



FIRSTRUN – Fiscal Rules and Strategies under Externalities and Uncertainties.
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Summary report of the FIRSTRUN project

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Table of contents

Introduction.....	2
1. Spillover effects.....	3
2. Cross-country risk-sharing and shock absorption in the euro area.....	7
3. Real-time uncertainty	8
4. Fiscal rules.....	9
5. Political economy and institutional challenges	10
6. Tools for policy analysis	12
References.....	14

Introduction

FIRSTRUN, or Fiscal Rules and Strategies under Externalities and Uncertainties, is a Horizon 2020 project that investigates fiscal policy coordination in the EU. This report provides a brief overview of the project and summarises its most policy-relevant results. It also describes new methods and models developed within the project.

The results are structured around the following six themes: fiscal spillovers, risk-sharing, real-time uncertainty, fiscal rules, political economy and institutional challenges and tools for policy analysis.

By fiscal spillovers, we mean the influence of national fiscal policy measures on other countries. In addition to spillovers from changes in the level of government spending or taxation, we consider spillovers from “structural fiscal policies”, such as pension reforms, which influence the supply side of the economy.

Cross-country risk-sharing distributes the effects of economic shocks across countries, thereby disconnecting domestic consumption from domestic income. We present new results related to both private and public risk-sharing mechanisms in the Economic and Monetary Union (EMU) and compare risk-sharing in EMU to risk-sharing across states in the United States.

Real-time uncertainty refers to the fact that we often possess imperfect knowledge of the current state of the economy. It is particularly difficult to distinguish between the economic cycle and trend. It turns out that this has major implications for fiscal policy.

As for the fiscal rules, the project has focused on the enhanced Stability and Growth Pact. We have studied, for instance, how real-time uncertainty affects the workings of the fiscal rules.

The project has also examined the political economy of fiscal coordination and the related institutional challenges. Our work on this topic is partly based on the reports and the flows of information between the EU and the member countries as well as case studies of member state implementation of EU fiscal coordination.

Finally, the project has developed new quantitative economic models (and extended existing models), which should be helpful in designing better fiscal policies and coordination mechanisms in the future.

For brevity, we refer here only to deliverables as well as other reports and articles that make up the project’s output, organised around six main themes mentioned above. References to the related literature can be found in the research papers. FIRSTRUN deliverables and research reports can be downloaded at <http://www.firstrun.eu/research/>.

1. Spillover effects

Fiscal spillover multipliers

The team at NIESR quantify the magnitude of fiscal spillovers in response to a fiscal contraction in individual members of the euro area (EA) using the National Institute's Global Econometric Model, NiGEM (Carreras et al. 2016a and b). The findings suggest that first year fiscal spillovers from a temporary fiscal shock of 1% of GDP in Germany range between 0.01 to 0.3% of each country's GDP. The spillover to the rest of the EA, excluding Germany, is about 0.1%. Spillovers in the cases of France, Italy and Spain are somewhat smaller, reflecting the smaller size of these economies as well as a lower import penetration compared to Germany. Trade is the main transmission channel of spillovers between countries, and interest and exchange rates act to dampen this channel.

NiGEM captures many differences between EA countries. Some of the differences matter for the fiscal spillovers. Naturally, countries that are more open to trade experience smaller domestic multipliers, as the decline in demand in response to a fiscal contraction is absorbed by imports to a larger degree, and thus spillovers from fiscal shocks in these countries are larger. Moreover, countries whose agent's consumption plans are more sensitive to fluctuations in short-term income are found to experience larger domestic multipliers and spillovers to other countries will also be larger.

The researchers also found that domestic fiscal multipliers increase significantly when countries coordinate their fiscal policies. There is a large degree of variation across countries, but the average percentage increase in the fiscal multiplier, in absolute value terms, is 60% for government spending shocks and 100% for revenue shocks. Most of the variation is explained by differences in openness of the EA economies.

