax credit in state taxation was first introduced in 2006 and replaced by a similar work tax credit in 2009. The continuous decline of the average wage income tax rate ended in 2009, after which it has stayed at a similar, somewhat rising level. (For more details, see e.g. Kirkko-Jaakkola, 2022.)



Note: The tax rates are calculated for a median yearly wage income that corresponds to an income of 36 266 euros in 2019 following the index of wage and salary earnings.

Figure 1: Average tax rate for median income full-time worker. (Source: Finnish Microsimulation model (SISU), own calculations.)

Figure 2 shows the collected income taxes and compulsory social security contributions in 1993–2021 in relation to GDP. The make-work-pay policies of previous governments have aimed at decreasing wage-income taxation and shifting the focus of taxation on consumption taxes. We can see that the amount of collected state income taxes has decreased, but this has been partly offset by mainly the increase in municipal income taxes and pension insurance contributions. The average municipal tax rate increased from 17.20% to 20.02% during 1993–2021, and employees' pension insurance contributions increased from 3% to 7.15%/8.65% during the same period.

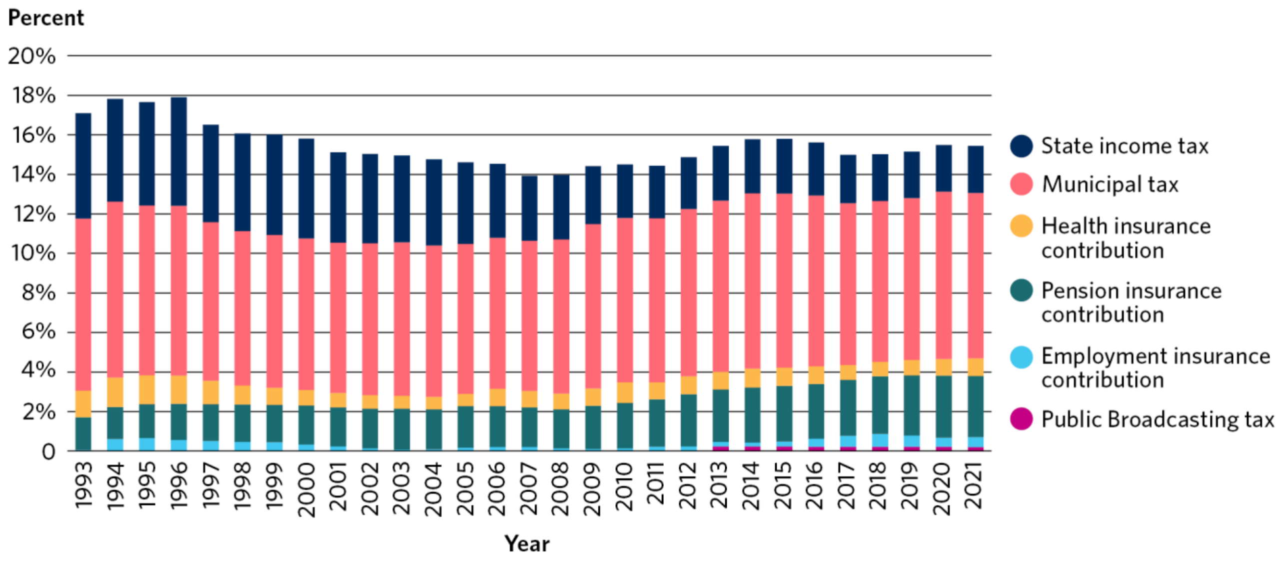


Figure 2: Wage-income taxes and contributions 1993–2021, % in relation to GDP. (Source: Statistics Finland.)

Capital income tax rate varied between 25% and 29-% in 1993–2011. In 2012, the capital income tax rate was increased from 28% to 30% and changed from a flat tax to a progressive tax: capital income exceeding 50 000 euros was taxed at 32%. In 2014, the threshold was lowered to 40 000 euros and a year later to 30 000 euros, and the tax rate was increased to 34% for income exceeding the threshold. There was 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 euros in 2005. However, the wealth tax was abolished in 2006, and the focus of taxation was transferred from share ownership to share dividends. 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 the decrease in the corporate tax rate 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 VAT level of 24% is among the highest in the euro area. However, there are lower rates for some items. For example, food, restaurant, 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 have a VAT of 10%. In addition, some business operations, such as health care and medical services, are entirely exempt from VAT.

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

Unemployment benefit system

The Finnish unemployment benefit system has been altered in the past decades with the sometimes-contradicting aims of improving income security, boosting employment, and increasing incentives, as well as reducing government expenditure. This has resulted in a relatively complex system.

The current state is based on the reform of 1984, which created a system of two benefits: basic unemployment benefit and earnings-related benefit, the latter requiring a predetermined employment history as well as the 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 time. The amount of the labour market subsidy, the basic unemployment benefit, and the basic part of the earnings-related benefit is the same. (HE 235/1993)

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). After the financial crisis, the rules of eligibility and the level of unemployment benefits have been both relaxed and tightened. A significant one-off increase of 100 euros per month was made to all three benefits in 2012 (HE 90/2011).

To boost employment, an earnings disregard, which had been in effect from 1985 to 1997, was introduced again in 2014 and at a higher level that previously. This means that it is possible to earn 300 euros per month without losing the unemployment benefits. Income above 300 euros reduces the benefits by 50% of the earned amount (HE 176/2013). 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 work history were also abolished, and the higher replacement rates based on active labour market participation were reduced. (HE 113/2016)

In 2018 and 2019, a so-called 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 an employment-promoting service for a sufficiently long time during the past 65 days. (HE 124/2017) The waiting period before receiving an unemployment benefit has been shortened and lengthened several times in recent years, and it is now 5 days.

In figure 3, we can see the fluctuation in unemployment expenditure and the output gap, which measures the business cycle.

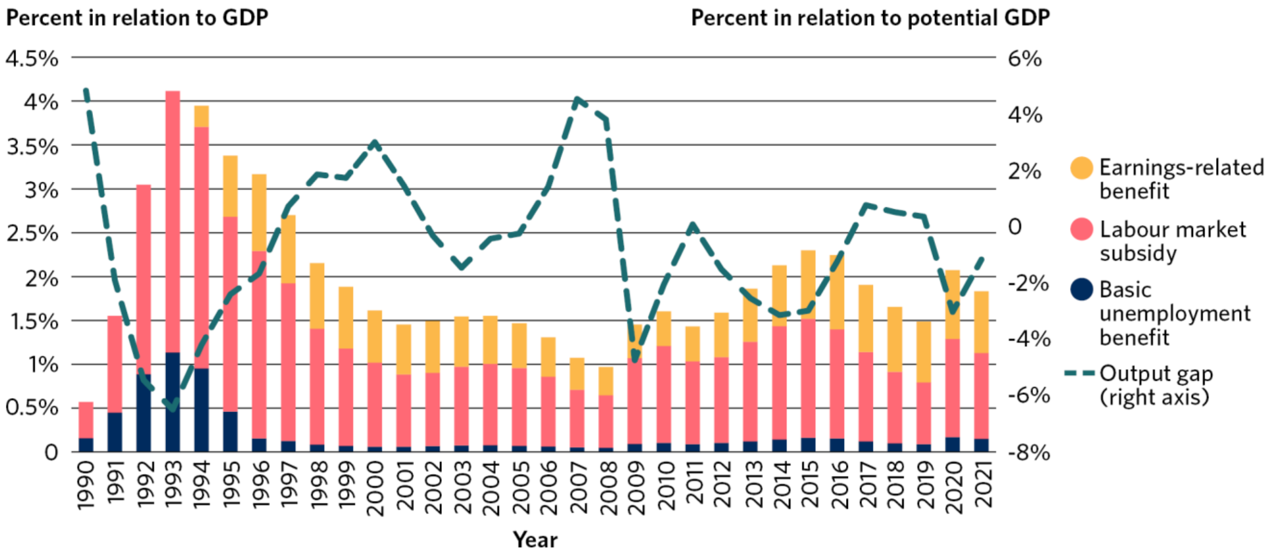


Figure 3: Unemployment benefits and output gap 1990-2021. (Source: Finnish Institute of Health and Welfare and Ministry of Finance.)

