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Contact

OFCE, 10 place de Catalogne 75014 Paris

Tel. : +33(0)1 44 18 54 24

mail : revue.ofce@sciencespo.fr

web : www.ofce.sciences-po.fr

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ECONOMIC POLICIES IN THE EURO AREA AFTER THE CRISIS¹

Catherine Mathieu and Henri Sterdyniak

Sciences Po, OFCE

In 2019, 20 years after the launch of the single currency, the euro area policy framework remains highly debated among politicians, academics, and citizens. The need to improve this framework had been highlighted by the widening of imbalances prior to the 2007 financial crisis, and afterwards by the huge impact of the financial crisis, the sovereign debt crisis in Southern European countries, and the Great Recession. The issues under debate may be divided into four main axes.

An unfinished construction?

The architectures of the European Union (EU) and even more of the euro area are specific and subject to never-ending changes, with disagreement on the plans among EU architects.

For federalists, the EU should become a federation that progressively acquires all the powers and characteristics of a nation. The single market, the single currency, the monetary union (the European Central Bank, ECB, the banking union), the fiscal union (the Stability and Growth Pact, the Fiscal Treaty, the “first European semester”) already exist. Fiscal EU should be deepened (a federal fiscal policy), as well as the banking union, the capital markets union, EU diplomacy, social Europe, European taxation, European defence, etc. There is a need to move forward, towards greater integration than in current treaties. At each step,

1. This volume brings together a group of papers, following a reviewing process and based on earlier drafts presented at the 15th EUROFRAME Conference on economic policy issues in the European Union: “Economic Policies and Political Economy in the EU after the Crisis”, held in Milan (Italy) on 8 June 2018. EUROFRAME is a network of ten independent European research institutes: DIW and IfW (Germany), ESRI (Ireland), OFCE (France), PROMETEIA (Italy), CPB (Netherlands), WIFO (Austria), ETLA (Finland), CASE (Poland), and NIESR (United Kingdom). Since 2004, every year in June EUROFRAME has been organising a Conference on economic policies in the EU. In 2018, 25 papers were presented. Most of them are available on the Conference web page (<http://www.euroframe.org>)

Europe remains an unstable construction, which needs to be consolidated through more Europe.

For the proponents of a Europe of Nation-states, the EU should keep an intergovernmental functioning, and decisions should be made by heads of government, under the unanimity principle. EU powers and its size should not be extended. The subsidiarity principle should be respected: decisions should be made at the lowest possible level, and domestic specificity should be allowed to remain.

Each of these strategies raises economic and democratic issues. The federalist strategy does not account for EU countries' diversity in terms of economic and social structure. The Member States (MS) are expected to converge towards a single model, defined through a technocratic process. According to some, the EU should oblige the MS to converge towards a neo-liberal economic model, the only model suitable to globalisation. According to others, the EU should protect the European social model, with its specificities, its scale of social protection, labour laws, etc. The Nation-state strategy is not promising. It does not account for interdependencies between the MS. There is a strong contradiction between on the one hand the single market and the single currency, and on the other hand domestic structures, be it in terms of wage developments, taxation, the social system, or industrial policy. In both cases, crucial decisions are being made at the EU level without democratic debate, without political choices, either within technocratic federalist circles or through compromises reached by governments. This is what we have seen since the 2007 crisis, with the absence of democratic debates at the EU level on issues such as financial support for Greece, the Fiscal Treaty and Brexit.

There are permanent tensions in the euro area between a federalist ambition (*an ever closer Union*) and desires to retain or recover domestic sovereignty (*taking back control*). These tensions may lead to open or hidden crises, like Brexit, or some MS' reluctance to combat tax optimisation or the refusal of some Central and Eastern European countries to open their frontiers to migrants.

A crisis of national cohesions

In addition, in all the advanced economies, national cohesion is being weakened by technical progress, globalisation, financialisation and migration. De-industrialisation, robotisation and automation reduce the number of stable and relatively well-paid jobs for lower- and middle-class workers. Conversely, a small number of people benefit from financialisation and globalisation. Wage and income inequalities increase. While social protection needs grow, the public finances are constrained by tax competition. Temptations towards protectionism and nationalism mount. The fracture between the upper class and the rest of the society widens as the lower

class loses trust in the elites. This is not a phenomenon specific to the euro area, as can be seen from Brexit or the election of Donald Trump in the US. In Europe, this often translates into rejecting European construction.

Each advanced country (or area) has to choose between two strategies: strengthening competitiveness and attractiveness, and thereafter relying on job and wage flexibility to allow the invisible hand to restore a satisfactory equilibrium; or strengthening domestic (or EU) protection, either via trade policy, industrial policy, or social policy. Moreover, the ecological constraint requires tough economic decisions. Strategic choices are particularly hard to make in the EU where the MS are in different situations and have diverging interests and ways of thinking. So far, the attempt by French President Emmanuel Macron to promote a “European renaissance” has faced inertia from some MS and clear hostility from other MS, who oppose any move towards further European integration. How to make strong and constructive decisions in these conditions?

Which rules of functioning?

The euro area does not have satisfactory functioning rules. Fears of Northern countries about fiscal laxism leads to the introduction of numerical fiscal rules lacking economic rationale, such as the deficit limit of 3% of GDP and the 60% limit of GDP for public debt, the objective of long-term public structural balance, or the requirement to reduce the structural deficit by an annual 0.5% of GDP. The EU Commission and several MS are refusing to change the rules, although they do not fit the current economic context. A situation with nominal interest rates at the zero lower bound was not anticipated. Some level of public deficit and public debts seem necessary today for the macroeconomic equilibrium. The pre-crisis periods have shown the need for more precise economic policy coordination; it has turned out that the tricky points were wage coordination and the compatibility of external balances objectives.

Fortunately, the principle of the absence of solidarity between MS as well as of the ECB not being allowed to buy public bonds have been forgotten. But more generally speaking, while some progress has been made, this has not resulted in a coherent architecture. The EU institutions assess the economic policies implemented in the MS and provide critical assessments if the latter do not follow EU rules and guidelines, but they do so on a country-by-country basis, with no real overall coherence. It would be illusory anyway to try to reach coherence if the MS that have room for manoeuvre refuse to use it. All in all, the EU can only criticize MS whose fiscal policy does not follow the predefined rules; but this does not at all define an overall fiscal and wage strategy.

In principle, there is a single monetary policy for the whole euro area, but the financial markets increase spreads on long-term interest rates, punishing fragile countries (such as Italy) and lending at low rates to strong countries (such as Germany), which exacerbates divergences. This could be corrected by a macro-prudential policy, which nevertheless conceals an ambiguity: how to control domestic imbalances by imposing credit ratios on increasingly internationalized banks?

On the one hand, one may wish to give the EU authorities more power to steer euro area macroeconomic developments, either by offering them the possibility to play a fiscal role, or by organizing automatic transfers between MS in differing economic situations. On the other hand, this would require that EU authorities abandon rigid fiscal rules and that they set themselves the objectives of full employment and the elimination of intra-zone imbalances. But these are areas where a consensus is very difficult to reach, meaning that national fiscal policies will have to remain autonomous for a long time, with the EU authorities having only an advisory role.

National fiscal policies would be facilitated if a European budget financed investments, and more generally European common goods (such as fighting against climate change), by using common resources (the carbon tax and the financial transaction tax) and by issuing Eurobonds. But this cannot be a pretext for adding constraints on national budgets.

The European institutions believe that they can overcome these problems by two strategies. On the one hand, the capital markets union is supposed to improve financial efficiency and play an automatic stabilizing role, but only if portfolio diversification is sufficient, which is not assured. On the other hand, structural reforms are expected to contribute to the convergence of the European countries. However, will these be sufficient to cope with the divergent trends induced by the polarization of industrial activities? Moreover, the direction of these reforms would probably benefit from a more open debate.

Towards which kind of normalisation?

At the time of the EUROFRAME Conference, in June 2018, EU economic policy was facing two main challenges: monetary policy normalisation and improving the fiscal policy framework. So far, no advanced country has succeeded in bringing their economy back to a normal situation, where real interest rates would be close to long-term output growth and a primary structural balance close to 0. Central banks are considering a move to increase their interest rates and to progressively bring non-conventional policies to an end. Higher interest rates are anticipated, and one may expect that companies and financial institutions are prepared for this. Almost all EU countries already run structural primary surpluses. The issue is more of a macroeconomic order. Will monetary policy normalisation be

implemented without being accompanied by more expansionary fiscal or wage policies, which are difficult to coordinate in the EU? The need for an ecological transition could suggest a new orientation of fiscal and monetary policies, gearing them towards joint support for investments made in the ecological transition framework.

More fundamentally, the euro area economic policy framework will need to be redesigned, by taking into account European choices and national choices, in terms of monetary policy but also of credit, fiscal policy, tax policy, and wage policy. Once simplistic solutions, such as a federal unification under the auspices of the EU institutions or such as the full autonomy of the national choices have been removed, a painful compromise will have to be found.

