

Thoughts on a Fiscal Union in EMU¹

Niklas Gadatsch

German Economic Council

Josef Hollmayr

Deutsche Bundesbank

Nikolai Stähler

Deutsche Bundesbank

Abstract

In this paper, we assess welfare and business cycle consequences of a fiscal union within EMU with a large-scale New-Keynesian Model. We differentiate between three different scenarios: a public revenue equalisation, a tax harmonisation and a centralized fiscal authority. Relative to the Status-Quo the long term consequences would be harmful for Germany and beneficial for the rest of the Euro Area. Short term effects are minor, both in terms of business cycle statistics as well as in risk sharing of asymmetric shocks. Welfare effects are mixed depending on the scenario but the differences between Germany and the rest of EMU boil down to a few key parameters. Additionally, we show that, had a fiscal union regime been installed at the start of EMU, German GDP and consumption losses in the past 13 years would have been considerable under a fully centralized fiscal union whereas the differences under the two other scenarios would have been milder.

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¹ Contact address: Wilhelm-Epstein Straße 14, 60431 Frankfurt am Main, Germany. Phone: +49 69 9566 2865. E-Mail: nikolai.staehler@bundesbank.de, josef.hollmayr@bundesbank.de and niklas.gadatsch@svr-wirtschaft.de.

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1. Introduction

The debt crisis in the EMU has provoked a debate about ways to advance the development of the euro area. There are various positions on this subject. On the one hand, there have been calls for the individual states to strengthen compliance and reinforce individual responsibility within a decentralised framework. Politically, this orientation has in recent years led to various resolutions, such as the fiscal compact. An agenda outlining potential ways to strengthen individual responsibility and how the euro area should deal with future fiscal problems can be found in the March 2015 issue of the Bundesbank's Monthly Report, for example. According to the publication, each country should itself be responsible for cushioning asymmetric shocks. In this case, low debt levels would be necessary to enable member states to absorb shocks, especially as a result of allowing automatic stabilisers to operate. Low debt levels in the public sector and credible compliance are highly crucial for the decentralised framework.

On the other hand, many are also calling for deeper fiscal integration now that this has already taken place for monetary policy following the introduction of the monetary union. The economic argument behind this demand is that a fiscal interconnection has the potential to overcompensate for the costs resulting from the abandonment of individual states' "own" monetary policy in a monetary union. These costs may be triggered by nominal rigidities, for example. In this paper, we will examine the impact that *three* different forms of a fiscal union could have both on Germany and on the euro area within the framework of a large simulation model (New Keynesian DSGE model) that has been estimated for Germany and the rest of the euro area. Specifically, we will analyse the impact of tax harmonisation, the equalisation of public revenues and the creation of a centralised supranational fiscal union. These will be compared respectively with the status quo of country-specific fiscal policy design. The status quo is based on an estimate of the model incorporating German data as well as an average from the remaining euro-area countries (see Gadatsch et al., 2015). The analysis accordingly allows us to draw quantitative conclusions. Specifically, this means that the paper not only answers this question abstractly on a theoretical level based on models involving two *identical countries*, but rather investigates the issue explicitly for two specific countries or country groups, unlike what has frequently been the case in the literature (see Ewers, 2015, for example). The findings are significantly different than in these studies on account of the greater practical nature and the non-symmetric countries or country groups. For example, in two completely alike countries, the transmission of asymmetric shocks is alike in the respective economies. This no longer applies if important features such as price and wage rigidities or

openness, to name a few, are different. Consequently, the exact modelling and heterogeneity of the countries is one crucial factor in the quantitative results and the final evaluation.

Our findings show that international risk sharing beyond the various forms of a fiscal union is principally very low. The degree of fiscal integration has a negligible effect on economic performance. However, differences emerge over the long term, because more fiscal integration leads to a new long-term equilibrium – and consequently to structural changes in output, employment and other factors.

According to our analysis, deeper integration would detrimentally affect Germany in the long term from an economic perspective (with regard to declines in output, employment and consumption), yet it would benefit the rest of the euro area. When it comes to the equalisation of public revenues, this would primarily have a negative impact on the fiscal deficit, whereas all variables in Germany would be negatively influenced by tax harmonisation. In this case, the new long-term equilibrium would be characterised by higher unemployment, lower gross domestic product (GDP) and lower private consumption, for example. Conversely, this would apply even more so in the case of a central fiscal authority. However, the simulations show that a transition from one regime to another could take place relatively quickly.

With regard to welfare, it is possible to establish that the welfare gains that would materialise in a fiscal union would be negligible both for Germany and the euro area. Short-term aspects (with the potential to stabilise the economy) are the prime dominating factor here, too, rather than a higher or lower long-term equilibrium level.

In the closing counterfactual analysis, we will examine how GDP, private consumption and the debt ratio would have developed in the past decade had a fiscal union (in accordance with the three aforementioned forms) been created at the same time as the monetary union. Again, the differences with regard to the development of macroeconomic variables are principally minor, as these developments are not primarily driven by fiscal policy.

The paper is structured as follows: The second part features a brief and intuitive model description as well as a list of the three fiscal union scenarios and a short explanation thereof. The third part examines the findings of the study. Great stress is laid on the distinction between short- and long-term effects. A welfare analysis is used to determine which form of fiscal policy could be advantageous.

2. Model description and description of the fiscal union

1) Model:

The current status quo in the euro area is illustrated by an estimated New Keynesian DSGE model – specifically, the Bundesbank model GEAR²: a three-country model, where two countries (Germany and the rest of the euro area) form a monetary union and together represent an open economy. The developments in the third country (the rest of the world) are therefore *exogenous* in nature. However, they influence development, especially demand, in the euro area. Each country has essentially the same economic structure: both countries have households that make optimal consumption, savings and labour supply decisions. Part of the households has limited liquidity and is therefore forced to consume its entire income in each period. As a result, this part of the households does not make savings decisions. Furthermore, involuntary unemployment arises if the aggregate labour supply exceeds the demand for labour in the overall economy. Labour and capital are used as production factors for the production of goods. Taxes and levies comprise consumption, wage and capital taxes as well as social security levies. They distort supply and demand decisions or savings decisions because they ultimately reduce net earnings or net interest income, thereby potentially increasing financing costs. The components of fiscal expenditures comprise transfers (including unemployment benefits), public consumption, public-sector wages and public investment. Public employment and public capital have a positive effect on private production. Public authorities also borrow to balance the budget in each period, if necessary. To do so, they have to pay interest that is guided by the nominal interest rate for the euro area, which is determined by the monetary policy institution in accordance with a Taylor rule for the entire monetary union (i.e. it sets it in accordance with the aggregate variables inflation and output).

According to the literature on optimum currency areas (see Mundell, 1961; Kenen, 1961; and McKinnon, 1965), a currency area is essentially optimum if the input factors, such as capital and labour, are sufficiently mobile. Should this not be ensured, asymmetric shocks could have very persistent and negative effects on the country in which the shock occurs, and therefore on the entire currency area. These costs could generally be further exacerbated by high price and wage rigidities or frictions, both in nominal and real terms. These frictions and rigidities are taken into account in GEAR. Unlike in Ewers (2015), for example, capital is included as a key input factor. The labour market is modelled explicitly and in detail. Internationally, both production factors are not mobile. However, this is in part the case in the euro area, compared with the United States, for example. Therefore, a key aspect of the literature on optimum currency areas is not met. The degree of (nominal and real) frictions and rigidities is estimated and is accordingly different within the euro area. Compared to other model-based studies, this is a decisive advantage with regard to realism.

² GEAR means Germany in the Euro Area and the Rest of the World. See Gadatsch et al. (2015) for an exact description of the model including all model equations.