2 Methods and data

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

$$\boldsymbol{b} = \boldsymbol{b}^* + \boldsymbol{\alpha}\left(\frac{\boldsymbol{Y} - \boldsymbol{Y}^*}{\boldsymbol{Y}^*}\right) \tag{1}$$

where b^* denotes the structural balance, α denotes the impact of automatic stabilizers 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 total government 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 semi-elasticity, denoted by α, is then formed by the following equation (Almenberg and Sigonius 2021):

$$\boldsymbol{\alpha} = \sum_{\boldsymbol{i}} \boldsymbol{\varepsilon_i} \frac{\boldsymbol{T_i}}{\boldsymbol{Y}} - \boldsymbol{\gamma} \frac{\boldsymbol{G}}{\boldsymbol{Y}} \tag{2}$$

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

The elasticity ε_i shows how public revenues respond to changes in GDP. When the elasticity is divided into two parts, ε_{τ_i} and ε_{β_i}, the first part indicates how tax revenues change in response to changes in the tax base, while the latter shows how the tax bases change with respect to the output gap. β_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.

$$\boldsymbol{\varepsilon_i} = \frac{\boldsymbol{\partial \tau_i}}{\boldsymbol{\partial (y - y^*)}} = \frac{\boldsymbol{\partial \tau_i}}{\boldsymbol{\partial \beta_i}} \frac{\boldsymbol{\partial \beta_i}}{\boldsymbol{\partial (y - y^*)}} \equiv \boldsymbol{\varepsilon_{\tau_i} \varepsilon_{\beta_i}} \tag{3}$$

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

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

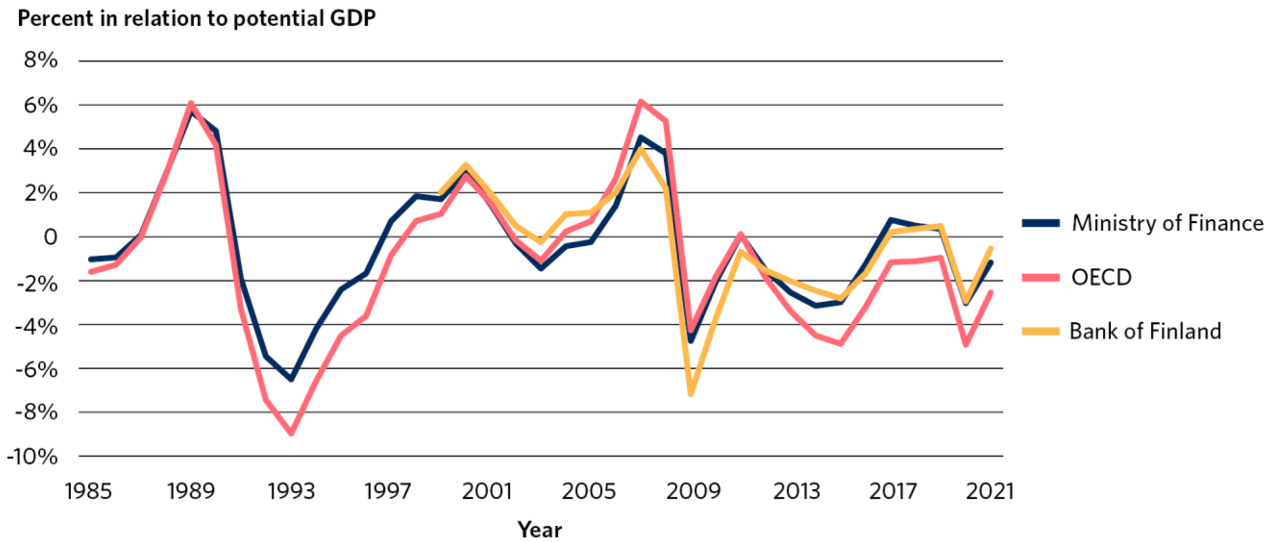
The elasticity of expenditure with respect to changes in the output gap is denoted by γ_u, primary expenditure by G, while g denotes the logarithm of primary expenditure. Based on this decomposition, the elasticity of general government primary expenditure can be derived as follows:

$$\gamma = \frac{\partial g}{\partial(y-y^*)} = \frac{\partial g}{\partial(u-u^*)}\frac{\partial(u-u^*)}{\partial(y-y^*)} \equiv \gamma_g \gamma_u \tag{4}$$

The disaggregated approach, while data sensitive, offers valuable insight into the cyclical responses of specific tax and expenditure components, since this approach shows which tax and expenditure items drive the cyclical balance within the output cycle. Furthermore, by extracting different tax and expenditure categories, this approach highlights the response of individual taxes bases with respect 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 revenues and primary expenditure responds to 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. Third, the overall size of individual tax categories and primary expenditure, determined by their share in relation to GDP.

We use data from the national accounts of Statistics Finland for the years 1987 to 2021. The data include such macroeconomic variables as GDP, gross operating surplus, compensation of employees, and tax revenues regarding different tax categories. In addition, the total current primary expenditure is retrieved from the European Commission's AMECO database. The 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 of Statistics Finland. When calculating the elasticity of direct taxes on labour with respect to its tax base, we approximate the distribution of wage income in 2019, based on register microdata of approximately 800 000 individuals, acquired from Statistics Finland.

In addition, we utilize estimates of the potential output from the Finnish Ministry of Finance. It is based on the EU commonly agreed methodology (CAM) and used also by the European Commission. Figure 4 shows the output gaps for Finland, 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.



Note: The Bank of Finland's output gap data includes estimates for 1999–2021.

Figure 4: Output gap in Finland 1985-2021. (Source: Finnish Ministry of Finance, Bank of Finland and OECD.)

In addition, the figure 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 such as Nokia. While the financial crisis of 2008 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 the 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 remains higher than before the crisis, and general government debt-to-GDP ratio has stabilized at a higher level. (Pohjola, 2017).

3 Results

Chapter 3 describes the methodology used to calculate individual tax and expenditure elasticities and combines them into the semi-elasticities presented in table 7. In order to perform the calculations, we use a two-step methodology when calculating elasticities for four revenue components and one expenditure component. On the revenue side, we first calculate the relationship between the wage sum and the output gap using an OLS regression. This estimated elasticity describes how wages react to economic fluctuations. As a second step, we multiply this tax base to output gap sensitivity by a tax category's revenue-to-base elasticity.

When calculating the elasticity between primary expenditure and the output gap, we apply a similar two-step methodology. As done in previous literature, we first estimate the elasticity of unemployment gap (difference between unemployment and equilibrium unemployment) with respect to the output gap. Secondly, we determine the elasticity of primary expenditure with respect to the unemployment gap. These elasticities are then multiplied, resulting in primary expenditure elasticity with respect to the output gap.

Finally, each elasticity is multiplied by the corresponding revenue or expenditure share in relation to GDP. These contributions are added up to get the total budgetary semi-elasticity.

3.1 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 with respect to the relevant tax base, and the elasticity of the tax base with respect to the output gap.

The tax estimations proceed as follows. First, we estimate the elasticity of the specific tax base with respect to the business cycle, using time series data. 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 time period of 1993–2021. Taking into account the change in the tax system's progressivity is particularly important since higher progressivity of income taxation contributes positively to overall semi-elasticity estimates as shown later in the calculations.

The elasticity of direct taxes on labour with respect to the output gap

When estimating the elasticity of direct taxes on labour with respect to the output gap, the tax base is defined as the sum of wages and salaries, and employers' social security contributions from the national accounts.[3] 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 with respect to the output gap, $\varepsilon_{\beta_\omega}$, is then estimated using the following equation:

$$\boldsymbol{\Delta(w_t - y_t^*) = a + \varepsilon_{\beta_\omega}\Delta(y_t - y_t^*)} \tag{5}$$

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.[4]

---

[3] The tax base for direct taxes on labour and payroll taxes can also be defined as the labour cost share of value added in the economy, where GDP is divided into labour and capital. Therefore, the labour cost share is calculated as the share of the economy's value added that is not allocated to firms as gross operating profits. This broader definition is based on macroeconomic aggregates and is used by Girouard and André (2005), Flodén (2009), and Almenberg and Sigonius (2021). Defined in this way, we get 0.72 as our estimate of the elasticity of the labour cost share with respect to the output gap for the period of 1987–2021.