The papers released in this volume address three main topics: fiscal rules, which remain at the core of fiscal policy debates in the EU, euro area governance, and bank stability.

Fiscal rules

Katja Rietzler (Macroeconomic Policy Institute (IMK) at the Hans-Boeckler-Foundation, Düsseldorf) and Achim Truger (University of Duisburg-Essen, German Council of Economic Experts, Wiesbaden, and IMK), in “Is the ‘Debt Brake’ behind Germany’s successful fiscal consolidation?”, carry out a comparative analysis of the “structural” consolidation of public finances in Germany from 1991 to 2017. They show that Germany’s successful budget consolidation since 2010 is due not to the introduction of the German debt brake, which serves as a model for the European fiscal treaty, but to fiscal stimuli, the progressive reduction in transfers to East Länder, and low interest rates.

Heikki Oksanen (University of Helsinki), in “New output gap estimates for the euro area and elsewhere”, proposes a simple statistical method for estimating output gaps: to introduce explicit assumptions about future growth and to smooth GDP by an HP filter. This method would give results that are as satisfactory as the more elaborate methods used by international organizations (EC, IMF and OECD). The author recognizes, however, that the output gap estimates remain subject to revisions, which affect the fiscal effort assessment. Looking at the years 2011-14, the author shows that an undervaluation of potential growth can be self-fulfilling, leading to overly restrictive fiscal policies and thus a decline in effective growth. However, the author argues for transfers between countries based on differences in output gaps.²

2. A critique of statistical methods to estimate output gaps, as well as of the use of potential growth for forecasting and for economic policy analysis may be found in: Catherine Mathieu and Henri Sterdyniak (2015): “Should we still use the concept of potential growth?”, *OFCE Working Paper*, 2015/30.

Euro area governance

Catherine Mathieu and Henri Sterdyniak (OFCE) in “Euro area macroeconomics—where do we stand twenty years later?” recall recent euro area reform proposals from EU institutions (a convergence and competitiveness instrument, a fiscal stabilization mechanism at the euro area level) and from the Member States (more budgetary discipline supervised by markets or, on the contrary, more solidarity between MS and a euro area budget). The authors present and discuss the different viewpoints of economists: those who trust financial markets to control national economic policies, those who want to strengthen fiscal rules, those who want to improve existing rules, those who want to organize more or less automatic transfers between MS, those who want to establish a euro area budget and finance minister, those who want to move towards a democratized federal Europe, those who propose original measures to reduce public debts, and finally those who advocate a better coordination of autonomous fiscal policies in a Keynesian perspective.

Harmen Lehment (Kiel Institute for the World Economy), in “Fiscal implications of the ECB’s public sector purchase programme” analyses the fiscal impacts in terms of the seigniorage gains of the public sector purchase programme (PSPP), which the ECB started in 2015 for monetary policy purposes. The author shows that this programme allowed governments to get funding through banks’ excess reserves, i.e. at a short-term and entirely safe interest rate instead of selling longer-term bonds at an interest rate bearing a risk premium. The gain increases as the remuneration on reserves is low and the risk premium is high. In order to compensate for the future rise in the rate of remuneration of reserves, the author recommends increasing banks’ reserve requirements and not to remunerate them.

Bank stability

Ilkka Kiema (Labour Institute for Economic Research, Helsinki) and Esa Jokivuolle (Bank of Finland) in “Bank stability and the European deposit insurance scheme” analyse the impact of a deposit insurance mechanism, under the assumption that depositors anticipate the risk that governments may default, and compare the cost of a guarantee with the cost of a loss in reputation. From this perspective, the European deposit insurance scheme would improve bank stability for a limited crisis, but its effects might be ambiguous in a systemic crisis that affects the whole Banking Union (increasing the risk of voluntary default by all MS).

IS THE “DEBT BRAKE” BEHIND GERMANY'S SUCCESSFUL FISCAL CONSOLIDATION?¹

A COMPARATIVE ANALYSIS OF THE “STRUCTURAL” CONSOLIDATION OF THE GOVERNMENT SUBSECTOR BUDGETS FROM 1991 TO 2017

Katja Rietzler

Macroeconomic Policy Institute (IMK) at the Hans-Boeckler-Foundation, Duesseldorf, Germany

Achim Truger

University of Duisburg-Essen, German Council of Economic Experts, Wiesbaden, and Macroeconomic Policy Institute (IMK) at the Hans-Boeckler-Foundation, Duesseldorf, Germany

The German general government recorded a surplus for the fourth year in a row in 2017. The fast consolidation after the Great Recession coincided with the transition period for the full introduction of the federal debt brake. At the same time Germany's economy is performing better than those of many other countries. Therefore it is nearly impossible to overrate the symbolic power of the debt brake as a seeming success story. We scrutinise this story by carrying out a comparative analysis of the “structural” consolidation of public finances in Germany for the period from 1991 until 2017, showing that the German debt brake is not the cause of the successful budget consolidation since 2010. The improvement of the general government finances since 2010 was smaller than in previous consolidation phases and was strongly supported by both a favourable macroeconomic environment and one-off effects. Finally, without the blessing of a strong upswing, Germany would hardly have become the fiscal role model for Europe, and the German debt brake would not have become the blueprint for the European Fiscal Compact.

Keywords: Germany, debt brake, consolidation, Euro crisis, sovereign debt.

1. This paper is based on an article in German (Rietzler and Truger, 2017) that has been completely updated and substantially modified. We would like to thank an anonymous referee for helpful suggestions and comments. We are also grateful to the participants in the “Fiscal sustainability” session at the 15th EUROFRAME Conference in Milan on 8 June 2018 and the participants in the session “Preparing for the next crisis: a macroeconomically sensible European Fiscal governance” at the 22nd conference of the Forum for Macroeconomics and Macroeconomic Policies “10 Years after the Crash: What Have We Learned?” on 27 October 2018 in Berlin. The usual disclaimer applies.

In the summer of 2009, the so-called “debt brake” was incorporated into the German constitution. Its central feature is that it strictly limits structural deficits to 0.35% of GDP for Germany’s federal government and 0% for its state governments. In addition a cyclical component increases or decreases the scope for borrowing across the economic cycle. In case of an emergency, an exception clause permits borrowing beyond the usual limits. Further, a control account ensures that the federal government complies with the debt brake in both the draft and the execution of the budget. For the federal government, the debt brake has been fully binding since 2016; for the states, this will be the case from 2020 onwards.

From the beginning the debt brake has been a highly controversial issue, and numerous objections and warnings have been expressed (Truger and Will, 2013). Nevertheless, its supporters will believe that their initial point of view has been confirmed, as Germany’s public finances seem to be in excellent shape since the introduction of the debt brake—by both international and historical standards. Since 2010, the consolidation of the general government finances proceeded at a fast pace. Already in 2012 and 2013 the general government net borrowing (national accounts definition) was close to zero. Since 2014, the general government’s balance has been positive and increasing every year. According to recently revised data on Germany’s Excessive Deficit Procedure (EDP) notification, the surplus amounted to 1.3% of GDP in 2017.² In 2014, Germany belonged to a group of only three countries in the euro area with a budget surplus. In 2017, eleven euro area countries were still running deficits.

After decades of budget deficits, the federal government recorded a surplus for the fourth time in a row—both according to the national accounts and the government finance statistics. The rapid consolidation of the federal government budget has coincided with the transition period for the full introduction of the debt brake, which is sometimes interpreted as causality (e.g. BMF, 2015). The federal government’s budget, including all extra-budgetary operations, has complied with all the debt brake regulations, by a wide margin. At the same time Germany’s performance in terms of growth and especially

2. The calculations for Germany presented in the paper are based on annual data published in February 2018.

employment has been better than that of many other countries. This is often attributed to the strategy of “growth-friendly consolidation” associated with the debt brake, which is said to prove that budget consolidation and growth can go hand in hand, or even that the former is a prerequisite for the latter. Thus, the strict adherence to the debt brake—and the permanent over-compliance with its requirements via the policy of the “schwarze null” (“black zero”, i.e. policy of a permanently balanced budget)—became the hallmark of Finance Minister Schäuble’s “sound fiscal policy” (“solide Finanzpolitik”, BMF 2016). For this reason it is nearly impossible to overrate the symbolic power of the debt brake as a seeming success story. As a consequence, the German debt brake became the blueprint for tightened fiscal rules and plans to anchor the limitation on budget deficits in the legal systems and even the constitutions of EU countries via the Fiscal Compact.