Despite the characteristics that set this model apart and make it possible to use it to perform in-depth analyses, a model-related deficit arises for the issue being addressed here: politico-economic aspects such as moral hazard are generally not illustrated in a large New Keynesian DSGE model. However, every form of fiscal union can potentially generate incentives for free-riding, for example. With this in mind, the findings presented here should be interpreted as an analysis of the “mechanical” effects, without regard to the incentives to make policy changes. Still, compared to other studies in the literature that have attempted to answer similar questions (see Ewers [2011, 2015] or Fahri, Werning [2013]), the model used here is more capable of drawing conclusions regarding the quantitative impact of various forms of fiscal union. On account of these weak points, however, the inclusion of politico-economic incentives in larger general equilibrium models should be on the research agenda in addressing this issue.

2) Fiscal union scenarios:

The issue of the pros and cons of a fiscal union is challenging for various reasons. The first obstacle lies in the question of what the term “fiscal union” denotes exactly. For this analysis, we have decided on three different potential scenarios in agreement with Bargain et al. (2013). The first scenario includes an equalisation of public revenues similar to the fiscal equalisation system in Germany or Switzerland. The second consists in tax harmonisation in which certain tax rates are harmonised for both Germany and the rest of the euro area. The farthest-reaching form of fiscal integration, our third alternative, illustrates a centralised supranational fiscal authority at European level.

The basis scenario is the estimated status quo. Fiscal policy is described here using estimated rules. Every fiscal instrument on the revenue side and on the expenditure side reacts to the deviation of the debt level from the long-term equilibrium and to the output gap. The latter can be interpreted as a sort of automatic stabiliser. The reaction coefficients have also been estimated in the standard model. Rules are also required within the centralised framework. We address this necessity in the modelling of scenarios. The three fiscal union scenarios are described briefly in the following section. An analytical illustration with the most important equations that describe the respective regime can be found in the appendix.

Public revenue equalisation (RE) implies that a European fiscal authority generates revenues through taxes and levies and redistributes them in such a manner that the countries have the same per capita income as a result of these “European” tax and levy rates. European tax and levy rates are an average derived from the country-specific tax and levy rates that are then applied to the country-specific tax and levy base. Every country is additionally able to set its own tax and levy rates that deviate from the European average and/or allow them to react to debt and economic activity, thereby deviating from the European average. Accord-

ingly, these resulting “additional revenues” are either below or above the average that is apportioned to each country. In the original long-term equilibrium (known as the steady state), this is the case on account of the calibrated tax and social security rates. However, the redistribution results in a transfer union.³

The second form of fiscal union that we describe is **tax harmonisation (TH)**. In this form, only the labour income tax and social security levy rates are standardised. All other fiscal instruments therefore remain in the control of the individual countries. We assume that labour income tax and social security levy rates are set in such a manner that the revenues generated by both countries do not differ from those that result from the individual setting of rates. This results in a “European” revenue that is then redistributed among both countries and their fiscal sectors in a population-weighted manner. Although a change in revenues may not materialise within the euro aggregate, this may very well occur at country level, thereby changing the levy rates in the respective countries. European tax and levy rates then no longer react to the national debt level and country-specific economic activity. However, it still contains the two shock terms that were previously estimated for the individual countries in the status quo.

The **centralised supranational fiscal authority (CA)** is the strongest form of fiscal union that we examine in this study. Under this system, both the revenue-side and expenditure-side fiscal instruments are centralised, as is public debt. The European taxes, levies and expenditure components then react to pan-European public debt and the weighted business cycles. The result is therefore also a single budget equation for the state, which is supranational in this case.

3. Findings

The paramount interest lies in the issue of how (the introduction of) a fiscal union influences international risk sharing and hence impacts welfare. In doing so, it is essential to differentiate between long-term effects, transitional effects (i.e. short-term effects) and the impact on the business cycle. Finally, we will also look at the hypothetical question of how the debt ratio, GDP and other variables would have developed if a fiscal union had been introduced at the same time as the monetary union (known as a counterfactual analysis).

³ In the steady state, this would mean higher levels of debt in one country than in another. However, in this analysis we assume that they are 60% of GDP. Another fiscal instrument must be adjusted to achieve this. We assume that the adjustment instrument is a per capita tax so as to avoid distortions.

3.1. Long-term effects

The long-term effects of the respective fiscal union are illustrated in Table 4 in the appendix. The findings are given as percentage deviations compared with the status quo. As outlined in the description of the equalisation of public revenues, this regime implies a permanent redistribution of revenues. Germany's "better" fiscal position results in a redistribution from Germany to the rest of the euro area. This entails a higher primary deficit in Germany and a lower one in the rest of the euro area. However, because the respective countries may levy surcharges or discounts on the European rates, the real variables remain unaffected. The per capita tax is changed accordingly in order to keep debt ratios within the new steady state at 60% of the respective GDP pursuant to the Maastricht criteria.⁴ If we were to allow the debt ratio to vary, it would rise in Germany, whereas it would fall in the rest of the euro area.

In the case of tax harmonisation, however, all real variables also react because the actual labour income tax and levy rates change. The decrease in the labour income tax does not compensate for the significantly higher social security levies in Germany. Overall, this results in an increase in the tax- and levy-induced distortions in the German economy, which negatively impacts employment, output and consumption. However, the rest of the euro area benefits due to the lower tax burden on the production factor labour. In the long term, Germany loses 0.16% of its GDP, whereas the rest of the euro area gains 0.1%. Similar figures result for private consumption and private investment. Unemployment also rises in Germany, whereas it falls in the other euro-area countries. The steep rise in social security levies in Germany reduces the country's primary deficit. By contrast, it increases in the rest of the euro area.

In the final scenario, the supranational fiscal authority, capital taxes would rise in Germany, which would lead optimising households to invest less. The steeply rising social security contributions overcompensate for the falling labour tax rate, ultimately resulting in a rise in unemployment. Private consumption rises as a result of the substitution of lower private investment. Public consumption ends up being lower in the long term, which frees up resources for higher public investment, for example. The latter makes its way into the production process in the form of a certain productivity, which plays a major role in increasing overall economic output in the long term despite a higher unemployment rate. The primary deficit decreases as a result of the mentioned effects. For the rest of the euro area, some of these findings are reversed from a qualitative perspective. As a result, long-term GDP declines, while unemployment falls. Private consumption also falls, whereas private investment increases. This leads to a higher primary deficit in the rest of the euro area in the long term.

⁴ The per capita taxes are not assumed to be part of the primary deficit. The changes are identical following correction for the proportion of optimising households (see appendix).

3.2. Economic statistics

Key statistics regarding the economic implications of the various forms of fiscal union are illustrated in Table 5 in the appendix. Generally speaking, the economic implications of the various scenarios are very similar. The indicators we examine here are standard deviations as well as autocorrelations and cross-correlations for selected key variables that indicate the moments in the business cycle. The standard deviations for employment are practically the same for Germany as for the rest of the euro area. Slightly higher standard deviations result under tax harmonisation and under a supranational fiscal authority. This is probably due to the lower number of fiscal instruments contributing to smoothing out the business cycle, which leads to a slightly higher volatility of macro variables. The various forms of fiscal union and the status quo are very close together with regard to the autocorrelation of the variables as well, which measures the persistence of shocks. Choosing the centralised form of fiscal union also results in a slightly higher persistence for German GDP and employment, but does not have any effect in this respect in the rest of the euro area. Similarly, we also see an increase in GDP and employment in the cross-correlations between the two countries if we compare the centralised fiscal authority with the status quo. Consumption, too, changes very little from one scenario to the next. The following is an important finding, at least for policy analysis: the synchronisation of the two business cycles increases by up to 12.6% (cross-correlation of GDP rises from 0.581 to 0.654) in a fiscal union, which would make a single monetary policy for both countries easier, for example. The greatest differences between the status quo and a fiscal union emerge from the GDP correlation with the deficit ratio. This figure decreases dramatically for Germany, as the domestic economy is then less closely correlated with domestic fiscal policy and that redistribution is then more pronounced at all times in the business cycle. Development in the rest of the euro area – in which the correlations also grow more negative, resulting in a more pronounced anticyclical relationship between the fiscal sector and the business cycle – stands in contrast to this. The centralisation of fiscal instruments means that they no longer have a targeted effect on a country's individual economy. For both countries, this results in a lower correlation between the business cycle and the fiscal sector. In summary, however, it is possible to conclude that – with a few exceptions – the economic statistics do not demonstrate any major differences between the status quo and the fiscal union scenarios.