[4] Although they choose to use the value 0.59, based on a panel estimation between similar countries.

The elasticity of the wage sum with respect to the output gap is 0.68 when estimated over the period of 1987–2021. This is higher than the sum calculated by Girouard and André (2005), who, using the time-period of 1980–2003, estimate the wage sum elasticity with respect 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 periods, and the estimates depend on the subsamples used. The elasticity of the wage sum (wages and salaries including the employer's social security contributions as expenditure) with respect 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 stabilizers. Therefore, smaller estimates of wage elasticity have a decreasing effect on the overall size of the automatic stabilizers.

While there are some differences between the estimation results, it is also notable that the results are not statistically significant for specific subsamples, which affects the confidence intervals in the final results. While the significance level is at least 0.1 for all time period estimates, the margin of error should be considered when estimating yearly semi-elasticity values. We will discuss this further later on.

Table 1: Regression results with different subsamples.

Time period	Elasticity ε_{β_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 will estimate the elasticity of earned income taxes, including employees' compulsory social security contributions, with respect to the wage sum. This can be calculated as the ratio between the marginal and average tax rates as in Girouard and André (2005).

$$\varepsilon_{\tau_w} = \frac{\Sigma_j m(W_j) f(W_j)}{\Sigma_j a(W_j) f(W_j)} \tag{6}$$

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

We use the Finnish SISU microsimulation model and the tax codes of each year included in the model to calculate the average and marginal tax rates for the years 1990–2021.[5] As in Almenberg and Sigonius (2021), the average and marginal tax rates are evaluated for individuals with an income of $\{0.01\widehat{W}, 0.02\widehat{W}, \dots, 8.00\widehat{W}\}$, where $\widehat{W}$ denotes the median income for the year t.

The income distribution of full-time workers 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 has been constant between 1993 and 2021. In the baseline estimation, we assume the individual to work full-time and the income to be solely wage income. At each wage level, we calculate the marginal tax rate by increasing wages proportionally by 5%.

[5] The average tax rate includes the state income tax, municipal tax, health insurance contribution, pension insurance contribution, unemployment insurance contribution, and public broadcasting tax.

Table 2 shows the average tax rate, the marginal tax rate, and the elasticity of personal wage income tax with respect to the wage sum for the years 1993–2021. The average tax rate decreased significantly after 1995, being at its lowest in 2009 at 25.2%, and increasing somewhat to 26% in 2021 (see also figure 5 for the average tax rates at different income levels). The marginal tax rate has evolved similarly (see also figure 6 for the marginal tax rates at different income levels). However, we can see from figures 5 and 6 that the average and marginal tax rates have decreased more for lower income levels than for higher income levels during the examined period. As a result, the elasticity of personal income taxes has risen from 1.5 to 1.7 over the period of 1993–2021 (table 2).

Table 2: Marginal tax rate, average tax rate and the elasticity of direct taxes on labour with respect to the wage sum. (Source: Finnish Microsimulation model (SISU) and own calculations.)

Year	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.

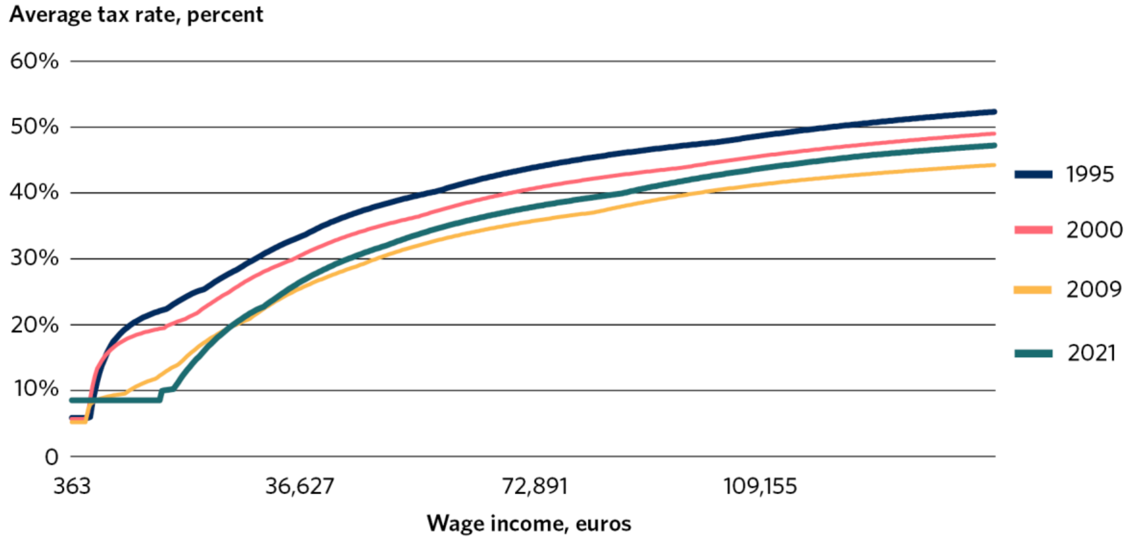


Figure 5: Average tax rates in 1995, 2000, 2009 and 2021. (Source: Finnish Microsimulation model (SISU) and own calculations.)

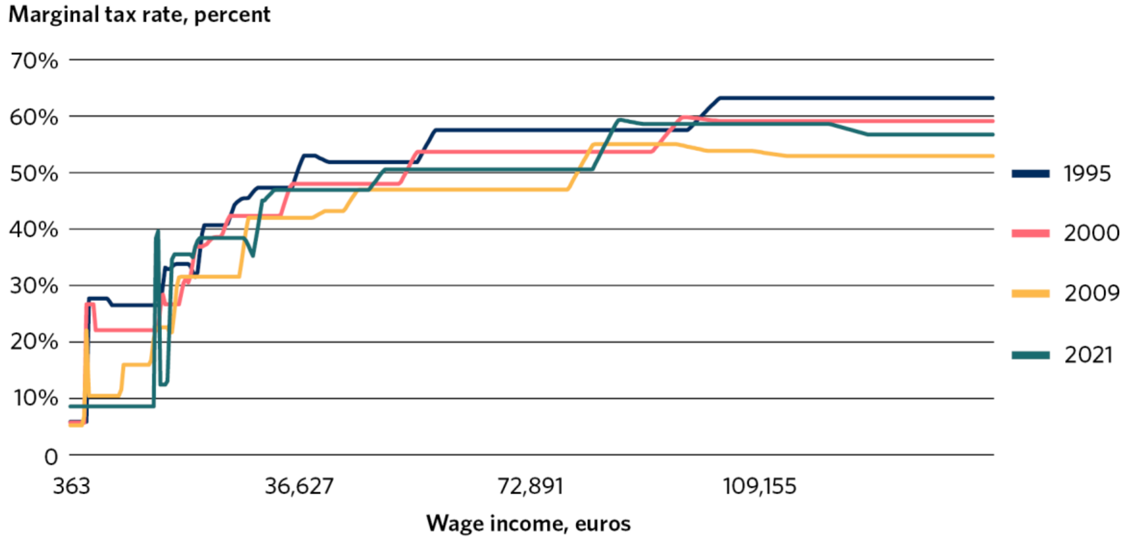


Figure 6: Marginal tax rates in 1995, 2000, 2009, and 2019. (Source: Finnish Microsimulation model (SISU) and own calculations.)

As an alternative approach, we also estimate the average and marginal tax rates in 2019, using SISU 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 estimation (42.4% and 25.6%, respectively). The lower tax rates are explained by the composition of the individuals included in 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 full-time employed during the whole year. The median income level in the alternative approach is significantly lower. The elasticity of personal income taxes with respect to the tax base, ε_{τ_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 stabilizers. (The combined baseline estimate is analysed more thoroughly in section 3.3.)

Table 3: Median marginal and average tax rates of the working age population aged 15 to 74 (excluding pensioners) in 2019. (Source: Finnish Microsimulation model (SISU) and own calculations.)