With this paper the authors aim to scrutinise the seeming success story of the debt brake and assess it on the basis of empirical facts.³ Is the debt brake really the cause of the good performance of Germany’s public finances? A closer inspection reveals that this is highly implausible. To illustrate this we carry out a comparative analysis of the “structural” consolidation of public finances in Germany for the period from 1991 until 2017. We start with some methodological remarks (Section 1). This is followed by a comparison of different consolidation phases between 1991 and 2017, in which the “structural” balance of the general government sector increased (Section 2), which already casts doubt on the debt brake as a success story. In Section 3 we show that the seemingly impressive consolidation of the federal budget since 2010 looks much less impressive when compared to the consolidation in other government subsectors over time, and that the post-2010 consolidation has benefited from special circumstances. In Section 4 we apply a simple simulation to illustrate how the balances of the government subsectors would have evolved if the German economy had not experienced such an unexpectedly dynamic recovery since 2010. Section 5 sums up the economic and fiscal policy implications.

3. A similar analysis can be found in Paetz *et al.* (2016), but this is confined to the federal government budget and based on government finance statistics (instead of the national accounts used here) on the one hand, and incorporates numerous institutional details on the debt brake for the federal government on the other hand.

1. Methodological Remarks

In the following we analyse key fiscal indicators of the general government, the territorial entities⁴ as well as the social security funds as defined in the national accounts for the period from 1991 until 2017. The working tables (“Arbeitsunterlage”) on the accounts of the government sector provided by Destatis in February 2018 serve as the main data source. Using the national accounts data has the important advantage that the government sector and its subsectors are clearly defined according to uniform criteria and that time series are available for a sufficiently long period and with reasonable publication lags. Due to the large number of entities, differing definitions and variations in the coverage over time, an analysis based on government finance data would have been not only time-consuming, but also inaccurate. Recently government finance statistics published by Destatis have overcome some of these drawbacks, as they now use the same definition of the government sector as the national accounts and thus include relevant extra-budgetary operations. However, the publication lag is rather long, and the time series starts as late as in 2011, making comparisons over longer periods of time impossible.

The use of national accounts data also has the advantage that the relevant benchmark indicators of the Stability and Growth Pact (SGP) are based on the same concept. However, it is a drawback that the national accounts data differ substantially from the public revenue and expenditure data relevant for the German debt brake. Thus, the analysis in this paper allows only a very rough assessment of the budget balance relevant for the federal and state governments according to the debt brake. Therefore, it cannot indicate an immediate need for fiscal policy action as dictated by these institutional constraints.

The federal government’s official Spring projection of potential output and the output gap serves as a basis for the estimation of the cyclically adjusted “structural” indicators (BMWi/BMF, 2018). The German Federal Ministry of Finance provided the budget semi-elasticities for the government subsectors upon request. For the government sector as a whole, these add up to the general government estimate of the European Commission of 0.55 (Mourre *et al.*, 2014). The government uses a variant of the European Commission’s method of calculating potential GDP (Mourre *et al.*, 2014), which therefore suffers from the

4. Bund = federal government, Länder = state governments, Gemeinden = municipalities.

same problems of endogeneity (Truger, 2015). What is more, the exact details of the method have never been published and are still not transparent, as had already been pointed out by Truger and Will (2013).

2. Doubt Number 1: Comparison of different consolidation phases

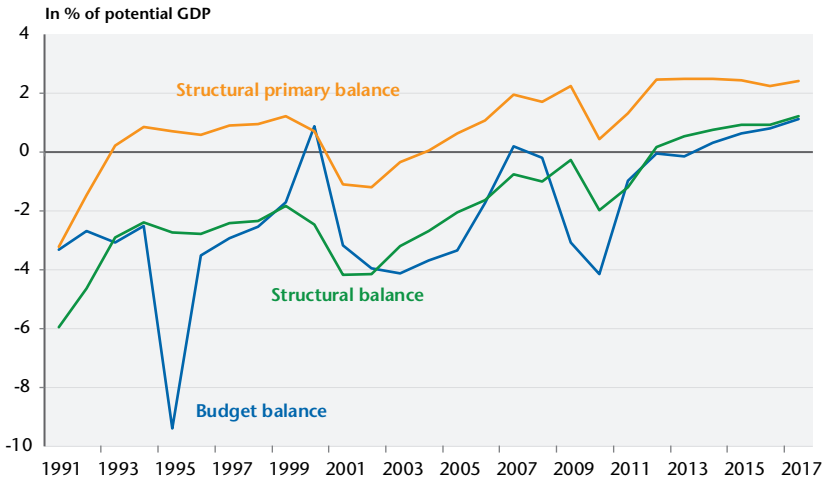
Figure 1 shows the general government budget balance, the structural balance—adjusted for cyclical and one-off effects—and the structural primary balance, i.e. the structural balance minus gross interest payments, for the period from 1991 until 2017.⁵ Indeed, the graph shows an impressive consolidation performance in the period since the introduction of the debt brake. The budget balance moved from a deficit of 4.2% of GDP in 2010 to a surplus of 1.1% of GDP in 2017—an improvement of 5.3 percentage points. Concerning the structural balance, the improvement is substantially smaller at 3.2 percentage points, because of the cyclical adjustment and the adjustment for large one-off expenditures to stabilise the banking sector, which amounted to 1.3% of potential output in 2010. If we further take into account that public finances strongly benefitted from unusually low interest rates and thus look at the structural primary balance, the improvement is reduced to 2% of potential output, which is nevertheless a substantial consolidation performance.

However, Figure 1 reveals at a glance that there were similar phases of substantial budget consolidation even before the introduction of the debt brake. Table 1 compares four consolidation phases after 1991, which were identified on the basis of the structural balance. Obviously, the structural balance increased substantially in the phases from 1991 until 1994, from 1996 until 1999, from 2002 until 2007 and from 2010 until 2017. Interestingly, the phase with the most pronounced consolidation is not the most recent phase following the introduction of the debt brake. Both the period from 1991 until 1994 and the fairly recent period from 2002 until 2007 exhibited much stronger improvements, by 3.6 and 3.4 percentage points respectively in the case of the struc-

5. We have classified the year 2017 as the end year of the last consolidation phase, although strictly speaking we could have classified the year 2015 as the end year, because from 2015 to 2016 there was a very small worsening of the structural balance-to-GDP ratio. This would not only have decreased the length of the consolidation period, but also the overall size of consolidation in that phase by 0.31 percentage points for the structural balance. However, as the worsening in 2016 was only -0.00023 percentage points and therefore negligible, we decided to use 2017 as the end year.

tural budget balance, and by 4.1 and 3.2 percentage points in the case of the structural primary balance, compared to only 3.2 percentage points for the structural balance and 2.0 percentage points for the structural primary balance in the phase from 2010 until 2017. In the analysis, potential GDP rather than GDP is used as the yardstick in order to avoid strong cyclical distortions—especially due to the sharp recession triggered by the financial crisis.

Figure 1. Balance, structural balance and structural primary balance of general government in Germany, 1991–2017



Sources: Destatis, authors' calculations.

In addition, it has to be noted that unlike the period from 2002 until 2007 the most recent phase after the introduction of the debt brake has been characterised by very favourable macroeconomic conditions: although the estimated average output gap of -0.5% of potential output was hardly better than in the preceding period (-0.7%) and the average growth rate of 1.8% was only slightly higher (2002-2007: 1.6%), the period after 2010 was much more dynamic than the preceding period, which included several years of stagnation from 2002 until 2005. After 2010 the average growth rate of wages and salaries was 4.0% and the unemployment rate was as low as 4.8%, whereas these indicators amounted to 1.0% and 9%, respectively, in the preceding period. As the recent literature on fiscal multipliers suggests, it can be assumed that fiscal multipliers are higher in downturns than in upswings (Gechert, 2015). Therefore, it is highly plausible that the consolidation was much easier and produced smaller negative macroeconomic effects than in the period from 2002 until 2007 when the economy stagnated for several years.

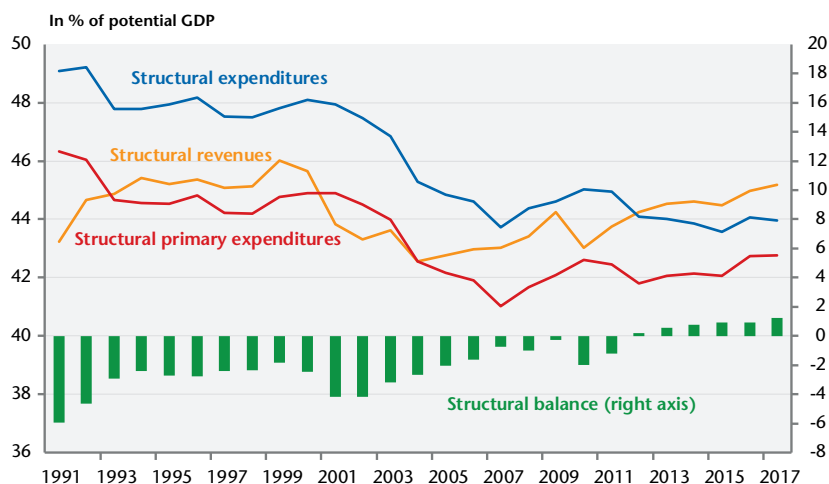
Table 1. Phases of structural budget consolidation of general government, 1991-2017

In % of potential GDP

Consolidation (+)	1991-1994	1996-1999	2002-2007	2010-2017	1991-2017
Δ structural balance (% POT)	3.6	1.0	3.4	3.2	7.2
Δ structural primary balance (% POT)	4.1	0.7	3.2	2.0	5.6
Average output gap	2.0	-0.6	-0.7	-0.5	-0.1
Average GDP growth rate	1.1	1.9	1.6	1.8	1.4
Average growth rate of wages and salaries (domestic concept)	4.2	1.6	1.0	4.0	2.6
Average unemployment rate	6.8	8.5	9.0	4.8	7.0

Sources: Destatis, Federal Ministries of Finance (BMF) and of Economic Affairs and Energy (BMWi), authors’ calculations.