An important conclusion from this work is that domestic multipliers and spillovers increase during "crisis times". Carreras et al. (2016b) consider the sensitivity of the multipliers to reasonable increases in the proportion of agents that face liquidity constraints, an exercise that proxies the situation during severe downturns. The findings suggest that the increase in the magnitude of the multipliers from tax rate shocks is around 20% when looking at multipliers arising from fiscal shocks implemented in each country in isolation and around 25% when there is international coordination of fiscal policies.

These model-based results are roughly in line with most of the available empirical estimates. They are also in line with the empirical work undertaken within the FIRSTRUN project, see e.g. Belke and Osowski (2016).

The result that the fiscal spillover multipliers are on average rather small limits the need for active fiscal coordination in the EA, at least during "normal times". However, the fact they may be much larger during "crisis times" and increase when fiscal policies are coordinated, underlines the importance of fiscal coordination in special circumstances.

This is also line with the findings of De Grauwe and Ji (2016), who study endogenous business-cycle movements in a monetary union. They start from the evidence that business cycles among eurozone countries are highly correlated, which suggest that spillovers (not necessarily only fiscal) tend to be large. They develop a two-country behavioural macroeconomic model in a monetary union setting to investigate new channels of transmission of shocks other than trade and interest rate. In the model the synchronisation of the business cycle is produced endogenously and the main channel of synchronisation occurs through a propagation of “animal spirits”, i.e. waves of optimism and pessimism that become correlated internationally. This points to the existence of financial markets channels, as catalyst of spillover effects, that tend to be particularly powerful in time of financial crises.

Stabilisation policies

Cole et al. (2016 and 2017) analyse the stabilisation properties of different scenarios for fiscal policy coordination in a two-country DSGE-model of a currency union. The model is calibrated to mimic Germany and the rest of the EA, by setting country-specific price rigidities and degrees of openness. The authors consider both complete and incomplete international financial markets. Fiscal policy is characterized by distortionary taxation and a feedback rule for the government spending. In the model, fiscal policy in each country is completely home-biased; as a consequence it strongly affects domestic prices and the terms of trade. With this mechanism, it spills over to the other country through the trade channel. In the case of independent national fiscal policies, each country is assumed to target domestic output gaps, where the response to the output gap is set optimally to maximize households’ welfare. On the other hand, fiscal policy coordination is modelled as a joint commitment to reduce the volatility in net exports, by both targeting their net exports gap, which is the main source of fiscal spillovers in the model. In the latter scenario, the two countries can additionally decide to share the costs of fiscal policy, by consolidating the government budget constraints and moving taxes symmetrically to keep it balanced. This scenario resembles the idea of a transfer union and is defined as a full fiscal union. Therefore, the paper provides a framework for a systematic comparison of different scenarios for fiscal policy coordination in terms of output and price stabilisation and aggregate welfare in the currency union.

In this framework, the best policy, in terms of stabilisation, requires internalising spillover effects by reducing volatility in the terms of trade. This is obtained by setting government spending to reduce the net exports gap, while simply targeting output gaps leads to less stabilisation, even of output itself. The intuition relates to the fact that with country-specific nominal price rigidities, price fluctuations imply destabilising fluctuations in the terms of trade and, in turn, in output. The higher level of coordination, obtained by consolidating the government budgets, slightly improves overall stability, because it allows for some temporary larger fiscal capacity when needed. When one country reduces its public debt, instead, there is little or no gain from consolidating the budgets

because it results in a large upswing in taxes, which are highly distortionary for the economy. However, deleveraging with taxes is preferable because this way the government contrasts the deflationary pressure stemming from debt consolidation.

In some situations, standard macroeconomic stabilisation tools are constrained. Conventional monetary policy may be constrained by a lower bound on short-term nominal interest rates. Fiscal policy in turn can be constrained because of EU fiscal rules or because private investors require prohibitively high rates of interest on government borrowing. Hurst et al. (2016) consider the interaction of monetary and fiscal policies in EMU in situations in which standard policy tools are constrained using the NiGEM model. One key result of the analysis is that when only a subset of the monetary union is fiscally constrained, a domestic fiscal expansion by the remaining unconstrained members can provide a cross-country intra-union offset that makes all member countries better off than they would otherwise be. In other words, constraints on fiscal and monetary policy substantially increase the importance of fiscal coordination.