Year	Mean marginal tax rate (%)	Mean average tax rate (%)	Elasticity ε_{τ_w}	Automatic stabilizers
2019	38.1	16.2	2.3	0.52

Payroll taxes

The elasticity of payroll taxes with respect to the output gap is calculated as a product of the elasticity of the wage sum with respect to the output gap and the elasticity of payroll taxes with respect 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 with respect to the output gap gets the value 0.68.

Corporate income tax

The elasticity of corporate income tax with respect to the output gap is derived through the profit share in GDP and the wage sum elasticity with respect to the output gap. The profit share in the economy shows broadly how much value added is distributed as gross profits in the economy instead of as labour compensation. The elasticity of corporate income tax revenue with respect to the tax base (defined as gross profits) is assumed to be proportional. This assumption is justified by the corporate tax being a single statutory rate. Therefore, cyclical fluctuations only affect corporate profits. The elasticity is then defined using the elasticity of the wage sum with respect to the output gap but with an opposite sign, using the following equation[6]

$$\varepsilon_{\beta_C} = \frac{1 - (1 - \theta)\varepsilon_{\beta_w}}{\theta} \tag{7}$$

where θ is the average profit share in GDP, defined as the ratio of gross operating surplus[7] to value added in the economy (Pionnier & Guidetti, 2015). Defined in this way, the profit share has varied around 40 percent in relation to GDP during the examined time period, 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.

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 taxes, can be linked to changes in the business cycle. VAT and excise tax revenues are affected by income, and thus they can be affected by changes in the output gap. However, following previous literature, we assume no shifts in the consumption pattern between the time periods; therefore, short-term fluctuations in the elasticities with respect to the output gap are not taken into account. The elasticity of tax revenue with respect to the tax base is assumed to be unity for VAT and excise taxes although there can be progressive or regressive elements related to these taxes. The capital income tax rate in Finland is progressive but considering the low level of progressivity and the relatively small GDP share, we have kept the assumption of unitary elasticity.

The results regarding individual tax elasticities are summarized in table 4. Column (1) shows the elasticity of the tax base of direct taxes on labour with respect to the output gap. Column (2) shows the elasticity of direct taxes on labour with respect to the wage sum. The elasticity of direct taxes on labour with respect 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.

[6] This approach has the disadvantage that it assumes a constant profit share ratio through time. We also estimate the elasticity of gross operating surplus with respect to the output gap directly and get the value 1.27, but it is not statistically significant.

Table 4: Revenue elasticities with respect to the output gap.

Year	Elasticity of the wage sum with respect to the output gap	Elasticity of direct taxes on labour with respect to the wage sum	Elasticity of direct taxes on labour with respect to the output gap	Payroll tax	Corporate income tax	Indirect taxes
-	ε_{β_w}	ε_{τ_w}	$\varepsilon_{\beta_w} * \varepsilon_{\tau_w}$	-	-	-
-	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) with respect 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 to its tax base is set to 1.

3.2 Expenditure elasticities

In the next subsection, we calculate the elasticity for total government current primary expenditure. Following the methodology of 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.[8] It can be argued that income-related benefits, such as general housing allowance, social assistance, and wage security, are all affected by cyclical fluctuations. However, developments in the last decade, especially as regards the housing allowance[9], have decreased their significance as automatic stabilizers and resulted in them being rather universal welfare benefits.

[8] As an alternative and broader measure, we also include general housing allowance, social assistance, and wage security expenditure.

[9] In the context of this study, we specifically mean the general housing allowance in Finland. The housing allowance for pensioners in excluded from the data.

While unemployment benefit expenditure has indications of having a robust, negatively correlated relationship with the output gap (figure 8), the correlation is somewhat lower for the housing allowance, social assistance, and wage security. Furthermore, as shown in figure 7, these expenditures, especially the housing allowance, show an increasing trend during the examined time period, especially after 2014. This can be recognized despite considerable fluctuations in the output gap. However, in principle, these expenditures should decline during economic upturns and thus create fiscal buffers, while the opposite should occur during a recession.

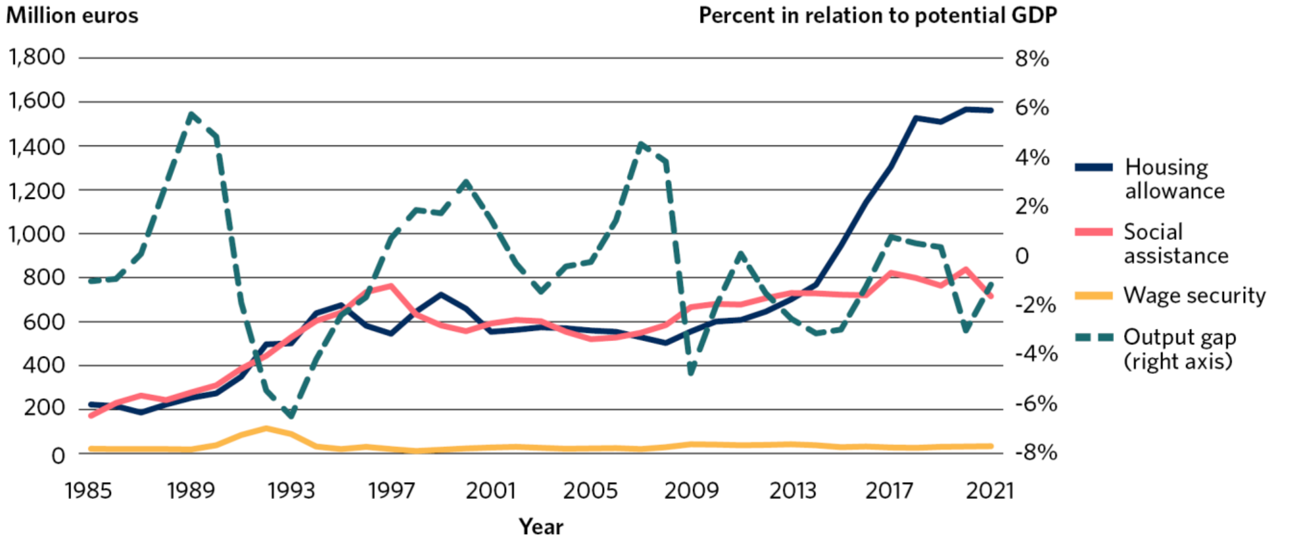


Figure 7: Housing allowance, social assistance, and wage security expenditures and the output gap in Finland 1985–2021. (Source: Social Insurance Institution of Finland, Finnish Institute of Health and Welfare and Ministry of Finance.)

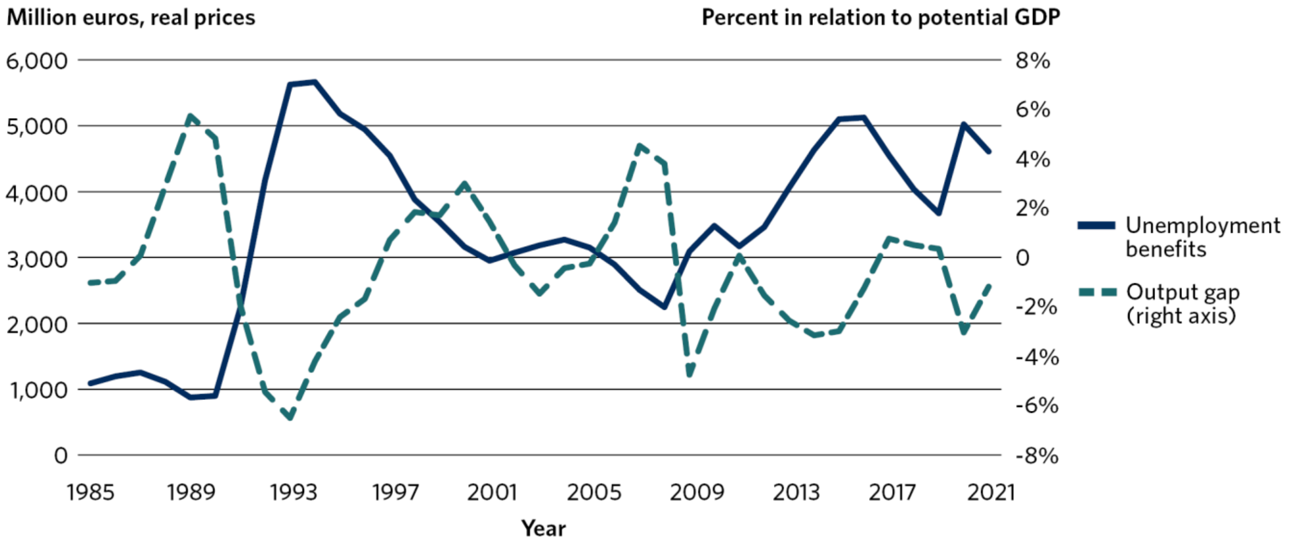


Figure 8: Expenditure on unemployment benefits and output gap in Finland 1985–2021. (Source: Finnish Institute of Health and Welfare and Ministry of Finance.)