From a macroeconomic point of view, the structure of the budget consolidation during the individual phases is also remarkable. Figure 2 shows both the general government structural balance and structural revenues and expenditures. It reveals that the consolidation during the period from 2002 until 2007 was almost exclusively achieved on the expenditure side of the budgets. Substantial tax cuts under the “red-green” coalition in the early 2000s were followed by substantial spending cuts in order to reduce deficits that were partly cyclical and to comply with the rules of the SGP (Rietzler *et al.*, 2017). As a consequence, the expenditure ratio fell by 3.7 percentage points. As expenditure multipliers are much higher than revenue multipliers (Gechert, 2015), the overall macroeconomic effect can be assumed to have been strongly negative (Truger, 2010: 29 ff).

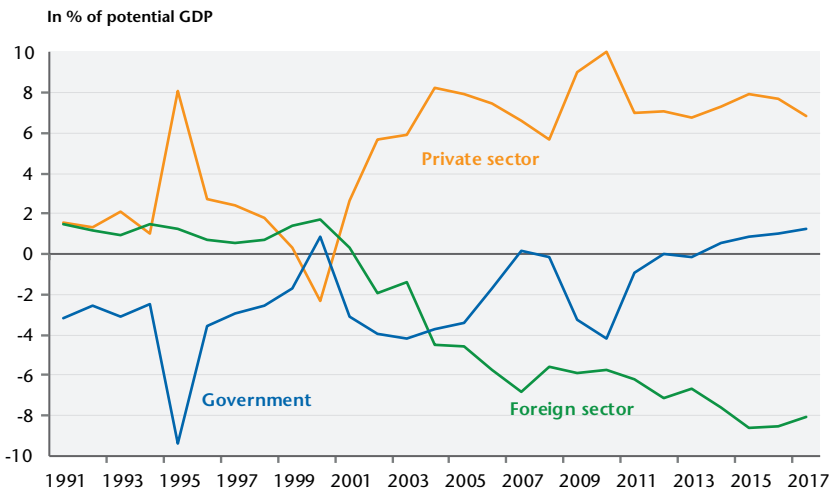
Figure 2. Structural general government balance, structural revenue and expenditure ratios, 1991-2017

Sources: Destatis, Federal Ministries of Finance (BMF) and of Economic Affairs and Energy (BMWi), authors’ calculations.

According to the cyclically adjusted data used here, the consolidation process has been much more benign for the macro economy since 2010—with about 67% on the revenue side and only 33% on the expenditure side. On balance there were no discretionary tax increases (Rietzler *et al.*, 2017).

It can be noted that the consolidation of the general government budget has been somewhat weaker since 2010 than in the preceding periods, although the debt brake did not exist back then. In addition the consolidation has been facilitated by favourable macroeconomic conditions and the resulting improvement in revenues, which had very limited negative effects on the economy. However, it is problematic from a macroeconomic perspective that the budget consolidation after 2011 was almost continuously accompanied by a rising current account surplus, as the private sector saw no overall decrease in its balance, so that the already substantial external imbalances were exacerbated (Figure 3). It was only from 2010 until 2011 that the consolidation was strongly supported by the domestic economy via a reduction of the private sector's net lending. If the German model of current account surpluses—recently exceeding 8% of GDP—came increasingly under political pressure from countries with current account deficits, as we can expect, this would therefore have an immediate negative impact on the sustainability of Germany's fiscal consolidation.

Figure 3. Net borrowing/net lending in Germany by institutional sector, 1991-2017

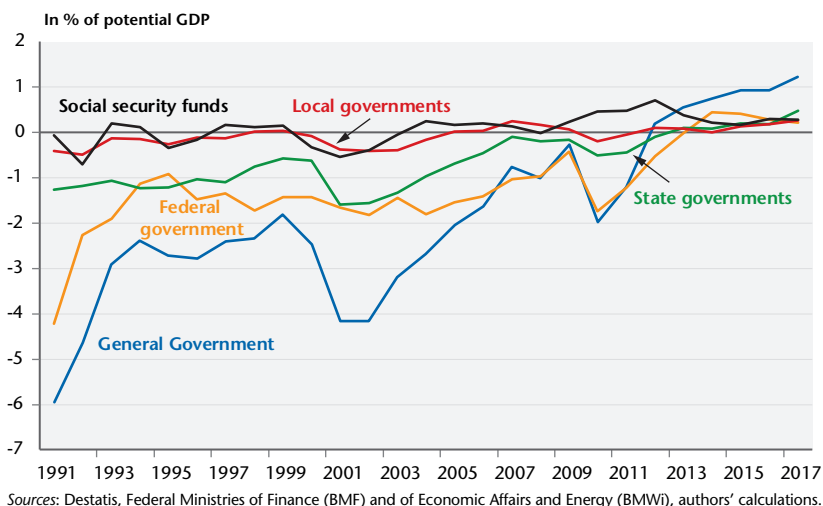


Sources: European Commission (2018), authors' calculations.

3. Doubt Number 2: Relative consolidation performance of government subsectors

How much have the individual government subsectors consolidated their budgets since 2010? Figure 4 and Table 2 show that the federal level accounted for most of the consolidation. Its contribution to the general government consolidation of 3.2% of potential output was 1.9 percentage points, whereas the joint consolidation of the states and the municipalities accounted for 1.5 percentage points, and the structural budget balance of the social security funds deteriorated by 0.2 percentage points. The relative consolidation performance remains broadly unchanged, if the consolidation effort is assessed on the basis of the structural primary balance.

Figure 4. Structural budget balance of government subsectors in Germany, 1991-2017



Sources: Destatis, Federal Ministries of Finance (BMF) and of Economic Affairs and Energy (BMWi), authors' calculations.

Is this indeed evidence for the effectiveness of the debt brake, which has been fully in force for the federal government since 2016? In order to answer this question a comparison of the consolidation phases mentioned above is helpful. This time we focus on the developments in the government subsectors (Table 2). We can see that, except for the phase immediately after German reunification, the federal government hardly contributed to the budget consolidation of the government sector. Instead the improvement of the general government structural balance was largely brought about by consolidation efforts at state level. The municipalities and the social security funds contributed far less than the states, but still more than the federal level.

Obviously the other government subsectors had already proceeded further with their budget consolidation in the earlier phases, particularly from 2002 until 2007, and could thus build on previous achievements—interrupted only briefly by the effects of the global economic and financial crisis and the stimulus packages. In the case of the municipalities and the social security funds, which have only limited scope for credit-financed counter-cyclical policies, it is not surprising that the consolidation was achieved without any debt brake. Indeed, Figures 7 and 8 illustrate that the structural expenditure ratios of the municipalities and the social security funds quickly adjusted to their declining revenue ratios after 2001.

Table 2. Phases of structural budget consolidation, General government and subsectors (1991-2017)

Change in % of potential GDP

Consolidation (+)	1991-1994	1996-1999	2002-2007	2010-2017	1991-2017
Δ structural balance					
General government	3.6	1.0	3.4	3.2	7.2
Federal government	3.1	0.0	0.8	1.9	4.4
State governments	0.0	0.5	1.5	1.0	1.7
Local governments	0.3	0.1	0.7	0.5	0.7
Social security funds	0.2	0.3	0.5	-0.2	0.4
Δ structural primary balance					
General government	4.1	0.7	3.2	2.0	5.6
Federal government	3.6	-0.1	0.5	1.2	3.5
State governments	0.0	0.4	1.5	0.5	1.3
Local governments	0.3	0.1	0.7	0.4	0.5
Social security funds	0.2	0.3	0.5	-0.2	0.4

Sources: Destatis, Federal Ministries of Finance (BMF) and of Economic Affairs and Energy (BMWi), authors' calculations.

However, the decline of the structural expenditure ratio after 2002 is particularly pronounced in the case of the states, which, in principle, had access to higher credit financing. Their structural expenditure ratio fell from 13.4% of potential GDP at the beginning of the consolidation phase to 12.4% in 2007—a reduction by a whole percentage point of potential output or 7.5% (Figure 6). Obviously the states were able and willing to cut spending substantially without any pressure from the debt brake. By contrast, the federal government accepted the revenue shortfalls at the beginning of the millennium to a much larger extent and reduced expenditures far less, thus tolerating far higher deficits, which corresponds to a much higher need for adjustment in 2010 (Figure 5).