Apart from the examination of the statistical properties of the various fiscal policy scenarios, it is interesting to see how certain macro variables react to shocks in the economy. Here, we present the impulse responses of certain selected macro variables to two different shocks. These shocks are asymmetric, meaning they impact only one country, whereas the other one is affected only by spillover effects. To do so, we employ a supply shock (technology) and a

demand shock (consumer preference) in Germany⁵. For each of these shocks, we examine the responses of the macro variables in the four different scenarios.⁶

Conspicuously, there is almost no quantitative difference across the various scenarios in the event of a technology shock in Germany (see Chart 1). Differences with regard to public debt are discernible. The adjustment back to the steady state, however, is significantly faster given the existence of a centralised fiscal authority, since the burden is shared by Europe as a whole, in contrast to a reaction to the shock and its impact by German fiscal policy only. As a result, the debt ratio in the rest of the euro area reacts much more strongly than in the basis scenario. All told, the spillover effects of a shock in Germany, which are principally minor, lead to quantitatively minor changes in the rest of the euro area. These are most severe with a supranational fiscal authority because the deviations from the steady state are the most pronounced. Intuitively, this is due to the fact that European fiscal policy reacts most directly to a shock in Germany in this scenario.

The same picture with regard to the deviations between the fiscal union regimes results in the wake of a consumer preference shock (see Chart 2). In his case, consumption rises, leading to an increase in prices due to the impact on demand. Production increases, which initially causes unemployment to fall. These two aspects lead to higher government revenues, thereby lowering debt. On the other hand, the macro variables in Germany are not different, whereas investment and consumption deviate slightly in the rest of the euro area in the presence of minor spillover effects. There, the initial dip in investments is significantly greater under a supranational fiscal authority than under the status quo. The greatest changes are again apparent in the fiscal variables, both in Germany and in the rest of the euro area. Debt therefore varies depending on the regime. The stronger fiscal integration is, the weaker the debt reduction. The reaction of the fiscal variables aims increasingly towards the European aggregate. Accordingly, less is cushioned through domestic activity than through foreign activity. As a result, the contradictory reaction of debt in the rest of the euro area is stronger the deeper fiscal integration is. Here, too, fiscal policy is the channel for the transmission of the differences into the real economic variables in the rest of the euro area. However, these also remain sufficiently quantitatively similar from one scenario to the next.

⁵ Symmetric shocks, such as a monetary policy shock from the ECB or a demand shock from the rest of the world, are not of great interest in this analysis, as fiscal integration principally does not (have to) balance out much in the event of such shocks. The common instrument of monetary policy is also effective here. The reactions of both countries to a symmetric shock are quantitatively different, which is mainly due to the different parameter values. In the case of a monetary policy shock, GDP and unemployment in Germany therefore react more strongly than in the rest of the euro area. However, it is difficult to determine a difference for these variables. The same applies in the event of a demand shock from the rest of the world. These findings are available from the authors upon request.

⁶ We intentionally forgo the illustration of a fiscal policy shock, as our focus in this study is the reaction of both fiscal policy approaches to a shock that arises on the real side of the economy rather than the fiscal spillover effects that result automatically from fiscal policy.

3.3. Transitional phase

As seen in 3.1, the individual regimes lead to different steady states. However, the specifics of the transitional phase from the status quo to a fiscal union and its duration are just as crucial for the policy analysis. Depending on which country is examined, this transfer is associated with costs (Germany) or is profitable from a macroeconomic perspective (rest of the euro area). The relevant long-term differences for the macro variables – such as unemployment, GDP and debt ratio – have already been illustrated in Table 3 and described in Section 3.1. Chart 4 illustrates the transition from the status quo to a fiscal union. For most variables, the adjustment is relatively quick.

As described in Section 3.1, the transition from the status quo to the equalisation of public revenues should not require a major adjustment for any variable, as can be seen in Chart 4. Either they are flat or they undershoot or exceed the starting value before reconverging at zero.

This is different in the other scenarios, as can be seen based on the change in long-term output and unemployment in Germany, for example. After undershooting or exceeding the starting value in the first periods, they settle down at a lower or higher level in the long term. This applies in a more moderate form to a transition to a scenario of tax adjustment and in a quantitatively stronger form to a transition to a centralised tax authority. The opposite can be seen for the rest of the euro area in nearly reversed form. Because unemployment rises in Germany in the long term, the real wage falls. This is exacerbated by the 6% decrease in investment, which reduces capital stock on the whole, thereby also reducing marginal factor productivity. With the exception of a few variables, these changes will take place in both Germany and the euro area within a few quarters.

3.4. Welfare analysis

In New Keynesian models, welfare analysis is the decisive criteria for the evaluation of different policies. As a result, this also applies to the evaluation of the introduction of a fiscal union. It is necessary to differentiate between welfare gains and losses due to business cycle fluctuations and those triggered by a change in the steady state. The welfare gains and losses that arise on account of business cycle fluctuations are determined in the following by maximising the utility level of households. This is done by investigating how many units of consumption the households would be willing to give up per period in order to live in a deterministic world, i.e. in a world without stochastic shocks and therefore in absence of business cycles in line with expectations. The units of consumption are measured as a percentage of the long-term level of consumption. We initially perform this analysis for each scenario.

io, including the status quo. After that, we compare the fiscal union scenarios with the basis scenario to determine the relative welfare gains and losses from one scenario to the next. The respective findings for both Germany and the rest of the euro area can be seen in Table 1.

	Germany	Rest of the euro area	Monetary union
<i>Costs of the business cycle in %</i>			
SQ	0	6.0	4.3
RE	-0.1	6.1	4.4
TH	0	6.2	4.5
CA	0	5.2	3.8
<i>Relative total welfare gains/losses (including SS)</i>			
RE	0.03	-0.07	-0.04
TH	-0.02	-0.30	-0.22
CA	1.46	0.07	0.46

Table 1: Welfare analysis for Germany, the rest of the euro area and the euro area as a whole; welfare has been calculated as the consumption equivalent.

The findings are listed in per cent. This means that a representative German household would be willing to give up 0.01% of its consumption in every period in order to live in a deterministic world without business cycles. This does not vary greatly from one form of fiscal union to the next. Accordingly, the inclination in Germany towards hedging against any form of fiscal union or demanding something in return for it is low, as the welfare gains and/or losses would be very minor. However, households in Germany would have to spend 0.01% of their consumption each quarter if they were not to have to switch to the centralised fiscal union and were to be allowed to remain in the status quo. In the rest of the euro area, households would have to spend a higher percentage to live in a world without shocks; this affects both the status quo as well as revenue and tax harmonisation with a nearly identical quantity of around 6%. In the case of a centralised union, they would have to spend 5.2%. As a result, this regime would be advantageous from their perspective. Qualitatively, this is also the case for the entire euro area, which would improve from roughly 4.3% to 3.7%. This is also expressed by the relative improvement in the lower half of Table 1. Compared to the

status quo, the gains or losses for the rest of the euro area are also minimal. The cost of living in a volatile world is therefore similarly high in all scenarios. The weighted average for the entire union also expresses this. This model analysis accordingly does not allow us to conclude that fiscal integration will result in greater risk sharing. Risk sharing is not more pronounced than in the baseline scenario.