Regarding budgetary semi-elasticity estimates, including these broader benefits automatically increases the semi-elasticity estimates since their contribution as a share of both primary expenditures and GDP increases. However, if this expenditure is not closely affected by unemployment, its role as an automatic stabilizer can be questioned[10]. We bypass this debate by providing a broader measure of the budgetary semi-elasticity as shown later in table 7.

Expenditure and unemployment gap elasticities

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

$$\boldsymbol{\Delta(u_t - u_t^*) = a + \gamma_u \Delta(y_t - y_t^*)} \quad (8)$$

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 estimation of potential GDP, which includes the mean adjusted NAWRU as one of its components. This makes the data in our baseline calculations more consistent.[11] The regression results are presented in table 5 below.

Table 5: The elasticity of the unemployment gap with respect 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 with respect 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 (figure 9).

[10] Based on our data from 1985 to 2021, the correlation value between general housing allowance and the output gap is -0.18 while unemployment expenditure and the output gap yield a correlation value of -0.61. When their correlation is tested to unemployment, the results yield -0.12 for the housing allowance and -0.82 for unemployment.

[11] Running the regression using non-adjusted NAWRU has a small increasing effect on the estimate when estimating for the whole period ($\gamma_u = -5.30$). In addition, Huovari, Jauhiainen and Kekäläinen (2017) find that using a lower equilibrium unemployment estimate leads to 0.5% higher potential GDP estimate, which can affect the semi-elasticity estimates.

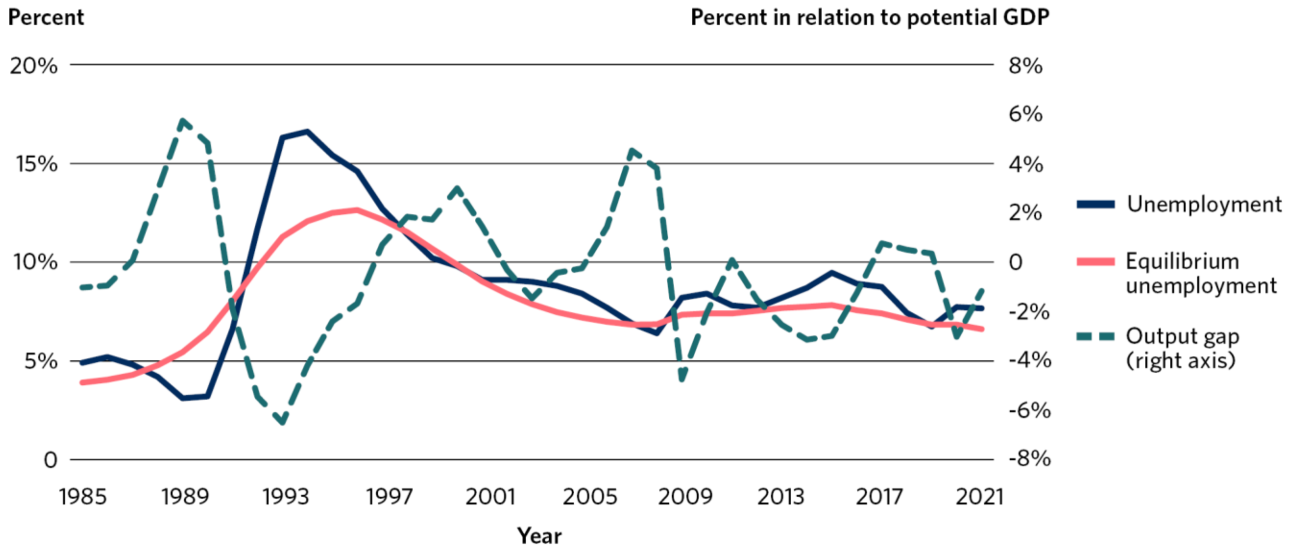


Figure 9: Unemployment, equilibrium unemployment in Finland 1985–2021. (Source: Ministry of Finance and Statistics Finland.)

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):

$$\gamma_g = \frac{\partial g}{\partial (u - u^*)} \tag{9}$$

We separate primary expenditure into two components:

$$G = \hat{G} + \sigma \tag{10}$$

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 σ^* and assuming that unemployment expenditure is proportional to unemployment, the relationship between expenditure and unemployment can be expressed as:

$$\sigma = \frac{U}{U^*}\sigma^* \tag{11}$$

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

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

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

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

The expenditure on unemployment benefits has varied in relation to GDP and as a share of primary expenditure (figure 10.) After the economic crisis in the 1990s, expenditure on unemployment benefits decreased due to a decline in unemployment and overall reductions in unemployment benefits. This decline continued until 2008 when a decade of slow growth maintained higher expenditure on unemployment benefits. Table 6 combines data on unemployment, unemployment expenditures, 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 expenditures has decreased from 7.6 to 3.6 between 1993–2021. It should also be noted that simultaneously, the unemployment and equilibrium unemployment levels have increased by over two percentage points. The results of the expenditure elasticity calculations are shown in table 6.

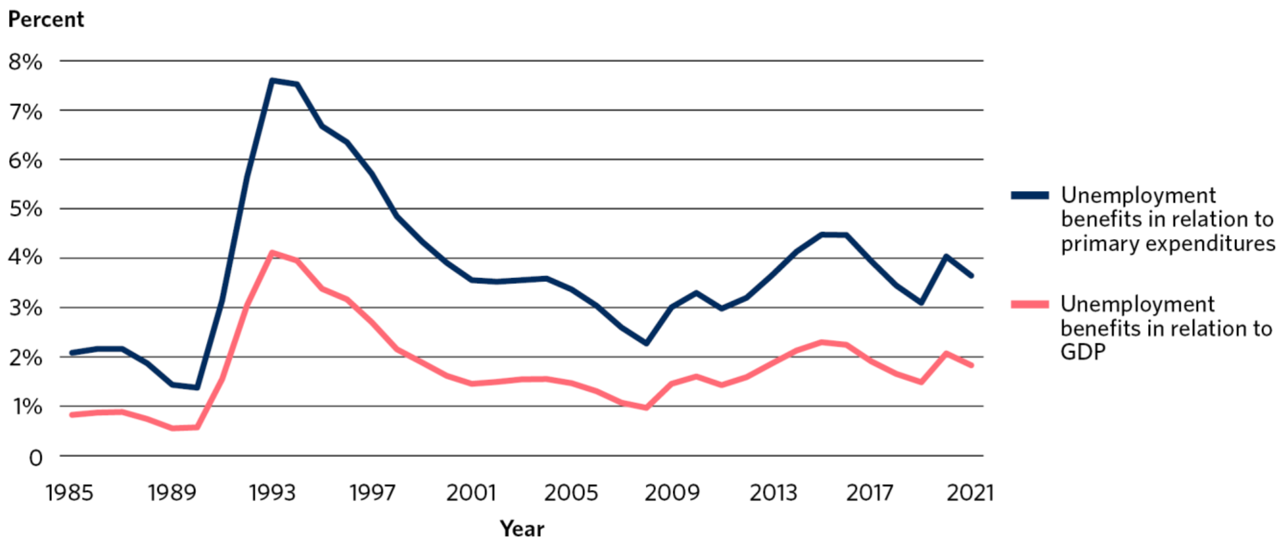


Figure 10: Unemployment benefits as a share of government expenditure and in relation to GDP. (Source: Statistics Finland, AMECO, Finnish Institute of Health and Welfare and own calculations.)