Figure 5. Structural budget balance, revenue and expenditure ratios of the federal government, 1991-2017

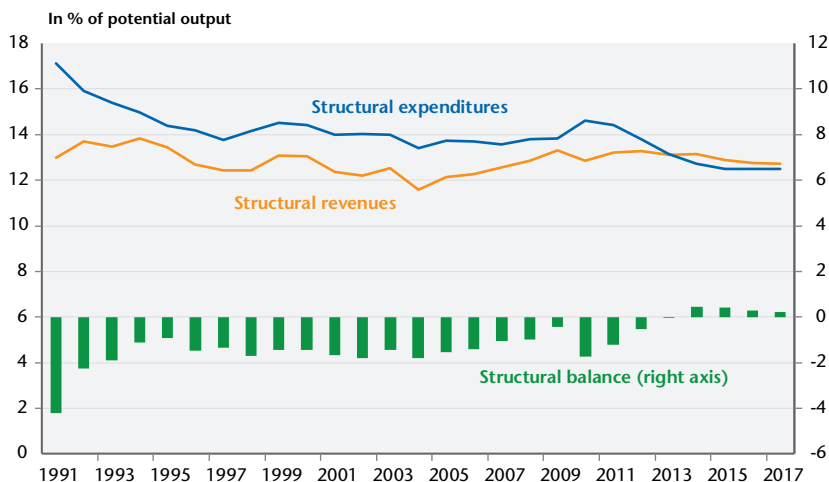
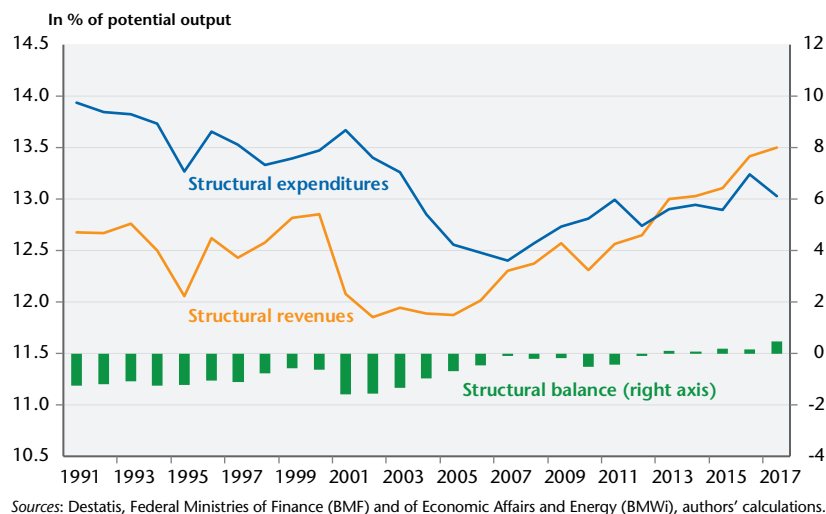


Figure 6. Structural budget balance, revenue and expenditure ratios of the states, 1991-2017



Nevertheless, it is a fact that the federal government addressed the obvious need to balance its budget set by the debt brake in 2010 and rapidly improved its budget balance. As the cyclically adjusted national accounts data suggest, the consolidation focused on the expenditure side, reducing the structural expenditure ratio of the federal government from 14.6% in 2010 to 12.5% in 2017, while the structural revenue ratio

actually declined by 0.1%. How did the federal government manage to reduce spending by 2.1% of (potential) GDP in such a short time? Of course, it benefitted from the unexpected favourable cyclical upswing. In addition, interest payments fell by 0.7% of potential GDP despite higher debt because of the exceptionally low interest rate level.

Figure 7. Structural budget balance, revenue and expenditure ratios of the local governments, 1991-2017

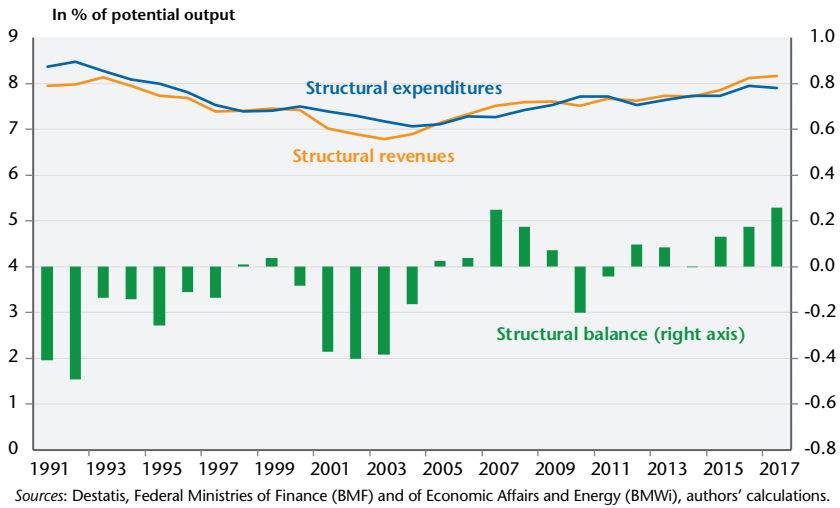
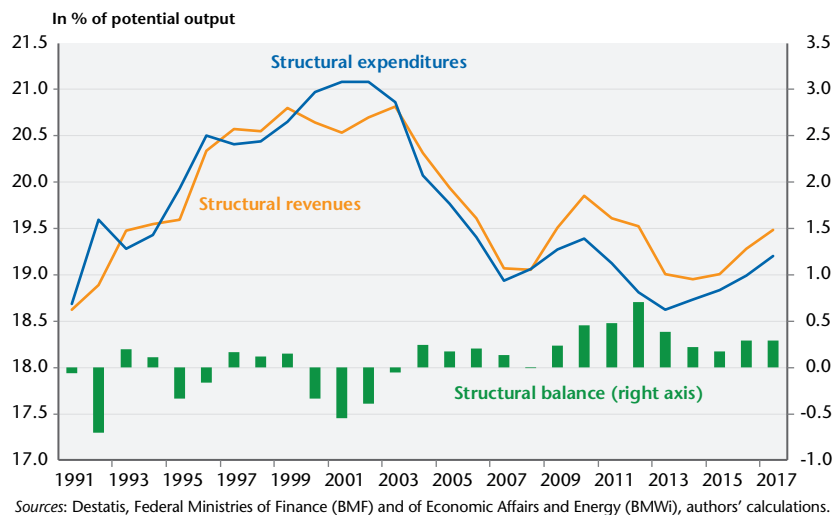
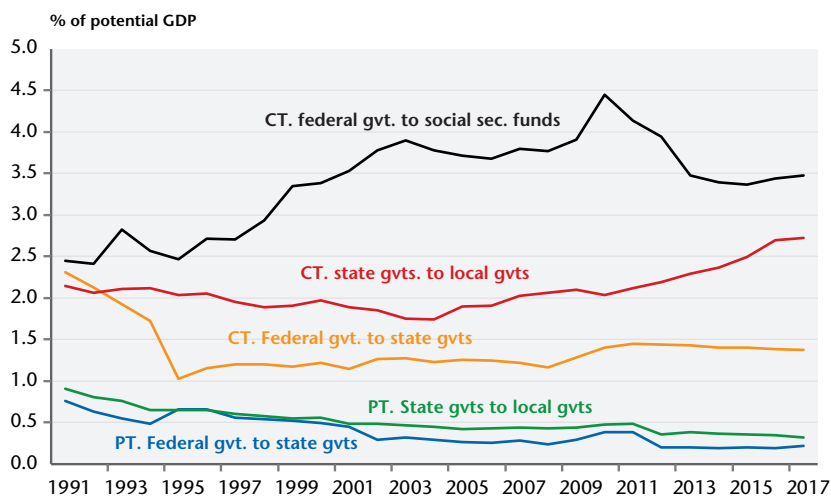


Figure 8. Structural budget balance, revenue and expenditure ratios of the social security funds, 1991-2017



This still leaves unexplained a substantial expenditure-side consolidation of 1.4% of potential GDP. A significant part of the explanation is that the federal government was able to cut its transfers to the social security funds that it had increased substantially in the crisis years of 2009 and 2010 (Figure 9). As employment rose and the financial situation of the social security funds improved, the federal government reduced its transfers to the social security funds by 1.0% of potential GDP. At first sight it seems surprising that the current transfers to the states have not increased relative to potential GDP since 2010, even though the federal government supported the states (and indirectly the municipalities) via a number of additional programmes. The fact that this does not seem to show up in the numbers can be explained first by the compensating effect of shrinking transfers from the “Solidarpakt” (solidarity pact for East German states), which is being gradually phased out by 2019. Second, a part of the additional programmes was financed by reducing the federal government’s share of VAT rather than by additional transfers from the federal budget. This shift in revenues left the expenditure side unaffected, but it explains the weak structural expenditure growth of the federal government as well as the dynamic expenditure growth of the states (Figures 5 and 6).