For the assessment of a fiscal union it is in reality also important to include risk premia in the consideration. In Figure 5 we show the development of welfare depending on the size of the risk premia. We start off at a steady state default probability at 4% and vary how the deviation of the debt ratio from its steady state is affecting this probability. The higher the parameter is, the higher the default probability if the deviation of the debt ratio from its steady state (60%) is positive. As a result the default probability rises along with the risk premium. As a common result it can be seen that the higher the risk premium the lower is welfare in all scenarios and countries. The reason for this feature is that the more the debt ratio affects the default probability the more volatile the interest rate becomes. This worsens consumption smoothing for households. The consumption equivalent that households are willing to pay in order to live in a risk-free world is therefore rising along with the reaction of the debt ratio on interest rates. However, it is more interesting to see, whether there are relative differences between the scenarios or put differently, if one form of a fiscal union dominates another alternative the more the risk premium is increasing if it was inferior before. This is not the case neither for the rest of the euro area nor for the euro area aggregate altogether. In Germany, however, we start out (at a default probability in steady state) with the ordering that we discussed beforehand. The more the deviation of the debt-ratio is contributing to an interest rate reaction the ordering becomes inverse. First tax harmonization becomes inferior at relatively low levels. The baseline scenario and the revenue equalisation evolve in parallel and become worse than the central authority at some point. At high risk premia German households would pay the least in terms of consumption equivalents in the scenario of a central authority. Quantitatively this relative shift is not enough to overcompensate the parallel evolution over an increasing risk premium of the scenarios and does not change the ordering neither in the rest of the euro area nor in the aggregate.

3.5. Counterfactual analysis

The counterfactual analysis asks the question as to which course both economies would have taken if they had also entered into a fiscal union at the time at which the euro was introduced. More specifically, we examine the years 1999 to 2012 and simulate the economy for the respective fiscal union scenarios.

The estimation of the model in the status quo results in a series of quarterly shocks (for technology, demand, government expenditure, taxes, etc.) for the entire estimation period. We assume that these shock processes exist and feed them into the model variants for the various fiscal union scenarios to allow us to compare the fiscal union scenarios with the development in the status quo with the help of a counterfactual analysis.⁷ The findings of the analysis can be seen in Chart 3.⁸

Generally speaking, it is possible to identify few differences between the individual forms of fiscal union and the status quo. In this respect, the key macro aggregates would probably have seen similar development under a fiscal union, provided there was no change to the shock processes. More apparent differences emerge in the case of a centralised fiscal authority, which is mainly due to the initial (i.e. steady state) effects, however.

The largest differences emerge in the development of the debt ratio, which is, in some cases, highly divergent over time. In Germany, the debt ratio prior to the debt crisis would have been substantially lower in the scenario featuring a centralised fiscal authority, yet significantly higher after the crisis than under the status quo. In the basis scenario with the status quo, the debt ratio is lowest at the present time compared to the fiscal union scenarios. The opposite effect becomes apparent when looking at the debt ratio in the rest of the euro area.

As demonstrated in the previous sections, the findings vary the greatest if the focus is placed on structure and long-term effects. This can also be seen in the counterfactual analysis. Over time, the development of the macro variables – such as consumption, investment and GDP – is practically identical. Changes only emerge if the starting value (i.e. the long-term equilibrium effect) is also taken into account. Short-term changes only become apparent in the fiscal variables, as seen with the impulse responses. This is not particularly surprising, as the macro variables are, for the most part, not driven by fiscal policy shocks. Instead, they are driven by monetary policy shocks and other shocks occurring in the real economy.

A shock decomposition for the respective variables illustrates this. The fiscal shocks (in Germany and the rest of the euro area) have an impact of just under 2% on GDP in Germany, whereas 98% of the business cycle fluctuations can be explained by other shocks. Similar values result for private investment and private consumption. However, fiscal shocks account for 15% of the fluctuation of the debt ratio in Germany. With somewhat higher values, this is qualitatively identical for the rest of the euro area. Fiscal shocks are responsible for

⁷ This assumption is – as in all counterfactual analyses – relatively strong, as we assume that the shock sequence would not have changed in the case of having revenue harmonisation, tax harmonisation or a centralised fiscal authority. Although the fact that the shock sequences do not also change in the presence of a changed structure is hard to imagine, this exercise gives some initial insight into how a certain sequence of shocks (namely those of the last ten years) would have affected the key variables.

⁸ In this counterfactual analysis, we face the challenge of a mix of long- and short-term effects. We therefore need to make an assumption regarding the structure. Here, we have decided to illustrate the different structure as a long-term equilibrium effect. Accordingly, we start out by deviating from the status quo for certain variables.

around 3% of the fluctuation in the macro variables and for 25% of the fluctuation in the debt ratio. The impact of foreign fiscal shocks on the respective domestic macro variables is negligible.

	Fiscal shocks (GER)	Fiscal shocks (Rest)	Other shocks
GDP (GER)	1.9	0.08	98.02
CONS (GER)	2.4	0.07	97.53
INV (GER)	0.87	0.08	99.05
Deficit ratio (GER)	15.62	0.15	84.23
GDP (Rest)	0	3.35	96.65
CONS (Rest)	0	3.12	96.88
INV (Rest)	0.01	2.66	97.33
Deficit ratio (Rest)	0.01	25.42	74.57

Table 2: Variance decomposition by fiscal shocks and other shocks for certain macro variables

3.6. *Robustness analysis*

In order to better understand the findings and identify the significant driving forces, we examine the welfare analysis under different conditions. To do so, we ask the question of how welfare in Germany and the rest of the euro area would change if the countries were made “more equal”, i.e. if the structural parameters among the countries were gradually standardised. Another way to ask this question would be: “Which parameters in the countries primarily drive the differences in welfare?” This can, for example, affect the standard deviation of the shocks, i.e. the difference in the volatility of the reactions of the two countries to the same shock. Equalising the variance of the shocks for both countries therefore standardises the transmission of the shocks to the respective economies. In addition to the standard deviations, individual parameters are initially adjusted. Then all parameters are adjusted until both countries are identical in all respects except for size. The adjustment of the parameters also levels out the differences in the long-term equilibrium values (steady states).

As can be seen in Table 3, the welfare calculation for Germany and the rest of the euro area, as well as for the entire monetary union, is shown for the various scenarios. To begin, the basis version is replicated in the upper section for comparison. In the second section, the variances of the shocks are identical (at the estimated level of Germany), resulting in a projection qualitatively similar to the one seen before. In the rest of the euro area, the costs of the business cycle are halved compared to the completely different parameters. The costs therefore only amount to 3% in the status quo, revenue equalisation and tax harmonisation

scenarios respectively, whereas they would have fallen to 2.7% in the centralised authority scenario. For the union as a whole, this would result in an approximate halving of the costs from slightly over 4% to around 2%. Adjusting both the standard deviations as well as all parameters (to the level of Germany) to make them equal results in a projection where the costs for Germany and the rest of the euro area would be around zero and are no longer different in the various fiscal union scenarios. This begs the question of which individual parameters are specifically responsible for the differences. We can see in Table 3 that the “habit” parameter, which influences the extent to which households evaluate (especially negative) deviations from previous consumption from a benefit perspective, makes a substantial difference and clearly influences welfare in the four scenarios. On the one hand, this is due to the significant deviation of the estimated value from one country to another. While this value is 0.49 in Germany, it is markedly higher in the rest of the currency area at 0.75. On the other hand, this parameter is a component of the stochastic discount factor, which households use to evaluate their marginal consumption and therefore plays an important role in the economy.