Table 6: Expenditure elasticities. (Source: Statistics Finland, the Finnish Ministry of Finance, AMECO, Finnish Institute of Health and Welfare and own calculations.)

Year	Elasticity of the unemployment gap with respect 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 with respect 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 with respect to the output gap. Columns (2) and (3) report the average tax rate and unemployment expenditure as a share of primary expenditure, which are used to calculate unemployment expenditure net of tax in relation to primary expenditure, 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 with respect to the output gap is then calculated by multiplying columns (1) and (8) and reported in column (9).

3.3 Combining the estimates

Table 7 combines the calculated elasticities and their respective weights. During the examined period, 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 reaching 0.42 in 2007. From there on, the semi-elasticity has gradually increased, and for almost a decade it has remained close to the 2021 estimate of 0.47. The hike from 1993 to 1996 can be traced mainly to the increase in collected corporate income taxes during those years. From 1996 to 2009, the average tax rate for wage income lowered steadily, 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, and also the contribution to the semi-elasticity decreased. Since the financial crisis until 2021, especially medium and high wage income tax rates have been somewhat raised, and policies targeting at increasing incentives to work have resulted in lower tax rates for low-income levels. This has translated into a higher estimate of the budgetary semi-elasticity. As another contributing factor to a higher budgetary semi-elasticity, spending on unemployment started to rise again after 2008 with increased unemployment and a significant one-off rise in the level of unemployment benefits in 2012. Figure 11 highlights that both direct tax revenues and unemployment expenditure exhibit a similar general development in terms of their GDP shares, with both having a declining trend from 1995 to 2008, followed by a moderate increase in later years.

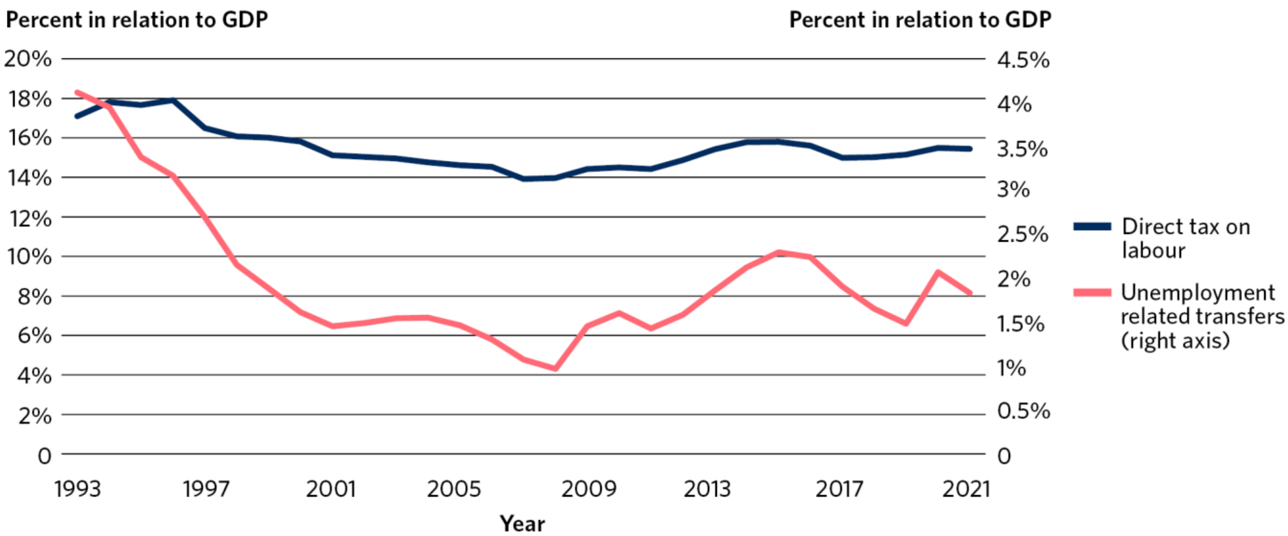


Figure 11: Direct taxes on labour (incl. employees' social security contributions) and unemployment-related transfers in relation to GDP. (Source: Statistics Finland, Finnish institute of Health and Welfare and own calculations.)

The elasticities for payroll taxes, corporate income taxes, and indirect taxes are assumed to be constant during the period. Therefore, they affect the semi-elasticity estimates only through their respective GDP shares. Payroll taxes and excise taxes (included in indirect taxes) have remained fairly stable during the estimated time period. Collected VAT (included in indirect taxes) has increased markedly during the last 15 years as the VAT rate has been increased by two percentage points, and this has contributed to a higher level of semi-elasticity. A minor decreasing trend in corporate income tax revenues can be noted, especially during the last two decades.

Finally, the difference between the estimates in the final two columns is explained by the benefits which are included in them, and which are assumed to be affected by cyclical fluctuations. In our baseline estimates, we only include unemployment benefits. However, as shown in the final column, we also include housing allowance, social assistance, 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 allowance and social assistance, which considerably increase their share of primary expenditures, and therefore the primary expenditure elasticity. This effect was highlighted further in 2014 when earnings disregard was introduced and in 2018 when students were transferred within the scope of the general housing allowance. As mentioned before, unlike unemployment benefits, these benefits are not taxed in Finland, and therefore they are not netted-off tax in the calculations, which further amplifies their contribution.

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

Year	Direct taxes on labour	Direct taxes on labour	Direct taxes on labour	Payroll tax	Payroll tax	Payroll tax	Corporate income tax	Corporate income tax	Corporate income tax	Indirect taxes	Indirect taxes	Indirect taxes	Primary expendi-ture	Primary expendi-ture	Primary expendi-ture	Auto-matic sta-bilizers	Auto-matic sta-bilizers
-	**Elasticity**	**GDP share**	**Contri-bution**	**Elasticity**	**GDP share**	**Contri-bution**	**Elasticity**	**GDP share**	**Contri-bution**	**Elasticity**	**GDP share**	**Contri-bution**	**Elasticity**	**GDP share**	**Contri-bution**	**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 stabilizers is calculated by multiplying each year's elasticity by its GDP share. Automatic stabilizers are calculated as a sum of the contributions of different tax categories minus the contribution of 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 allowance, social assistance, and wage security expenditure in cyclical components.

4 Discussion

Comparing our results to previous literature on Finland's budgetary semi-elasticity, some variation can be noted between the semi-elasticity estimates, and to a large extent, our baseline estimations are lower (table 8). While there is some methodological divergence, the sources of these differences can be partially explained by assumptions made regarding underlying estimations and the elasticity estimates with respect to the output gap. In addition, alongside the periods and subsamples used, estimating the empirical relationship between the cyclical components of the tax bases is sensitive to how these directly unobservable variables, such as the output gap and equilibrium unemployment, are measured.

Moreover, the simultaneity within potential output, and therefore in our calculations, may lead to biased estimations embedded in the model. Also, as pointed out by Girouard and André (2005), the semi-elasticity estimates may be affected by factors not directly linked to business cycles, such as one-off operations and asset prices cycles. Furthermore, the calculations on income tax elasticities are affected by the representative family type chosen, although data availability can be a limiting factor when choosing between household types.

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)
Girouard & André (2005)	2000	0.46	0.49 (0.52)
Girouard & André (2005)	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)
Alternative approach	2019	0.52	-

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

The differences between our estimates and those of Girouard and André (2005) in individual elasticities and overall semi-elasticity derive partially from the different periods used, taking into account that the individual unemployment gap and wage sum elasticities tend to be lower in more recent samples, and the different tax and legislation codes, which we acquired from the unit-level microsimulation model. In contrast, the studies conducted by Mourre et al. (2014 & 2019) and Price et al. (2015) are more different in terms of methodology for calculating total government revenue and expenditure elasticities. Moreover, they 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 also due to the length of the subsample used.