Figure 9. Substantial net flows between government subsectors



Sources: Destatis, Federal Ministries of Finance (BMF) and of Economic Affairs and Energy (BMWi), authors' calculations; CT = current transfers, PT = property transfers.

Another one-off effect helped the structural consolidation of the federal budget: the stimulus packages of 2009 and 2010 included some merely temporal measures affecting mostly the federal budget. Examples are the car-scrapping bonus and especially the investment programmes of €11 billion over several years, which were largely financed by the federal government (Truger, 2010; IMK Arbeitskreis, Konjunktur 2010). When these programmes gradually expired after 2010, the federal budget improved automatically by several tenths of a percentage point of potential GDP without any discretionary consolidation measures.

In retrospect almost all of the structural consolidation achievements can thus be attributed to favourable circumstances (cyclical upswing, low interest rates) and one-off effects (reduction of transfers to the social security funds, phasing out of stimulus packages). Obviously, what it cannot be attributed to is the debt brake.⁶

4. Doubt Number 3: Public finances without “the blessing of the upswing”

In the preceding sections we have repeatedly stressed that the unexpected favourable macroeconomic environment since 2010 has greatly helped the consolidation of the general government finances. One may object that the business cycle is merely relevant for the headline (cyclically unadjusted) budget balance, but not for the adjusted one. However, this is not quite true, as the usual cyclical adjustment methods underestimate the size of cyclical fluctuations and thus lead to a pro-cyclical policy, if they are applied to fiscal benchmarks. The method of the European Commission, which is used in the context of the German debt brake, has proved particularly problematic, because the potential output it produces is strongly affected by the current cyclical situation and especially the unemployment rate (Klär 2014; Truger and Will, 2013). Thus potential output is rapidly revised downwards in downturns, whereas it is rapidly raised in upswings. The sensitivity of potential output estimates to the business cycle is not merely an academic problem, but entails very concrete and serious consequences for the estimated structural deficits and thus for the ensuing consolidation requirements. During the euro crisis the Euro-

6. A detailed analysis of the factors determining the federal government's compliance with the debt brake based on government revenue and expenditure statistics is provided in Rietzler *et al.* (2017: 7-11).

pean Commission was already forced to admit that its estimates based on changes in the structural deficits substantially underestimated the actual consolidation efforts. For this reason the European Commission is now considering additional indicators (Carnot and de Castro, 2015).

When the debt brake was introduced this problem was already obvious, and corresponding concerns were voiced. At the same time it was pointed out that the debt brake might turn out to be seen as a success story if there were an unexpectedly strong and sustained cyclical upswing and, consequently, a "structural" consolidation, which is in fact cyclical:

"If the trend growth rate during a consolidation period turns out worse than expected, the structural deficit and the resulting consolidation requirements will increase [...]. This finding neglects the problem that the strong endogeneity of the estimated structural deficit combined with a restrictive fiscal policy may lead to a self-reinforcing vicious circle: if the macroeconomic performance worsens unexpectedly, part of this worsening will be recorded as a structural decline in growth. This automatically raises the structural deficit that remains to be reduced. If fiscal policy tries to comply by further tightening the fiscal stance, this may worsen the macroeconomic performance, further raising the structural deficit that has to be reduced. In this case the economy would remain caught in a stagnation trap and budget consolidation would be extremely difficult and entail a huge macroeconomic and social cost. Potentially, this mechanism also works in the other direction. In case of an unexpected favourable macroeconomic performance the required consolidation effort might actually decrease. The fiscal stance could then be loosened, which would in turn reduce the consolidation requirement via higher growth. In case of such positive feedback it is even conceivable that the fiscal strategy of the new federal government could prove reasonably successful. The government could then—at least for a few years—reconcile tax cuts with the transition towards the full implementation of the debt brake, without having to resort to extreme spending cuts or offsetting tax hikes." (Truger 2010, 21; authors' translation from German original).

This raises the question of how key fiscal policy indicators would have evolved if the macroeconomic performance since 2010 had been worse. In the following we analyse a scenario of weaker performance

for the period from 2010 until 2015 (Table 3). The “crisis scenario” assumes that the GDP growth rates for 2011 and 2012 that had been forecast when the debt brake was enacted at the peak of the global economic and financial crisis in the Spring/Summer of 2009 were realised. Therefore we use the GDP growth rates of the Spring joint forecast published in the years 2009 and 2010 (Projektgruppe Gemeinschaftsdiagnose, 2009 und 2010), which predicted growth rates of merely -0.5% and 1.4 % for 2010 and 2011, instead of the actual rates of 4.1% and 3.7%. Beginning with 2012 we use the actual GDP growth rates.

Table 3. Scenarios for real GDP growth in Germany, 2009-2017

In %

	2009	2010	2011	2012	2013	2014	2015	2016	2017
De facto growth rates	-5.6	4.1	3.7	0.5	0.5	1.9	1.7	1.9	2.2
Scenario “crisis”	-5.6	-0.5	1.4	0.5	0.5	1.9	1.7	1.9	2.2

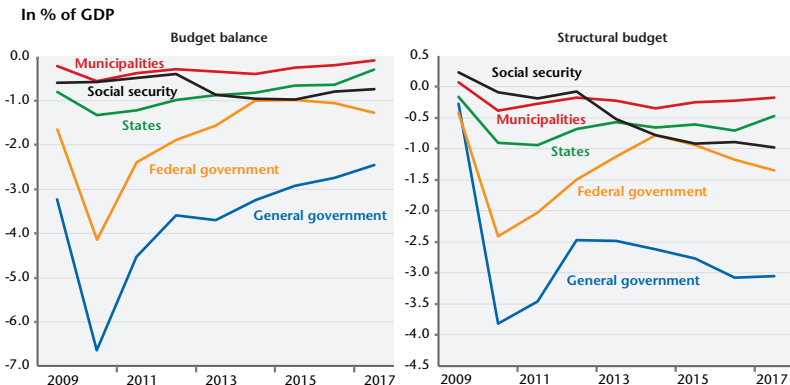
Sources: EU Commission (2018); Projektgruppe Gemeinschaftsdiagnose (2009, 2010); authors’ calculations.

For cyclical adjustment we do not use the complex method of the European Commission, on which the—still not adequately documented—method applied by the German federal government is also based. Instead we use the modified Hodrick-Prescott filter, which has been developed by the Swiss federal finance administration and which is used for the Swiss debt brake (Bruchez, 2003) for the sake of simplicity. According to calculations by the RWI (2010), it may even be less pro-cyclical than the European Commission method.⁷ In order to compare the output gaps of our simulation with those published by the federal government, we also have to estimate an output gap based on actual GDP. For all deviations of the simulated GDP from actual GDP, we can thus calculate the ensuing adjustments of the output gap. We subsequently multiply the change in the output gap with the respective budget semi-elasticity for the government subsectors and thus obtain the change of the structural budget balance caused by the revision of potential output. For the headline budget balance, we apply the budget semi-elasticities directly to the difference in GDP.

7. In Truger and Will (2013) a similar, though forward-looking, simulation was carried out using a version of the European Commission’s method. With respect to the endogeneity of potential output estimates, the results are broadly comparable, justifying the time-saving approach with the HP filter.

Figures 10a and b provide a summary overview of the simulation results. In the crisis scenario the general government deficit would have exceeded 3% of GDP until 2014. In 2017 it would still be at 2.4% of GDP. No government subsector would have recorded a balanced budget over the whole simulation period up to 2017. The findings are similar for the structural balance. The structural budget balance of the federal government would have been -0.8% in 2014 and would have worsened to -1.3% of GDP by 2017. From this national accounts indicator we cannot draw direct conclusions for the structural balance according to the government finance statistics, but it is highly likely that the structural deficit in this definition would have exceeded the 0.35% ceiling of the debt brake, causing major consolidation efforts. In addition, it would be highly unrealistic to assume a reduction of transfers to the social security funds of the size actually observed, because the funds' finances would have turned out much worse, with a deficit of 0.7% of GDP, which would have caused additional pressure on the federal budget. Although, again, the definition of the structural balance relevant for the federal states' debt brakes may be different from the one calculated from the national accounts, the federal states would have come under severe pressure, as their structural balances would not have improved over the entire period from 2009 to 2017, with the deadline for the zero structural deficit approaching in 2020.

Figures 10. ab Scenario "crisis": Budget balance and structural budget of the general government and its subsectors, 2009-2017



Sources: Destatis; BMWi/BMF (2018); authors' calculations.