Overall, it should be noted that welfare, in all scenarios, is always equally reduced (or not reduced), and that the relative welfare analysis between the status quo and the fiscal union regimes is never affected.

	Germany	Rest of the euro area	Monetary union
<i>Costs of business cycle fluctuations</i>	Different parameters in both countries		
SQ	0.000	0.060	0.043
RE	-0.001	0.061	0.044
TH	0.000	0.062	0.045
CA	0.000	0.052	0.038
<i>Costs of business cycle fluctuations</i>	Same standard deviations in both countries		
SQ	0.002	0.030	0.022
RE	0.002	0.030	0.022
TH	0.003	0.032	0.024
CA	0.002	0.027	0.020
<i>Costs of business cycle fluctuations</i>	Same standard deviations and same parameters in both countries		
SQ	-0.001	-0.001	-0.001
RE	-0.001	-0.001	-0.001
TH	-0.001	-0.001	-0.001

CA	-0.004	0.000	-0.001
<i>Costs of business cycle fluctuations</i>	Same consumption habits in both countries		
SQ	0.000	0.019	0.014
RE	-0.001	0.020	0.014
TH	0.000	0.021	0.015
CA	0.000	0.013	0.009
<i>Costs of business cycle fluctuations</i>	Same nominal adjustment costs in both countries		
SQ	0.000	0.059	0.043
RE	-0.001	0.060	0.043
TH	0.000	0.061	0.044
CA	0.000	0.051	0.037

Table 3: Counterfactual welfare analysis

4. Conclusion and policy implications

In this commentary/paper, we investigate quantitatively the effects that a fiscal union would have for Germany and the rest of the euro area. To do so, we define three possible fiscal union scenarios that are discussed in the literature and the debate. We find that the desired or expected international risk sharing through fiscal integration is very minimal and, from a welfare perspective, neither Germany nor the rest of the euro area would benefit significantly. The differences are primarily explained by the divergent structure of fiscal policy over the long term, whereby the short term aspects in the various scenarios are not depicted particularly differently. Especially over the long term, Germany would clearly be detrimentally affected by having to deal with higher deficits and higher unemployment.

Although the model used and the quantitative analysis are state of the art, a number of assumptions have to be made that, in turn, influence the conclusions. Thus not only the three scenarios are exogenous, but also the assumption of which fiscal variable adjusts to the debt ratio over the long term. In addition, this model class is hardly capable of factoring in politico-economic aspects such as moral hazard. The simulations can therefore produce explanations and policy recommendations in some respects, but these must be viewed with the above-mentioned limitations in mind.

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Appendix:

Analytical representation of the different forms of a fiscal union:

Equalisation of public revenues:

As in the basis scenario, the tax rates are as follows:

$$\tau_t^{w,a} - \bar{\tau}^{w,a} = \rho^{\tau,a} (\tau_{t-1}^{w,a} - \bar{\tau}^{w,a}) + \xi_a^{b,\tau w} \left(\frac{B_{t-1a}}{2.4 * \bar{Y}^a} \right) + \xi_a^{y,\tau w} \left(\frac{Y_t^a}{\bar{Y}^a} \right)$$

Here, labour tax is represented by τ^w . This has an autoregressive reaction (deviating respectively from its long-term equilibrium) to itself and to deviations in the debt ratio (B/Y with 60% annualised) and the business cycle (Y).

European revenues are now made up of the individual revenue components, with the respective tax rate serving as an average from the corresponding country:

Finally, the revenue results from the average of Europe as a whole and a country-specific surcharge or discount (here e.g. for labour tax and social security levies):

$$Re v_t^a = Re v_t^{EU} + (\tau_t^{w,a} - \tau_t^{w,EU} + \tau_t^{sc,a} - \tau_t^{sc,EU}) (w_t^a * N_t^{P,a} + w_t^{g,a} * N_t^{G,a}) + \dots$$

Tax harmonisation:

The formula for European labour tax (the formula for social security τ_t^{sc} is analogue) is as follows:

$$\tau_t^{w,EU} - \bar{\tau}^{w,EU} = \rho^{\tau,EU} (\tau_{t-1}^{w,EU} - \bar{\tau}^{w,EU}) + \left(\frac{P^a}{P^a + P^b} v_t^{\tau^w,a} + \frac{P^b}{P^a + P^b} v_t^{\tau^w,b} \right)$$

This tax rate is persistent (deviating from its long-term equilibrium), because it exhibits an autoregressive component and also reacts to the respective country-specific shock, which is also weighted. According to this formula, the two instruments together result in the revenues on a European level:

$$Re v_t^{EU} = (\tau_t^{w,EU} + \tau_t^{sc,EU}) \frac{P^a (w_t^a N_t^{P,a} + w_t^{G,a} N_t^{G,a}) + P^b \frac{w_t^b N_t^{P,b} + w_t^{G,b} N_t^{G,b}}{R_t^{b,a}}}{P^a + P^b}$$

The respective revenues are weighted using the size of the country, and the labour and social security levies or taxes are levied on wages. This applies to both the private sector (P) and the public sector (G). Wages are made up of real wages (w) and the number of hours worked (N). As usual, the rest of the budget is made up of the consumption and capital tax revenues.

Centralised fiscal union:

In the centralised fiscal union scenario, the central equation for each fiscal instrument (seen here

with labour tax as an example) is as follows:

$$\tau_t^{w,EU} - \bar{\tau}^{w,EU} = \rho^{\tau,EU} (\tau_{t-1}^{w,EU} - \bar{\tau}^{w,EU}) + \xi_b^{\tau w} \left(\frac{B_{t-1}^{EU}}{2.4 * \frac{P^a \bar{Y}^a + P^b \bar{Y}^b}{P^a + P^b}} \right) + \xi_y^{\tau w} \left(\frac{P^a}{P^a + P^b} \frac{Y_t^a}{\bar{Y}^a} + \frac{P^b}{P^a + P^b} \frac{Y_t^b}{\bar{Y}^b} \right)$$

The labour tax rate is once again autoregressive and reacts to the deviations from the European debt ratio (B) of 60% (240% annually) and to the weighted deviations of the output (Y) from the corresponding long-term equilibrium. The two ξ symbols indicate the strength with which the labour tax reacts to the respective deviation.

The European debt level is calculated using the revenues, which are applied to the weighted consumption, capital and payroll of both countries, and the expenditures measured at a European level. The budget equation for the “Fiscal State of Europe” is now as follows:

$$G_t^{EU} + (1 + i_t^a) \frac{B_t^{EU}}{\pi_t^a} = B_t^{EU} + \text{Re } v_t^{EU} + (1 - \mu^a) T_t^{EU}$$

G represents total European expenditures, and T stands for the per capita tax payable by all households without limited liquidity. Its proportion is expressed with μ . Interest payments are represented by i and are divided by the rate of inflation (π) when calculating real values.