Regarding the study conducted by Almenberg and Sigonius (2021) using Swedish data, several similarities with our baseline results can be distinguished, particularly regarding the developments of income tax elasticities, increased progressivity, and the developments of income tax revenue and primary expenditure prior to the financial crisis. Additionally, both studies conclude that despite reforms, automatic stabilizers have not been impaired to any major degree. 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 in relation to GDP started to return towards higher levels, affecting the overall semi-elasticity estimates positively. In Sweden, income tax revenue in relation to GDP has remained at a fairly stable level since the financial crisis. Regarding unemployment expenditure, Almenberg and Sigonius (2021) documented a clear and rather substantial fall in spending on unemployment compensation. However, although Finland has implemented multiple reforms to unemployment insurance, this has only led to a slight fall in its overall contribution.

It is challenging to link policy implementations directly to specific changes within the yearly semi-elasticity estimates. Therefore, for future research, it would be valuable to complement these similar macro-level estimations with, for example, microsimulations in order to obtain more precise information on how alterations to the taxation and benefit system affect the responsiveness of selected tax and expenditure categories. Furthermore, the application of joint methods could increase the robustness of the overall results.

Another potential area of exploration would be alternative definitions of a representative worker when calculating semi-elasticities. This could include using median earnings of both employed and unemployed individuals (including singles and cohabiting or married couples with children) and calculating the tax rates as an average of these difference households. As shown by our results in chapter 3.1, the composition of individuals affects the calculated direct tax elasticities. Furthermore, it would be interesting to estimate the average and marginal tax rate regardless of the person's labour market attachment, using the income distribution from the annual register data of 800,000 persons of Statistics Finland. However, data availability is limited to the years from 2010 onwards.

The disaggregated approach is utilized for fiscal surveillance purposes, given its straightforward nature. Theoretically, it includes comprehensively the factors affecting cyclical balances, such as indirect taxes and social security contributions. However, given the simplicity of this approach, some drawbacks should be acknowledged. It does not take behavioural responses into account; hence the tax elasticities are held constant during the examined time period, which may not hold up in practice, due to varying weights and consumption preferences. In addition, the disaggregated method fails to acknowledge the type of shock affecting the economy, a factor that plays a crucial role in microsimulation estimates, for example. These limitations do not compromise our main findings; however, they should be treated as approximations instead of absolute semi-elasticity values.

Effect on structural balance estimates

Country-specific structural balances have been a central element in European fiscal surveillance and fiscal rules during the last decade. The structural balance can be defined as follows:

$$\boldsymbol{b}^* = \boldsymbol{b} - \boldsymbol{\alpha}\left(\frac{\boldsymbol{Y}-\boldsymbol{Y}^*}{\boldsymbol{Y}^*}\right) - \boldsymbol{oo} \tag{14}$$

where b denotes the general government fiscal balance, α denotes the budgetary semi-elasticity, $\left(\frac{Y-Y^*}{Y}\right)$ denotes the output gap, and oo refers to one-off measures. Figure 12 shows the structural balance for Finland for the years 1993–2021 based on the European Commission's budgetary semi-elasticity (Mourre et al., 2019) and the budgetary semi-elasticity estimated in this paper. We can see that despite the relatively high semi-elasticity estimate of the European Commission, the two structural balance estimates do not differ significantly for most years. However, especially 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 whether the fiscal rules have been complied with.

Figure 12: Structural balance in Finland 1993–2021. (Source: European Commission, Ministry of Finance, and own calculations.)

5 Conclusions

In this paper, we examine the size of automatic fiscal stabilizers in Finland in 1993–2021, estimated as a budgetary semi-elasticity. Following previous literature, we apply a disaggregated method first proposed by Girouard & André (2005) and utilized by Almenberg and Sigonius (2021). Following the latter, we apply elasticities to decomposed revenue and expenditure categories in order to calculate the budgetary semi-elasticity estimates. To calculate average and marginal tax rates in our analysis, we used extensive unit-level data from Statistics Finland to approximate a more detailed income distribution function.

Our findings suggest that while the income tax and unemployment expenditures in relation to GDP have fluctuated, the effect on the budgetary semi-elasticity has been partly offset by their respective elasticities. Moreover, the analysis shows that before the financial crisis of 2008, the yearly estimates of automatic stabilizers have been on a declining trend, after which the estimates have increased. Altogether, the estimate of the budgetary semi-elasticity for Finland has been close to 0.5 during the whole period of 1993–2021. This suggests that policy decisions that have reformed the Finnish tax and benefit systems over the period of 1993–2021 have not significantly altered the overall size and effectiveness of the automatic stabilizers.

Comparing our results with those of Sweden, we find similarities on how different policies have affected the semi-elasticity estimates. While there are differences in the magnitude of these effects and their developments, especially after the financial crisis, the income tax and government primary expenditure developments have demonstrated a rather substantial role in the calculations for both countries. However, these developments have not altered the overall level of automatic stabilizers significantly.

We also compare our results with previous semi-elasticity estimates for Finland. There are some differences in the results, and our estimates are mainly lower. These differences can be partially explained by the benefits included in the calculations, the household composition, the included time periods and their length, and the alternative methodologies used in the estimation of specific elasticities. Furthermore, in addition to our baseline estimate, we provide a broader definition, in which we include the general housing allowance, social assistance, and wage security expenditure. These inclusions increase the estimates slightly; however, the cyclicality and role of these expenditures can be contradictory, given the latest reforms made in relation to them in Finland. Given our findings, we conclude that the European Commission's budgetary semi-elasticity for Finland, which was last revised to 0.582 in 2019, is on the higher side of the range. The effect on the structural balance is not major; however, considering the European Union's fiscal surveillance and fiscal rules, differences in budgetary semi-elasticity estimates can alter the interpretation of whether the rules have been complied with.

While this paper has provided information on the evolvement of automatic stabilizers in Finland, the work in this area could be expanded. Issues that deserve attention include the utilization of microsimulation models, the addition of behavioural responses, and a closer review of different expenditure items and their role as an automatic stabilizer.

Appendix

Table 9: Primary expenditure contributions in the broader estimate.

Year	Primary expenditure	Primary expenditure	Primary expenditure	Automatic stabilizers
-	**Elasticity**	**GDP share**	**Contribution**	$\tilde{\alpha}$
1993	-0.23	0.54	-0.13	**0.49**
1994	-0.25	0.52	-0.13	**0.51**
1995	-0.25	0.51	-0.13	**0.53**
1996	-0.26	0.50	-0.13	**0.54**
1997	-0.27	0.47	-0.13	**0.54**
1998	-0.25	0.44	-0.11	**0.53**
1999	-0.24	0.43	-0.11	**0.53**
2000	-0.22	0.41	-0.09	**0.52**
2001	-0.20	0.41	-0.08	**0.48**
2002	-0.18	0.42	-0.08	**0.48**
2003	-0.17	0.43	-0.07	**0.47**
2004	-0.17	0.43	-0.07	**0.47**
2005	-0.16	0.44	-0.07	**0.46**
2006	-0.15	0.43	-0.07	**0.46**
2007	-0.15	0.41	-0.06	**0.45**
2008	-0.15	0.43	-0.06	**0.44**
2009	-0.16	0.48	-0.08	**0.45**
2010	-0.17	0.49	-0.08	**0.46**
2011	-0.17	0.48	-0.08	**0.47**
2012	-0.18	0.50	-0.09	**0.48**
2013	-0.19	0.51	-0.10	**0.50**
2014	-0.20	0.52	-0.10	**0.50**
2015	-0.20	0.51	-0.10	**0.50**
2016	-0.21	0.50	-0.11	**0.51**
2017	-0.21	0.48	-0.10	**0.50**
2018	-0.22	0.48	-0.11	**0.50**
2019	-0.22	0.48	-0.10	**0.50**
2020	-0.22	0.51	-0.11	**0.51**
2021	-0.20	0.50	-0.10	**0.51**