From the counterfactual simulation we can conclude that without the favourable macroeconomic environment since 2010, neither the general government nor the federal government would be in such good shape in terms of their fiscal indicators. Instead, the German government—like many other governments in the euro area—would have struggled to comply with both the SGP and the German debt brake. Painful consolidation measures and spending cuts like those observed from 2002 until 2007 would have been very likely. They would have certainly had negative repercussions on the macroeconomic performance, rendering the budget consolidation even more difficult. Without the blessing of a strong upswing, Germany would hardly have become the fiscal role model for Europe, and the German debt brake would not have become the blueprint for the European Fiscal Compact.

5. Conclusion

The analysis has shown that—unlike suggested by some—the German debt brake is not the cause of the successful budget consolidation in Germany since 2010. The improvement of the general government finances since 2010 was even smaller than in previous consolidation phases, although the debt brake was not yet in place then. Furthermore, the consolidation was supported by a favourable macroeconomic environment and surging revenues. The federal government's seemingly impressive structural consolidation achievement since 2010 is due almost exclusively to favourable circumstances (cyclical upswing and low interest rates) as well as one-off effects (reduction of transfers to the social security funds, phasing out of the stimulus packages). Obviously, the debt brake contributed very little or not at all to these favourable developments. Finally, neither the general government sector nor the federal government would be in such a good shape in terms of their fiscal indicators had the economy evolved less favourably since 2010. Instead, the federal government—like many other governments in the euro area—would have struggled to comply with the SGP and the debt brake. Without the blessing of a strong upswing, Germany would hardly have become the fiscal role model for Europe, and the German debt brake would not have become the blueprint for the European Fiscal Compact.

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NEW OUTPUT GAP ESTIMATES FOR THE EURO AREA AND ELSEWHERE

Heikki Oksanen¹

University of Helsinki

Output gaps (OG) identify economic cycles. A new simple method for estimating them is presented, giving results that are more transparent than those published by the leading economic policy institutions. The retroactive changes to the OGs as such do not indicate that they would have been incorrect. Instead, they depend on what happened afterwards, including changes in the policies implemented. After the Great Crunch of 2008-09, fiscal policy was tight, notably in 2011-13 in the euro area, contributing to an unexpected fall in GDP, which led to large retroactive corrections of the OG estimates for earlier years. A more nuanced interpretation is that the retroactive corrections stemmed from the unduly tight fiscal policy followed in 2011-13. The new OG estimates explicitly based on an assessment of the possible changes in the long-term growth prospects provide the rudiments for a fiscal policy that both rationally copes with short term disturbances and underlines the policy measures necessary for long-term sustainability. This could help to avoid pro-cyclicality of fiscal policy in the euro area in future.

Keywords: Euro, fiscal policy, output gaps.

Distinguishing the cyclical and more persistent changes in macro-economic development by estimating output gaps (OGs), together with their projections a few years forward, has become a dominant

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feature in designing and assessing fiscal policy. In particular, they are used for identifying the cyclical and structural components in government budget balances and indirectly in assessing the sustainability of government debt. This way they provide crucial data for policy making in the euro area and in the European Union (EU) more generally, as well as for the surveillance work of the International Monetary Fund (IMF) and the OECD also on other countries.

The OG is defined as the percentage difference between the GDP (data for the past and a forecast for the future) and the reference level in each year that is estimated to represent the underlying “trend” or “potential”, with the term depending on the method used.

For comparing the OG estimates produced by different institutions, it is not sufficient to compare only the OGs, but as the main interest is about the current and next years and the forecasts for the GDP itself also differ, it is indispensable to examine the estimates for the reference levels as estimated by each institution, including because those estimates are interesting also for other purposes.

In the present paper we present a new application of the Hodrick-Prescott (HP) filter for estimating the “trend” and the results are compared to the estimates of the three main institutions mentioned above.²

In the present paper we cover the years from 2002, with special emphasis on the Great Crunch of 2008-09 and how it led to a “new normal” as estimated in real time, and as a further issue, on how the policies in the subsequent years shaped the developments, affecting the retrospective estimates of the “trend” or “potential” GDP before and after the Great Crunch.

It will be shown that our new application of the HP filter seems a useful and reasonably simple method for distinguishing the short-term movements from the more long-term trends, producing the results for

2. While the work on the new HP application reported here was underway, Hamilton (2017) published an article entitled “Why you should never use the Hodrick-Prescott filter”. The advice “never say never” seems appropriate here. It seems that Hamilton (2017) is promoting replacement of HP filter-based short-term forecasts for some variables and cases with a simple projection based on the most recent data, say, over the past four years. However, in estimating the “normal” level of GDP for the current and next years for calculating the OG, we are not producing a forecast for the GDP. The short-term forecasts we refer to are produced by each institution separately (using conventional practices based on a bulk of relevant data and judgement). Estimating the “normal” or “potential” GDP obviously benefits from using data from the more distant past, and in our new HP application, also from assessing the growth potential in the more distant future than just over the usual short-term GDP forecast.

the “new normal” over those years. There is no need to accept it as the only method for estimating the OGs. On the contrary, using several parallel methods may be useful for complementing the picture. The HP as a single variable method, using only the GDP series, is a viable alternative, as it is simple, relatively easily understood and does not rely on macroeconomic theories that are always controversial.

Also, the HP filter does not pretend to produce the only correct estimate on the “trend” of any variable, as the result depends on the value set by the user for a certain smoothing parameter for which there is no unique objective basis. Here, we use for our annual time series the commonly applied value of 100. It distils the short-to-medium term cycles from the possible underlying deceleration of the growth and possible long-term fluctuations extending over 19.8 years on average (Casey, 2018, 19).

While the Hodrick-Prescott filter (HP filter) developed in the 1990s was the first common method for estimating the trend of GDP, data on the stock of capital and the labour market was supplemented to estimate the reference level. The IMF and the OECD shifted to the new method, calling it the production function approach (PF) and labelling the result as “potential GDP” rather than “trend”. In 2002, the European Commission (EC) introduced its own PF estimates and gave them a dominant role, though continuing to produce also the HP estimates until today (Havik *et al.*, 2014).

The competing OG estimates have spurred quite heated controversies, as they are at the same time vitally important in designing fiscal policy and problematic to define and measure. The debate has only intensified recently, particularly due to the difficulty in judging the causes and consequences of the Great Crunch of 2008-09 and onwards.

In this paper we shall mostly work on the data on the aggregate of the 11 EU member states that formed the euro area in 1999 (EA11), adding observations on its four largest members (Germany, France, Italy and Spain) and the US.³

3. We use a fixed composition of the 11 member states to avoid any effects of new members coming in. The EA11 accounts for 96% of the GDP in the euro area (EA19) in 2017. As our real time data on the OGs will start from 2002, we could have included Greece, which became a euro member in 2001. However, as it is a special case, it is left out. Its share of the EA11's GDP peaked at around 2.5% in 2009 and it was 1.7% in 2017, so including or excluding it from our aggregate hardly affects our results. In 2017 the four largest members accounted for 79% of GDP in the EA11 and 76% of the full euro area of 19 members.

Short critical survey of previous studies on OG estimates

Deutsche Bundesbank (2014) launched a fierce attack on the OG estimates of the IMF and the OECD. It proclaimed that they are biased towards loose fiscal policy and an unintended increase in public debt and that the large retrospective revisions of these estimates disqualify their use for policy recommendations. Largely to reduce the retrospective revisions, the Bundesbank promotes an HP-filter application with a smoothing parameter of 6.25 for estimating the “trend” of GDP.

The issue of retrospective revisions of the OG estimates is most relevant, but minimising the retrospective revisions in the way that the Bundesbank proposes also reduces the OG estimates in real time by feeding into the “trend” estimate part of the cyclical movements. Thus, the purpose of identifying and measuring the cycles is partly dismissed.⁴

To avoid this, the revisions of the OG estimates should be accepted as natural consequences of their character: it is obvious that the OG for any given year will be revised even several times according to developments taking place after the year in question. One should not be surprised that even the sign of the OG sometimes changes, as the estimates are often not far from zero. This may happen especially if a major shock hits the economy. Thus, the revisions are not comparable to revisions of economic data in general, but they provide interesting information about what was in real time understood to be normal and what then happened.

Mc Morrow *et al.* (2015) complement the Bundesbank analysis by assessing also the performance of both PF and HP estimates published regularly by the EC, as these were not covered by the Bundesbank. They conclude that the EU's PF method has performed better than the HP filter and the PF estimates by the IMF and the OECD.

Mc Morrow *et al.* (2015) discredit the HP method referring, especially to its poor performance in the estimates of the EC for the HP trend of GDP in spring and autumn 2009. Their judgement turns out to be dubious, caused by failed mechanical statistical procedures in dealing with the well-known end-of-the-sample bias in the HP estimates: the HP formula gives a high weight to the latest observations of the original data series, which tends to bend the end of the estimated

4. The graphs in the Technical appendix of Oksanen (2018, 29) illustrate that the value of 100 for the smoothing parameter applied on the GDP series seems a reasonable presumption as compared to the value of 6.25 promoted by Deutsche Bundesbank (2014).