	RE	TH	CA
...in Germany			
GDP	0.000	-0.155	0.973
Priv. consumption	0.000	-0.189	2.164
Priv. investment	0.000	-0.199	-1.114
Unemployment rate	0.000	0.173	1.462
Real wages	0.000	-4.712	-0.693
Gov. purchases to GDP ratio	0.000	-0.014	-1.831
Gov. investment to GDP ratio	0.000	-0.002	0.521
Gov. employment rate	0.000	0.000	0.852
Gov. real wage rate	0.000	-0.144	1.055
Gov. transfers to GDP ratio	0.000	-2.799	-2.806
Labour tax rate	0.000	-1.977	-1.977
Social security contributions	0.000	5.716	5.716
Consumption tax rate	0.000	0.000	0.864
Capital tax rate	0.000	0.000	7.559
Lump-sum taxes to GDP ratio	2.699	-5.290	-2.231
Primary deficit ratio	1.937	-3.795	-1.564
...in the rest of the euro area			
GDP	0.000	0.106	-0.101
Priv. consumption	0.000	0.144	-0.484
Priv. investment	0.000	0.118	0.923
Unemployment rate	0.000	-0.099	-0.813
Real wages	0.000	1.728	0.467
Gov. purchases to GDP ratio	0.000	0.007	0.954
Gov. investment to GDP ratio	0.000	0.002	-0.196
Gov. employment rate	0.000	0.000	-0.328
Gov. real wage rate	0.000	0.116	-17.316
Gov. transfers to GDP ratio	0.000	1.249	1.492
Labour tax rate	0.000	0.763	0.763
Social security contributions	0.000	-2.204	-2.204
Consumption tax rate	0.000	0.000	-0.426
Capital tax rate	0.000	0.000	-2.591
Lump-sum taxes to GDP ratio	-1.081	2.125	2.063
Primary deficit ratio	-0.855	1.681	1.028
... euro area aggregate			
GDP	0.000	0.0335	0.1973
Priv. consumption	0.000	0.0515	0.2515
Priv. investment	0.000	0.029	0.3572
Unemployment rate	0.000	-0.0234	-0.1811
Real wages	0.000	-0.0609	0.1448
Gov. purchases to GDP ratio	0.000	0.0012	0.1803
Gov. investment to GDP ratio	0.000	0.0009	0.0032
Gov. employment rate	0.000	0.000	-0.0002
Gov. real wage rate	0.000	0.0437	-12.213
Gov. transfers to GDP ratio	0.000	0.1246	0.2981
Labour tax rate	0.000	0.0019	0.0019
Social security contributions	0.000	-0.04	-0.004
Consumption tax rate	0.000	0.000	-0.0677
Capital tax rate	0.000	0.000	0.2284
Lump-sum taxes to GDP ratio	-0.031	0.065	0.8702
Primary deficit ratio	-0.079	0.1599	0.308

Table 4: Long-term effects of certain macro variables of the respective form of fiscal union compared to the status quo

	SQ	RE	TH	CA
<i>Standard deviations</i>				
German GDP	0.271	0.271	0.291	0.290
German priv. consumption	0.333	0.334	0.363	0.342
German employment	0.131	0.131	0.136	0.131
GDP, rest of euro area	0.312	0.313	0.319	0.293
Priv. consumption, rest of euro area	0.340	0.339	0.348	0.342
Employment, rest of euro area	0.094	0.094	0.093	0.090
<i>Autocorrelations</i>				
German GDP	0.904	0.903	0.914	0.922
German priv. consumption	0.906	0.906	0.913	0.909
German employment	0.720	0.720	0.733	0.746
GDP, rest of euro area	0.947	0.947	0.948	0.944
Priv. consumption, rest of euro area	0.944	0.944	0.945	0.948
Employment, rest of euro area	0.808	0.809	0.802	0.796
<i>Cross-correlations</i>				
GDP	0.581	0.576	0.619	0.654
Priv. consumption	0.608	0.607	0.582	0.609
Employment	0.498	0.495	0.540	0.555
<i>GDP correlation with deficit ratio</i>				
Germany	-0.610	-0.594	-0.611	-0.390
Rest of the euro area	-0.109	-0.103	-0.255	-0.253

Table 5: Effects of the status quo and the respective form of fiscal union on economic activity

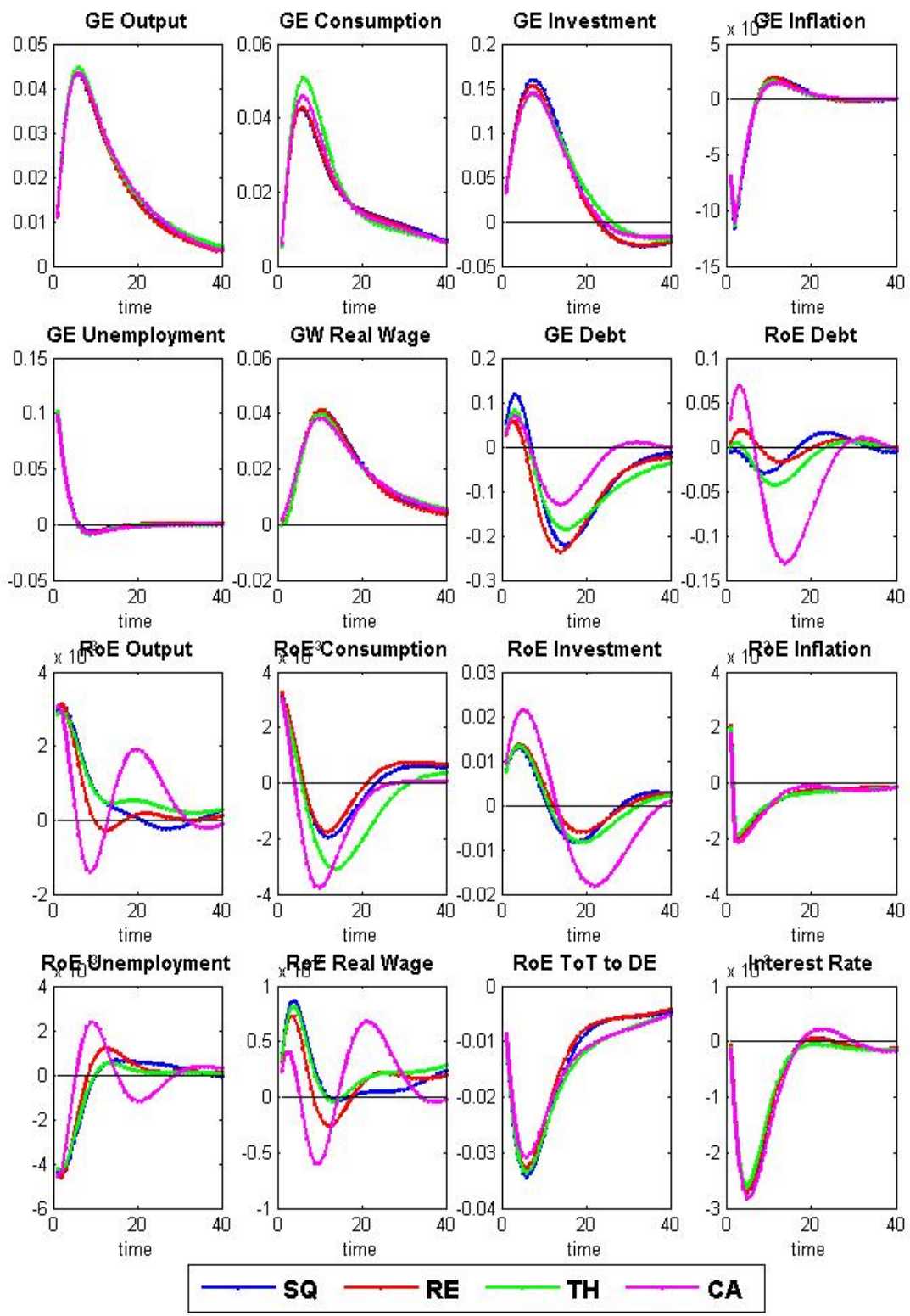


Figure 1: Reaction of certain macro variables under the four regimes after a technology shock in Germany