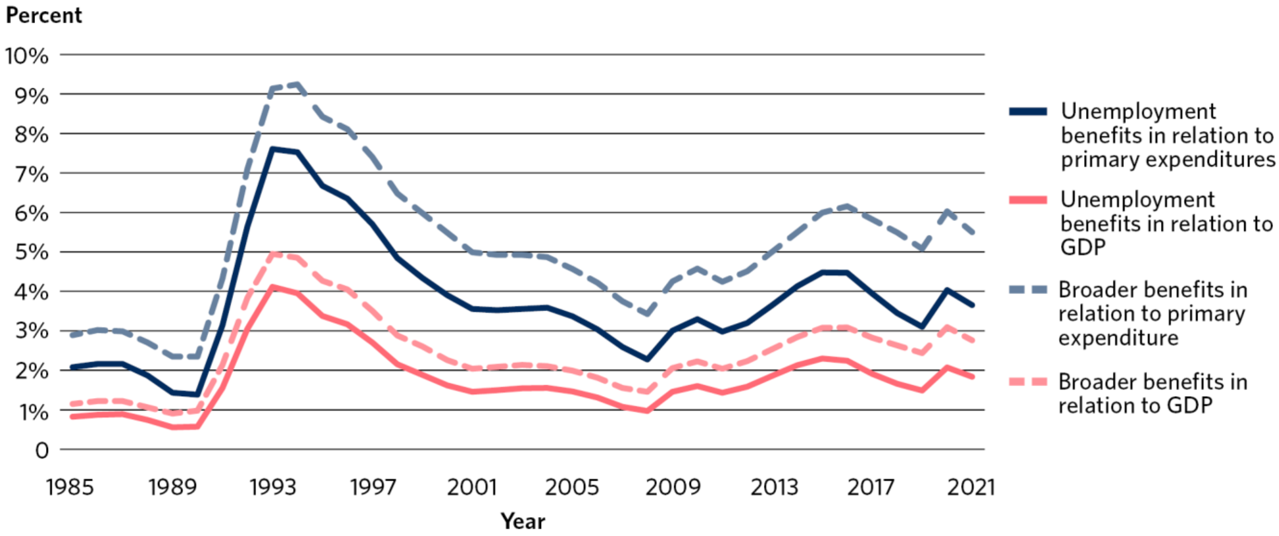


Figure 13: Broader benefits in relation to primary expenditure and GDP compared with baseline estimates. (Source: Statistics Finland, AMECO, Finnish Social Insurance Institution, Finnish Institute of Health and Welfare and own calculations.)

References

Almenberg, J. and Sigonius, M. (2021). Automatic fiscal stabilizers in Sweden 1998–2019. Working paper 155, The National Institute of Economic Research (NIER).

Astarita, C., Barrios, S., D'Auria, F., Maftei, A., Mohl, F., Schmitz, M. and Turkisch, E. (2018). Impact of fiscal policy on income distribution. Directorate General Economic and Financial Affairs (DG ECFIN–European Commission, Report on Public Finances in EMU, Brussels, 71-131.

AMECO database (2021 Autumn vintage).

Baunsgaard, T. and Symansky, S. (2009). Automatic Fiscal Stabilizers: How Can They Be Enhanced Without Increasing Government Size. SPN/09/23, International Monetary Fund.

Bouabdallah, O., Checherita-Westphal, C., Freier, M., Muggenthaler, P., Müller, G., Nerlich, C. and Sławińska, K. (2020). Automatic fiscal stabilisers in the euro area and the COVID-19 crisis. Economic Bulletin Articles, 6.

Burriel, P., Checherita-Westphal, C. D., Jacquinot, P., Schonlau, M. and Stahler, N. (2020). Economic consequences of high public debt: evidence from three large scale DSGE models. ECB Working Paper Series No 2450 / July 2020.

Debrun, X., Pisani-Ferry, J. and Sapir, A. (2008). Government Size and Output Volatility: Should We Forsake Automatic Stabilization? IMF Working papers, No 2008/122. International Monetary Fund Available at SSRN 1153743.

Dolls, M, Fuest C., and Peichl, A. (2010), Automatic Stabilizers, Economic Crisis and Income Distribution in Europe, No 4917, IZA Discussion Papers, Institute of Labor Economics (IZA).

Dolls, M., Fuest, C., and Peichl, A. (2012). Automatic stabilizers and economic crisis: US vs. Europe. Journal of Public Economics, 96(3-4), 279-294.

Dolls, M., Fuest, C., Peichl, A. and Wittneben, C. (2019). Fiscal Consolidation and Automatic Stabilization: New Results, CESifo Working Papers, No 8021.

Fatas, A. (2019). Are the current "automatic stabilisers" in the euro area member states sufficient to smooth economic cycles? Economic Governance Support Unit, European Parliament's Committee on Economic and Monetary Affairs.

Finnish Institute of Health and Welfare (2020), Social protection expenditure and financing, Statistical report 15/2022.

Giorno, C., Richardson, P., Roseveare, D. and van den Noord, P. (1995). Potential output, output gaps and structural budget balances, OECD Economic Studies, No. 24, pp. 167-209.

Girouard, N. and C. André (2005), "Measuring Cyclically-adjusted Budget Balances for OECD Countries", OECD Economics Department Working Papers, No. 434, OECD Publishing, Paris, https://doi.org/10.1787/787626008442.

HE 235/1993. Hallituksen esitys eduskunnalle työmarkkinatukea koskevaksi lainsäädännöksi sekä laiksi työttömyysturvalain muuttamisesta HE 235/1993.

HE 90/2011. Hallituksen esitys eduskunnalle laeiksi työttömyysturvalain 6 luvun 1 §:n ja aikuiskoulutustuesta annetun lain 12 §:n muuttamisesta HE 90/2011.

HE 176/2013. Hallituksen esitys eduskunnalle laiksi työttömyysturvalain muuttamisesta ja eräiksi siihen liittyviksi laeiksi annetun hallituksen esityksen (HE 90/2013 vp) täydentämisestä HE 176/2013.

HE 113/2016. Hallituksen esitys eduskunnalle laiksi työttömyysturvalain muuttamisesta HE 113/2016.

HE 124/2017. Hallituksen esitys eduskunnalle laeiksi työttömyysturvalain ja eräiden muiden lakien muuttamisesta HE 124/2017.

Kirkko-Jaakkola Mikael (2022): Kansainvälinen palkkaverovertailu 2022. Verotietoa 93. Veronmaksajain Keskusliitto.

Kyyrä, T., Pesola, H. and Rissanen, A. (2017). Unemployment Insurance in Finland: A Review of Recent Changes and Empirical Evidence on Behavioral Responses, VATT Institute for Economic Research.

Maravalle, A. and Rawdanowicz, L. (2020). How effective are automatic fiscal stabilisers in the OECD countries? OECD Economics Department Working Papers No. 1635.

McKay, A., & Reis, R. (2016). The role of automatic stabilizers in the US business cycle. Econometrica, 84(1), 141-194.

Mohl, P., Mourre, G. and Stovicek, K. (2019). Automatic fiscal stabilisers in the EU: Size and effectiveness (No. 045). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Mourre, G., Astarita, C. and Princen, S. (2014). Adjusting the budget balance for the business cycle: the EU methodology. European Economy Economic Papers No. 536. Doi: 10.2765/71756.

Mourre, G., Poissonnier, A. and Lausegger, M. (2019). The semi-elasticities underlying the cyclically-adjusted budget balance: an update and further analysis (No. 098). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Pionnier, P. A., & Guidetti, E. (2015). Comparing profit shares in value-added in four OECD countries: Towards more harmonised national accounts. OECD Statistics Working Papers No. 61 2015/03.

Pohjola, M. (2017). Suomen talouskasvu ja sen lähteet 1860–2015. Kansantaloudellinen aikakauskirja, 3/2017.

Price, R., Dang, T. and Guillemette, Y. (2014). New Tax and Expenditure Elasticity Estimates for EU Budget Surveillance, OECD Economics Department Working Papers, No 1174.

Price, R., Dang T. and Botev, J. (2015). Adjusting Fiscal Balances for the Business Cycle: New Tax and Elasticity Estimates for OECD Countries, Economics Department Working Papers No. 1275, OECD.

Russek, F. and Kowalewski, K. (2015). How CBO estimates automatic stabilizers. Congressional Budget Office US Congress, Washington DC.

Van den Noord, P. (2000). The size and role of automatic fiscal stabilizers in the 1990s and beyond. OECD Economics Department Working Papers, No. 230, OECD Publishing, Paris.

NATIONAL AUDIT OFFICE OF FINLAND (NAOF)
PORKKALANKATU 1, PO BOX 1119, FI-00101 HELSINKI

tel. +358 9 4321 | www.vtv.fi | @VTV_fi