De Grauwe and Yi (2016) also investigate stabilisation in the context of their behavioural model with endogenous synchronization of cycles. In their model the central bank has an even more important role in stabilising output than it does in more standard models. By forceful output stabilisation, the central bank can reduce the intensity of the movements in animal spirits and reduce the synchronisation of the business cycles in the monetary union.

Spillovers from structural reforms

The literature on cross-country spillovers tends to focus on demand-side policies. However, there may also be spillovers from structural policies. Our project analysed cross-country spillovers from pension and tax reforms, all of which also affect the supply side of the economy via changes in labour supply and investment (Davoine et al. 2016, Davoine 2017a, Davoine 2017b). The analysis is based on a multi-country OLG model (see below) and it takes cross-country differences in economic institutions and population ageing into account.

Regarding pension reforms, there are two key results (Davoine 2017a and b). First, pension reforms in one country have impacts on other countries. Second, pension reforms influence the extent to which countries can benefit or suffer from capital market integration over the long run.

The first result is not a surprise, given the integration of the capital markets. For some reforms, cross-country spillovers due to the integration of capital markets can increase the reform gains. For instance, gradually postponing the retirement age by 2.5 years in Germany leads in the model to a 0.2 percentage points higher GDP per capita, on average in each of the next 50 years, when the capital markets are integrated compared to a closed economy. The reason is the following: the postponed retirement age lowers the capital-labour ratio, which increases the returns to investment and thus attracts capital towards Germany, boosting production.

Differences in institutions also play a role in the second result. As an example, we may consider the case of Denmark. If no country implemented a pension reform, and all countries used labour income taxes to finance the increase in social security expenditures due to population ageing, Denmark would lose from capital market integration. Its GDP per capita would be on average 1.9 percentage points lower in each of the next 50 years than in a closed economy. However, if all countries gradually increased the retirement age by 2.5 years, Denmark would gain from capital market integration. In that case, its GDP per capita would on average be 0.8 percentage points higher in each of the next 50 years than in a closed economy.

The main reason why the effect of capital market integration is different in these two cases is the current size of the Danish welfare state, which requires a high level of taxation. In the first case, the tax increase would have a large disincentive effect on labour supply. This would increase the capital-labour ratio more than in other countries. Returns to investments would thus drop more in Denmark and capital would slowly flow out of the country. In the second case, the Denmark's slow population ageing effect would dominate. As the Danish population is aging less rapidly than in other countries, labour supply per capita drops less and the capital-labour ratio rises more slowly, with the result that returns to investment are increasingly higher than in other countries, attracting capital from abroad.

Ceteris paribus, the analysis shows that capital market integration also has implications for social security, beyond investment and production. It is indeed well known that population ageing requires pension reforms in most developed countries, to ensure the long-run financing of public pension systems. Failing these reforms, a macroeconomic penalty is incurred, as public debt or the tax burden become excessive. The FIRSTRUN research shows that the macroeconomic penalty of non-action is larger with integrated capital markets. Returns on investments are indeed lower in status-quo countries. The benefits of an increase in the retirement age, which drops the capital-labour ratio and increases returns on investments, are larger with integrated capital markets. The analysis also implies that immigration can help attract investments, as it lowers the capital-labour ratio. This strengthens the benefits to be obtained from immigration.

Davoine et al. (2016) also use the same multi-country OLG model to quantify cross-country spillovers from fiscal policy reforms. Spillovers, which occur via integrated capital markets, are found to be small for standard reforms. For instance, a labour income-tax reduction in Germany that increases GDP in Germany by 0.4% would not increase GDP more than 0.01% in other countries, a spillover ratio below 2%.