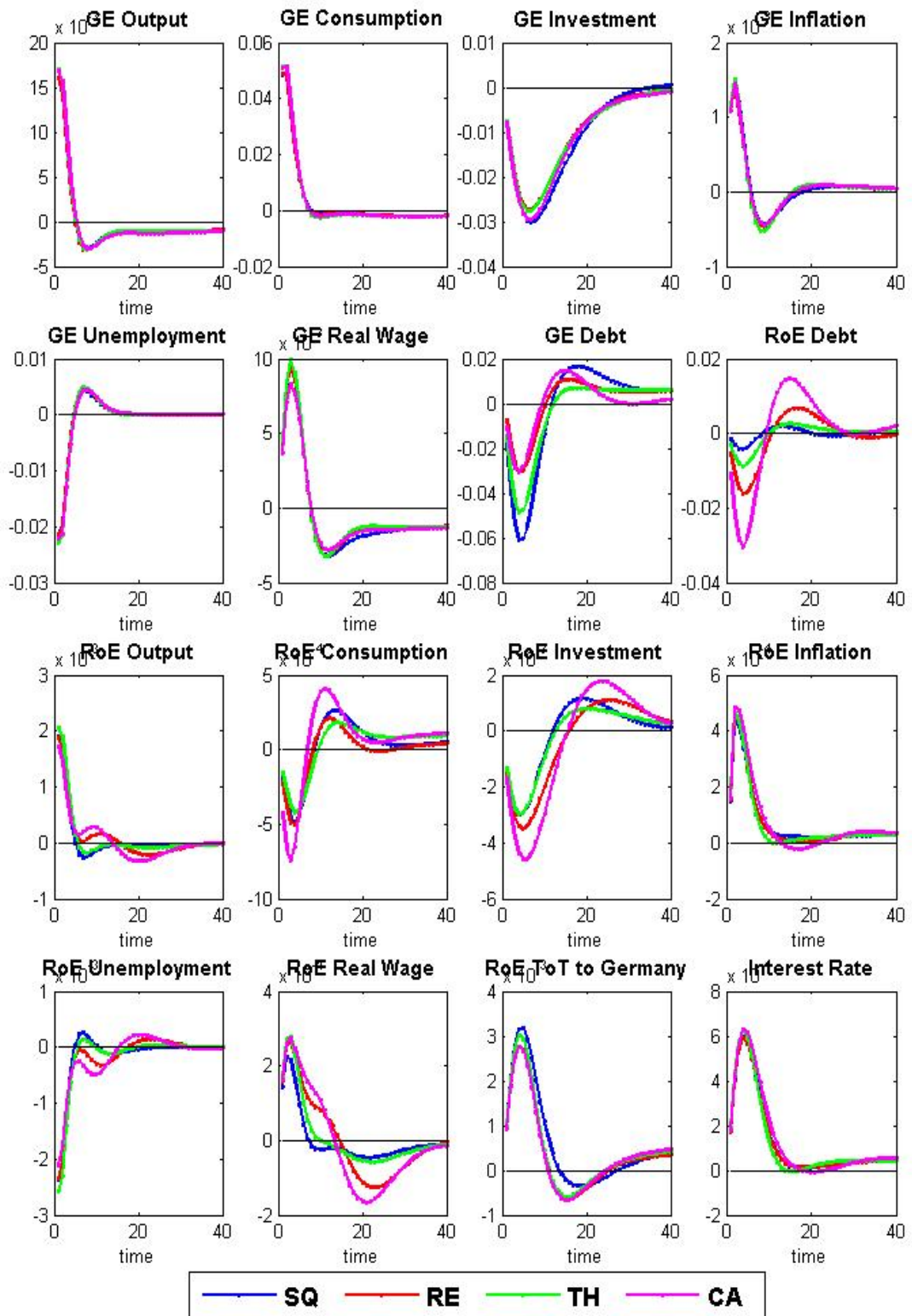


Figure 2: Reaction of certain macro variables under the four regimes after a consumer preference shock in the rest of the euro area