2. Cross-country risk-sharing and shock absorption in the euro area

In the analysis of the functioning of monetary unions, the mechanisms for smoothing the impact of shocks are of critical interest. Alcidi et al. (2017) and Alcidi and Thirion (2017) provide an in-depth analysis of how the impact of GDP shocks are smoothed through different channels in the euro area. The analysis is also carried out for the US in order to have a benchmark for the capacity of a fully-fledged fiscal, monetary and banking union to deal with shocks,. In the exercise the data for the euro area aggregates are made suitable for full comparison with the US. Capital markets in the US serve as the most powerful channel to absorb the impact of idiosyncratic shocks. This absorption has been on the order of 50%, despite a sharp decline around 2007, associate with the global financial crisis, and then a recovery. In the euro area this is much smaller, but the use of fully comparable data reveals that until 2008, it was about 30% instead of 10% as is usually cited in the literature. Despite such adjustment, after 2009 capital markets seemed to become completely dysfunctional, working to amplify the impacts of the shocks rather than to smoothen them.

Alcidi et al. (2017) suggests two possible explanations for these findings. The first is that after 2009, dynamics within the euro area have become very different in core and peripheral countries and average findings are strongly driven by deeper downturn in peripheral countries and financial fragmentation.

The second explanation relates to the persistence of shocks and the evidence that net savings (private savings, access to credit or even government borrowing) have limited effective capacity in smoothing consumption against persistent or permanent shocks. In the euro area, net savings' shock-absorption is mostly achieved domestically through pro-cyclical investment adjustments, rather than through access to international credit markets, and is more important than capital markets in smoothing the impact of shocks. However, since shocks tend to be highly persistent, on average much more than in the US, the absorption capacity is adversely affected. Overall, the limited shocks absorption capacity of credit markets and capital markets raises a fundamental question about the role played by financial integrational in providing stabilisation capacity. As in the euro area, financial integration occurred mostly through cross-border bank lending, it did not lead to the provision of risk sharing. Furthermore, when the debt crisis started markets' behaviour resulted in a sudden stop and amplification of shock rather than absorption.

Against this background, Alcidi and Thirion (2017) investigate the US fiscal mechanisms for cross-state risk-sharing to draw lessons for the euro area on how to potentially increase the absorption of asymmetric shocks through a federal fiscal capacity. According to the authors, the empirical evidence indicates that the stabilising role of US federal transfers to states is largely overstated in the current debate. Despite the absence of a centralised euro area stabiliser, the automatic stabilisers in the euro area bring about a greater degree of income stabilization against asymmetric shocks than that provided by the US federal budget.

The empirical findings described above point to two policy insights.

First, financial integration is not a sufficient condition for cross-country risk-sharing to occur. Financial integration needs to materialise as cross-border ownership of productive assets and this did not happen to a large extent in the euro area. The exact aim of the capital markets union (CMU) is to foster integration within capital markets. If this aim is successfully achieved, it could have an important impact on risk-sharing and the absorption capacity of asymmetric shocks. A corollary insight of this analysis relates to the fact that returns on cross-border holdings of assets need to be negatively correlated in order to deliver effective risk-sharing. This implies that full synchronisation of business cycles in the euro area may not be a desirable objective from a risk-sharing perspective.

The second policy insight relates to the lessons drawn from the US system and the features of a potential euro-area shock-absorption capacity. The discretionary nature of the US federal fiscal policy and the ability to borrow at federal level makes the US federal budget particularly relevant, and suitable to be triggered, in response to nation-wide (symmetric) shocks, rather than asymmetric shocks. In the context of the euro area debate about a fiscal stabilisation function at the central level, this implies critical thinking about the purpose (i.e. the stabilisation of precisely what, in response to what shocks) and the features (e.g. borrowing /no borrowing capacity) of such a function.

3. Real-time uncertainty

Our knowledge of the current state of the economy is always imperfect. For instance, first estimates of GDP for a given period are often subsequently revised. In other words, ex-post measures of GDP and other economic variables may be quite different from their real-time estimates. Our project has quantified this type of uncertainty and studied how it affects the cyclical properties of fiscal policy.

Real-time uncertainty appears to be very relevant for fiscal policy. Essentially, this is because it is particularly difficult to distinguish between cyclical and structural components of economic growth. As a result, the first estimates of variables like the output gap or structural deficit, which are key variables to consider when setting the stance of fiscal policy, are often later substantially revised. Busse (2016) describes in detail the revisions of the cyclically-adjusted budget balances of the EU–15 countries.¹

Alcidi et al. (2016) consider the cyclical properties of fiscal policies in EU–27 countries. The outcome looks quite different depending on whether one uses real-time or ex-post output gaps to measure the business cycle. Specifically, fiscal policy appears much less pro-cyclical (and appears to be

¹ Many of our studies on real-time uncertainty use data that were extracted from the AMECO dataset. The data set is available at <http://www.firstrun.eu/research/data/>.

approximately independent of the cycle) when the cycle is estimated using real-time data rather than ex-post data.

While real-time uncertainty can perhaps be reduced by using better techniques to estimate cyclical changes, it cannot be completely eliminated. Kuusi (2017) takes real-time uncertainty as given and asks how its presence should affect optimal fiscal policy. The analysis is based on a relatively parsimonious model where the policy-maker aims to smooth aggregate consumption over time. The key challenge the policy-maker faces is the difficulty of distinguishing between cyclical and trend shocks. Output gap uncertainty in the model is calibrated to match output revisions in EU countries. The main result of this analysis is that real-time uncertainty about the output gap makes the optimal fiscal policy much less pro-cyclical relative to the full-information case. It also calls for substantially lower average public debt levels than what would otherwise be optimal.

4. Fiscal rules

The EU fiscal governance framework has been extended and modified in many ways during the last 10 years or so. An important aim of the FIRSTRUN project has been to evaluate the new, enhanced framework.

For example, our approach has been to consider how the new fiscal rules would have constrained fiscal policies during past economic crises. The analysis requires having a clear view on the information that was available at the time when the rules would have applied. This brings real-time uncertainty into the picture again.

Kuusi (2016) considers the European Commission's output gap method of calculating the structural budgetary position (SB). He tests the method and its implications for fiscal policy by computing the fiscal requirements that Finland would have faced between the years 1984-2014 based on the real-time estimates of the SB together with the fiscal rules in the preventive arm of the SGP. The Finnish case is interesting partly because it includes one of the worst economic crises in an industrialized country since the World War II, namely the Finnish Great Depression of the 1990s.

The main result of this analysis is that the use of the structural deficit for steering fiscal policy would have led to pro-cyclical fiscal policy. One reason is the limited capacity of the output gap method to predict cyclical changes in real time. As a result, the rules wouldn't have constrained fiscal policies during "good times".

Kuusi (2016) also considers alternative methods for estimating the SB that are used within the EU fiscal framework, namely the expenditure rule in the preventive arm of the SGP and the so-called bottom-up assessment method in the corrective arm. The starting point in these indicators is the direct analysis of actual policy changes instead of indirect assessments based on the output gap method.

The main result is that the use of these alternative measures would have led to a more counter-cyclical fiscal policy. This suggests that they should be given more weight when assessing the structural fiscal position of an EU member country.

Domonkos et al. (2017) evaluate the crisis prediction ability of the MIP Scoreboard's headline and auxiliary indicators. They ask whether the MIP would have been able to detect increasing macroeconomic risks prior to the 2008 financial crisis and the following recession. They also evaluate the thresholds and estimate their optimal value subject to a policy-maker with preferences assigning equal importance to both missed-crisis and false-crisis prediction errors. The analysis also covers the impact of data revisions.

The results show that the MIP would have provided moderately useful alerts in terms of crisis prediction before 2009. The most useful indicators appear to be those related to external sector imbalances, such as changes in the nominal unit labour costs and export market share. However, many of the indicators, especially those related to the financial markets, would have been uninformative. This suggests that the MIP Scoreboard's revision, which can produce a simpler but still-effective system, may be in order. The analysis also provides recommendations regarding how the thresholds should be set.