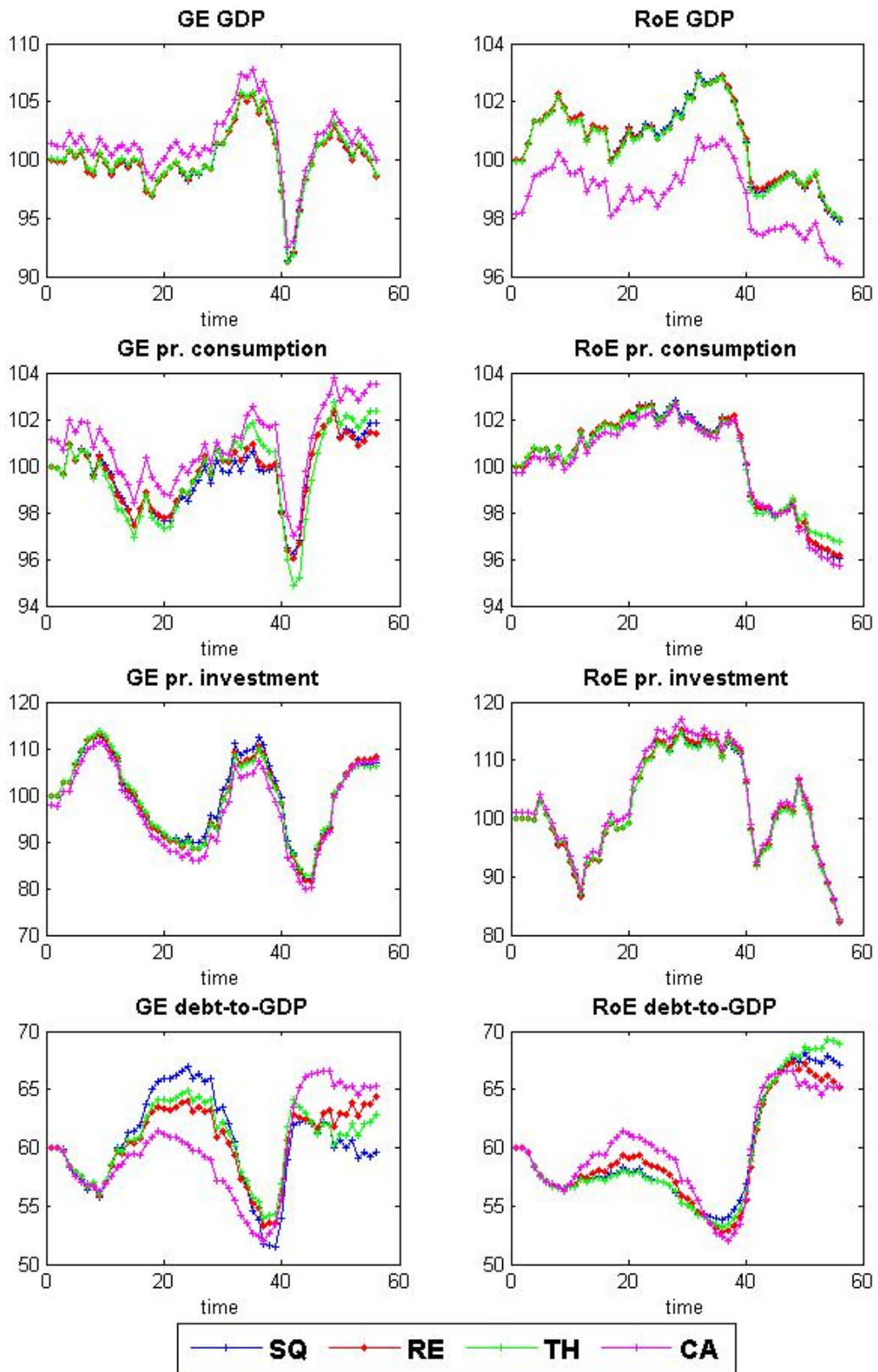


Figure 3: Counterfactual analysis of the four scenarios over the last decade

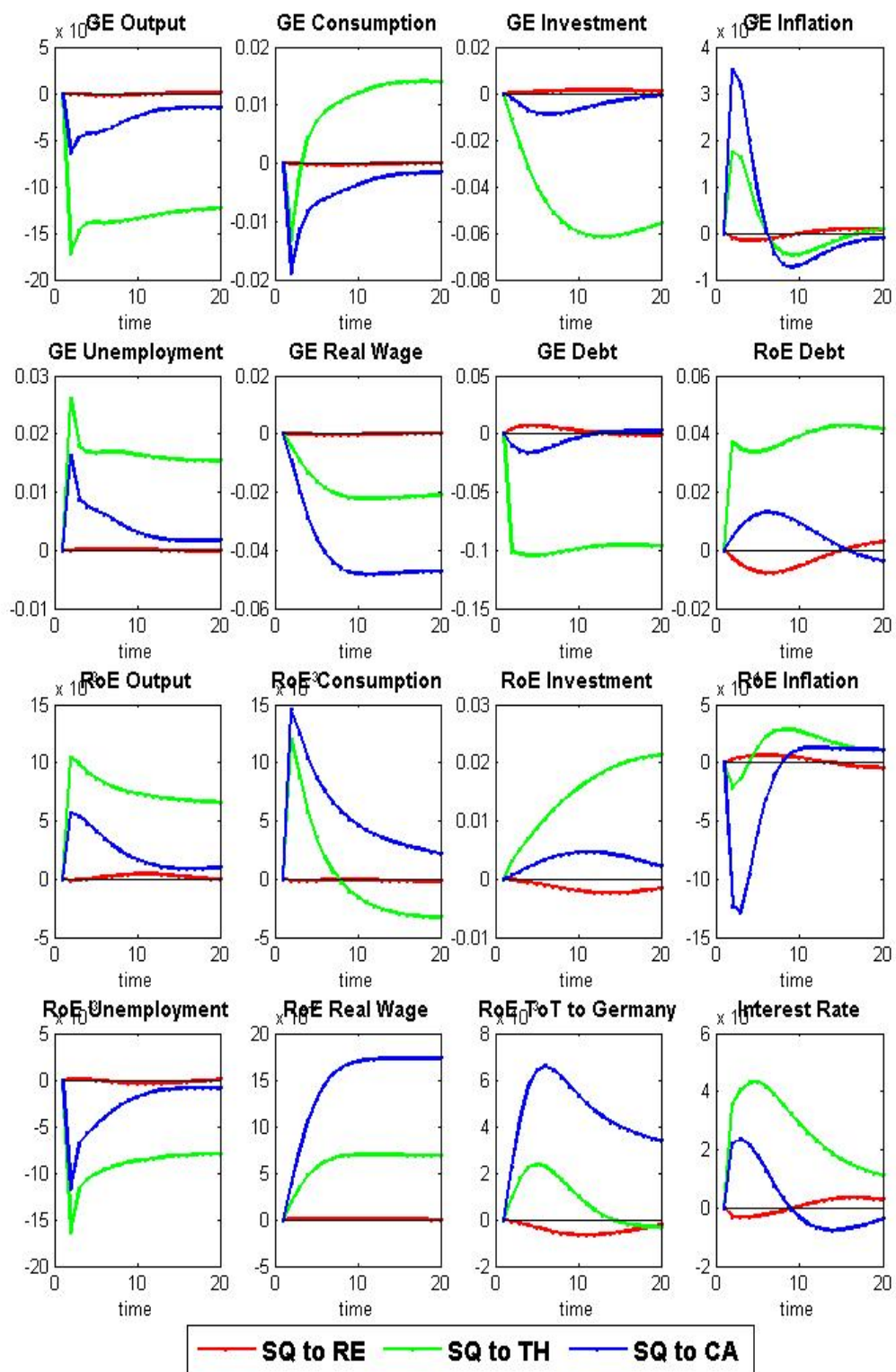


Figure 4: Representation of the transition from the status quo to one of the other regimes

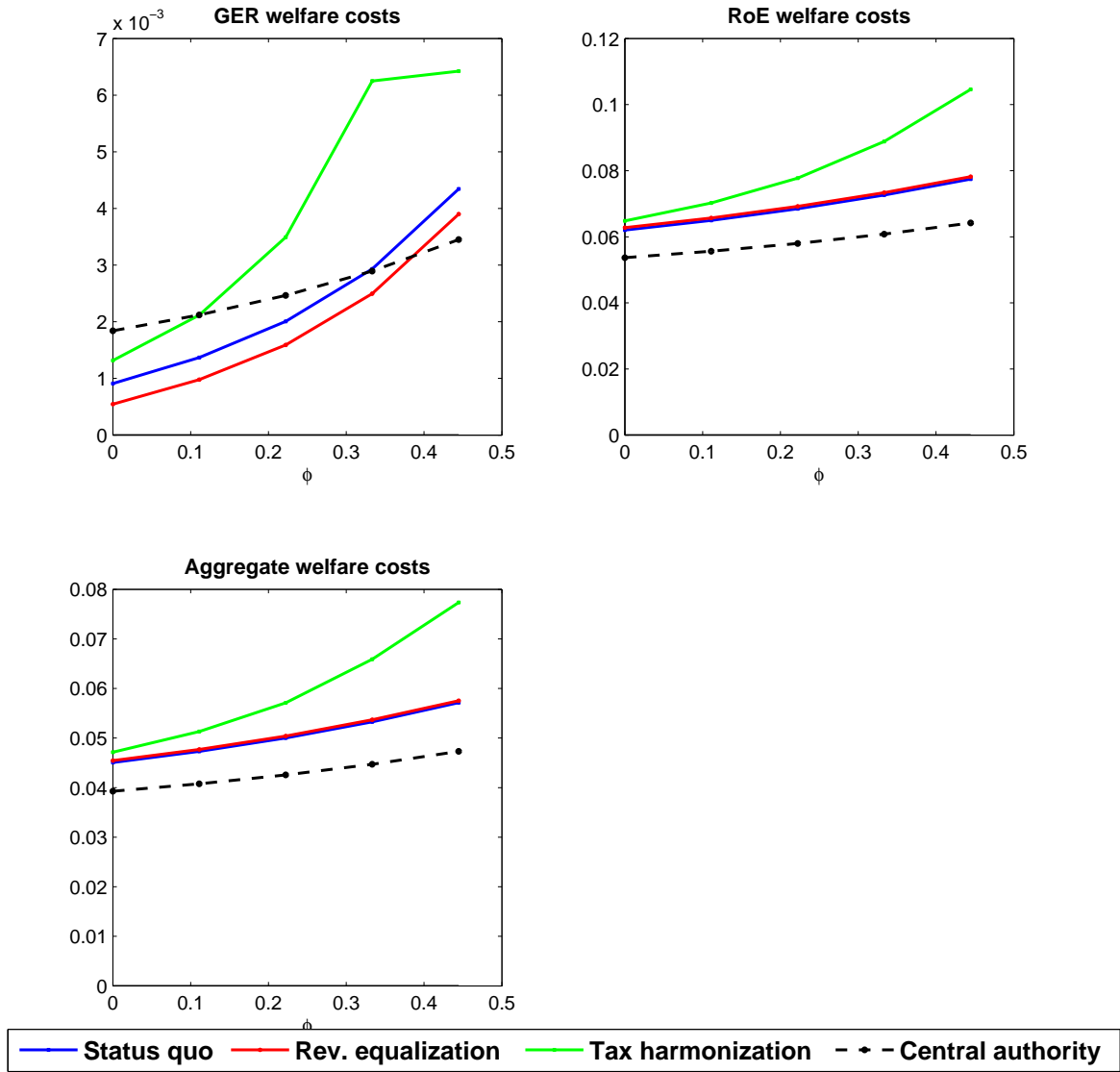


Figure 5: Welfare comparisons for different Fiscal Union scenarios depending on the size of risk premia.