Poniatowski (2018) considers the actual impact and the credibility of the fiscal framework. The econometric analysis shows that the significant variation of fiscal effort across time and across EU member countries can be explained to a large extent by institutional factors, including the existence of numerical fiscal rules and surveillance mechanisms. The most influential instruments appear to be the expenditure rules and the external sanctions for breaching the rules. To ensure the credibility of the framework, from a theoretical standpoint, the analysis suggests that the benefits of fiscal prudence and sanctions for breaching fiscal rules should be differentiated in line with the exerted fiscal effort.

5. Political economy and institutional challenges

The many changes in EMU governance raise difficult issues of legitimation. Begg (2015) argues that the upshot is the emergence of a new mode of EU governance, which is labelled the "expenditory state". It arises from the conjunction of legally binding fiscal rules, the establishment of fiscal councils and more intrusive oversight by the EU level of governance. Given that fiscal policy has more direct distributive consequences than other areas of policy, which have become more technocratic, the erosion of democratic legitimation potentially undermines the implicit contract between voters and national governments. Although this dimension of governance reform has been identified in successive EU reports (notably those of the Four and Five Presidents) as requiring attention, solutions are still in abeyance.

In addition, as a recent OECD survey² shows, public trust in government declined during the years of crisis in many countries, particularly those in which the EU level is viewed as having imposed harsh policies with little opportunity for citizens to influence them. If not attended to, this lack of attention to how the public perceives the role of the EU could be politically damaging. . An implication for policy development is that different facets of legitimacy warrant examination, going beyond the conventional distinction between “input legitimacy” (people voted for it) and “output legitimacy” (it works and that is what matters most)

The concept of “throughput legitimacy” offers a complementary approach by asking how the institutions which set, monitor and enforce rule-based approaches to governance arrive at their policy models. Why, for example, is one interpretation of fiscal sustainability or a means of estimating the output gap preferred to another and who determines the choice? A focus on this broader, yet more subtle, understanding of legitimation should be explored. The problem is to find answers that reconcile the desire for collective discipline, portrayed as being in the common interest, with national autonomy and democratic choice.

The political economy research also raises doubts about whether a system of governance that relies on rules can be effective. Some of the shortcomings of the design of EU rules have been extensively analysed, but Begg (2017) argues that implementation difficulties justify a different approach. Fiscal councils could be part of an answer, but because they have only recently been established in many member countries, there is not yet sufficient evidence of how much impact they have had. The case studies reported in Begg et al. (2017) are encouraging, but they also point to the scope for clashes with governments. A sensitive question is how to factor fiscal councils into legitimation and accountability.

The corollary is that seeking further to redesign or recalibrate rules as the cornerstone of EMU reform is likely to offer a false prospectus. Instead, what is needed is better definition of the EU’s fiscal constitution and, within it, of how the different elements of public finances are brought together. Rules may still have a place but a more limited one and, because of the implicit contract between voters and taxpayers, on one side, and decision-makers on the other, the political dimension of fiscal policy must move to centre-stage.

The political economy work is developed into a policy report (Begg, 2018) offering a number of recommendations. These include:

- dealing more decisively with legitimation concerns;
- rationalising and simplifying fiscal rules and revisiting institutional relationship to arrive at a better balance between enforcement, compliance and appropriateness

² <https://www.oecd.org/gov/government-at-a-glance-2017-highlights-en.pdf> page 14

- revisiting the macroeconomic imbalances procedure to establish whether the evident shortcomings in its implementation can be corrected to make it more effective; if not it will be seen as superfluous and might as well be discontinued; and
- developing the role of fiscal councils as more legitimate agencies for monitoring national policy

6. Tools for policy analysis

An applied multi-country OLG model

Multi-country macroeconomic models are needed to quantify the international impacts of national policy reforms or demographic shocks. Existing macroeconomic models typically fall in three categories. In the first category, models focus on short-run effects and monetary policy, but ignore the long-run impact of population aging. In the second category, models incorporate population ageing but in a stylized multi-regions setting, appropriate for theoretical questions but not to quantify between-countries spillovers. In the third category, large-scale models are detailed but only cover one country, which does not capture cross-country spillovers via integrated capital markets.

There exists no large-scale, multi-country macroeconomic model taking population ageing into account, allowing quantification of long-run national and international impacts for policy evaluation purposes. To fill the gap, Davoine et al. (2016) and Davoine (2017a) have developed a new multi-country model. This model combines existing large-scale, single-country overlapping-generations models, whose basis was developed by the IHS for the European Commission (DG EMPL). The resulting multi-country model includes 14 EU countries covering more than 80% of the total EU population.

The model allows analysing national policy reforms and demographic changes as well as internationally coordinated policy reforms, taking into account international spillover effects via international capital markets. The model also allows considering the fiscal consequences of central budgets options at the EU level, taking into account the impacts for both donor and recipient countries (see Davoine 2017b).

An OLG model with sustainability risks

The EU fiscal framework aims to make member countries pay more attention to how public debt and deficits are expected to evolve in the medium run and the long run. To facilitate this aim, Lassila (2016 and 2017) develops an open-economy overlapping-generation model that is calibrated to the Finnish economy and institutions. It features stochastic demographics, labour productivity growth and asset yields (in the first pillar pension funds). These uncertainties make the structural fiscal position uncertain. In the model, fiscal strategies are based on the point estimates of these variables.

The model allows for testing and developing alternative fiscal-policy strategies that are explicitly based on the Medium-Term Budgetary Objective. Arguably, one criterion for a good fiscal strategy is that it results in as much tax smoothing as possible. Due to its OLG structure, the model also allows taking into consideration intergenerational equity.

A dynamic simulation model of the fiscal rules

The new fiscal framework includes multiple rules and target measures that steer fiscal policy both in the short and long term. The complexity of this framework, however, may make analysis difficult. To provide more clarity, our project has developed an entirely new dynamic simulation model that allows quantifying the constraint that the rules impose on fiscal policy. The model developed in Kuusi (2017) allows quantifying multi-year adjustment programmes that minimise the need for fiscal adjustments while being compliant with the key elements of the framework.

Technically, the fiscal rules are introduced as constraints to a mathematical minimisation problem. They govern different parts of an adjustment programme towards the fiscal targets at the end of the adjustment, including requirements for the pace of adjustment (the deficit rule and the flexibility guidance), the target at the end of the programme (the debt convergence rule and the medium-term objective of the structural balance MTO) and deadlines (the debt transition rule). The programme is contingent on an underlying economic forecast.

Importantly, the model also allows taking into account possible output responses of fiscal adjustments (multiplier effects). The appropriate anticipation of output responses should facilitate designing realistic fiscal adjustment programmes in the future. The collective analysis of the rules may also pinpoint caveats in the overall design of the rules and guide their further development.

Macroprudential policy model within NiGEM

Since the global financial crisis, there has been increasing interest in macroprudential policy. Clearly, macroprudential policies may also increase economic stability in the EU. However, policy measures should be based on careful cost-benefit analyses. Existing analyses often omit feedback from the macroeconomy to the financial sector. This is partly because of the difficulty in modelling the emergence of “disequilibria” that motivate macroprudential policies in the first place in structural general equilibrium models.

The FIRSTRUN project has developed a new macroprudential policy model within the NiGEM model (Carreras et al. 2016 and 2017), which is a semi-structural global macroeconomic model. Specifically, the existing NiGEM model is expanded to include two macro-prudential tools, namely loan-to-value ratios on mortgage lending and variable bank capital adequacy targets. The former has an effect on the economy via its impact on the housing market while the latter acts on the lending spreads of

corporate and households. A systemic risk index that tracks the likelihood of the occurrence of a banking crisis is modelled to establish thresholds at which macroprudential policies should be activated by the authorities.

The model allows performing a cost-benefit analysis of macroprudential policies that takes feedback effects from the macroeconomy to the financial sector into account. Users may activate macroprudential policy directly or policy may be triggered endogenously when a systemic risk indicator exceeds a critical value, which can be set by the user and may vary between countries.

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