HP-filtered trend upwards or downwards depending on the latest data. As the main interest is usually exactly in those years, i.e. in the current conditions and one-to-two years ahead, the statisticians have attempted to find operational solutions to deal with this. However, no mechanical solution would work well in all cases. The HP estimates of the EC in the year 2009, when the direness of the economic situation had emerged, turn out to be one such failed case, as the swings in the HP-based OG estimates by the EC in spring and autumn 2009 were in the mechanically produced extensions of the GDP forecasts rather than by the HP method itself (shown in the graphs in Oksanen, 2018, 31). Noting this, we can conclude that the HP filter can produce useful results when used carefully.

Several recent studies also compare the merits of the parallel and often competing estimates for the OG in terms of their stability in the short term and proneness to revisions when the economies progress. For example, Busse (2016) and Kuusi (2017) investigate the impacts of the revisions of the output gaps and cyclically adjusted budget balances under the fiscal framework in the EU. Also, recent IMF Working papers on improving the estimates for potential output and OG (Blagrove *et al.*, 2015, and Alich, 2015) develop improvements to their PF methodology.

Practically all studies conclude that the OG estimates are indispensable for policy making—distinguishing the cycle from the trend (and identifying any specific factors) is both important and not straightforward. First, it is useful to admit that before the Great Crunch of 2008-09, the OG estimates used in policy making failed to guide policies to dampen the boom. Second, the retrospective revisions of the OG estimates for 2006-2013 are not an adequate reason to abandon them altogether. Instead, all the competing OG estimates should be looked at constructively, though critically.

Purpose, scope and outline of the present paper

The motivation of the present paper is that there is scope for improvement. While no perfect method will appear, we shall present new OG estimates produced with a new application of the HP filter. Special emphasis is given to the transparency and simplicity of the method so that the results can be understood also by non-experts and policy makers.

In Section 1 we present our new real-time estimates for the OGs based on the HP-filtered trend of GDP. “Real time” means here that we use the data and short-term forecasts available at the time. We focus on the estimates for the current year and the next. Our results are then compared to the estimates published by the EC, IMF and OECD in the context of their regular forecasts over the period 2002-2017.⁵

The novel idea in the present application is to make explicit that the estimates for the trend GDP and the OG for the current year and the next will always depend on the assumed path of the GDP in the consecutive years.

In Section 2 we shall discuss the main use of OG estimates for policy design, which is to separate the cyclical and structural components of government budget balances. Especially their projections based on planned fiscal policies obtain pivotal importance under the (complex) fiscal policy rules for the euro area (*Vade Mecum on the Stability and Growth Pact*, European Commission, 2017a). In this context we present the data on the retrospective revisions of the OG estimates and the real-time and retrospective estimates for the “new normal” level of GDP after the Great Crunch, covering the estimates of the three institutions as well as those based on our new HP trend estimates.

We are not interested in the OG estimates only for their descriptive usefulness, but also for their use in policy making, recognising an important simultaneity: the policies shape the economies and thereby affect the revisions of the OG estimates, and not only exogenous factors. This is the topic in Section 3. Regarding recent history, the question is to what extent were the policies responsible for the further fall in GDP in 2012-13 in the euro area and hence for the revisions to the OG estimates. We shall discuss the conflicting views on this, highlighting the evidence of the persistent pro-cyclicality of fiscal policy in the euro area.

In Section 4 we discuss two examples of the new OG estimates used as indicators of the cyclical position of the economy and in policy design. First, they can be used for designing a simple smoothing mech-

5. The data set required to perform these tasks is quite large: it contains all the forecasting vintages of the EC in 2002-2017 gathered from the original sources and made freely available by the FIRSTRUN (Fiscal Rules and Strategies under Externalities and Uncertainties) project; it contains data by EU member for several macroeconomic indicators, and the historical data goes back to 1960. We do not use all indicators but mainly those for the GDP, estimates of the potential GDP and the trend estimated by their HP application (and the implied OGs), the various budget balance indicators, etc. Similar data covering the real-time estimates by the IMF and the OECD are downloaded from their respective freely available data banks.

anism for country-specific asymmetric shocks, proposed by Oksanen (2016a), and second, the approach can be used for assessing a possible significant permanent downturn in GDP growth, supplementing the analysis of the consequences of the Great Crunch of 2008-09.

Section 5 gives a summary and concludes the paper.

1. New OG estimates generated by the HP method

1.1. Real-time OG estimates for the EA11 and others

The new OG estimates are the deviations of the observed (and forecast) data from a HP-filtered trend of GDP, which is derived using our new application: the GDP series as an object is based on the real-time data on GDP, including its short-term forecast by the respective institution (for the EA11 by the EC; for the US by the IMF) and its extension to future years. The extension is composed as follows: (1) the official forecasts of the respective institution for the current and coming years (t and $t+1$) are taken as given, (2) an *assumption* for the *underlying* long-term rate of GDP growth from year $t+2$ onwards is injected, and (3) the GDP from year $t+2$ onwards is additionally set to adjust so that the OG estimated for year $t+1$ will fade away by year $t+5$. Here, like in what follows, we only give the principles of constructing the new HP trend estimates and advise the reader to refer to the Technical appendix in Oksanen (2018).

The assumption on the future GDP is vital in our application. It is one source for tracking the revisions of the OG estimates afterwards: the OG will be revised due to the deviation of GDP from its previously assumed long-term path. Extending the GDP series into the future also allows us to cope with the possible end-point bias in the HP-filter applications. As the assumed underlying future growth is set by the user, any number of alternative results can be generated.

For the baseline, the underlying long-term growth rates for the EA11 countries are roughly based on the work of the Ageing Working Group (AWG) in the EU. In the AWG reports 2001, 2006 and 2009, the rough figure for EA11 GDP long-term growth was 1.5% pa. In the report 2012 it was lowered to 1.3%.⁶ As the views of long-term growth

6. This coincides also with the projection by Mc Morrow *et al.* (2016, Table 1), who produce a no-policy-change medium-term projection for 2015-2024 of 1.3% average growth for euro area GDP, based on the negative fallout from the financial crisis and the emerging drag on growth emanating from ageing populations.

obviously started to change earlier, we set the figure at 1.4% for our calculations for 2010 spring and autumn forecasting vintages, and 1.3% from autumn 2011 onwards (the assumptions of the AWG report 2012 were published in 2011). For the four largest countries, the growth assumptions are similarly based on the country-specific assumptions in the AWG reports.

The assumption that the OG in year $t+1$ closes by year $t+5$ follows the conventional practice in the AWG work and elsewhere where long-term projections are constructed and used.

The GDP data used starts from 1960, and the extended data runs until 2040, long enough to feed into the calculation the assumed underlying growth rate in future. For estimating the HP-filtered trends, we use logarithmic series (as the GDP series normally grow exponentially) and 100 as the HP smoothing parameter, which is a conventional practice with macroeconomic annual data.

The new results are based on real-time data from the forecasting rounds over 2002-2017. They are then compared to the real-time OG estimates published by the three institutions (EC, IMF and OECD) for the EA11. Additional results for the US and the four largest member states in the EA are found in Oksanen (2018, 33-34). All autumn forecasting vintages over 2002-2017 are treated, together with the spring forecasting vintages over 2007-2010 (to cover the developments before and right after the crisis in more detail).

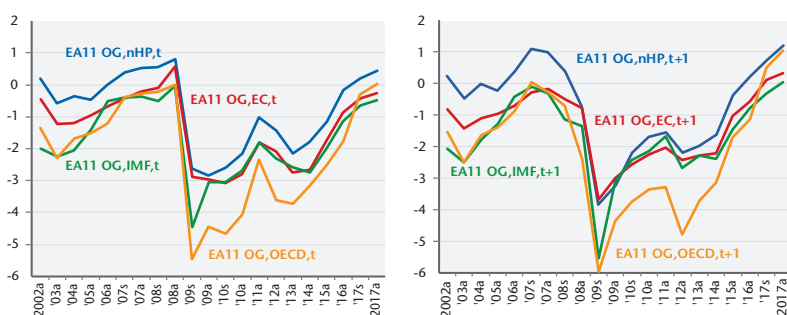
Figure 1 gives a broad picture, displaying the real-time OGs for the EA11 for the current year (t) generated by the new HP (nHP) method and those of the EC, IMF and OECD, and the corresponding results for the following year ($t+1$) in each case.

The charts show that, with one single exception, the real-time OG estimates of the three institutions were clearly negative or zero throughout the whole period 2002-2016. The only exception was the estimate (+0.6%) by the EC in autumn 2008 for 2008, and even in that case the forecast for the following year was a negative OG.

The OG estimates of the IMF and the OECD until 2009 are quite close to each other, and the EC estimate is also practically identical for 2006-2008, i.e. during the boom that was recognised only afterwards. After 2009 the estimates by the OECD are clearly the most negative ones, while those by the IMF and the EC are close to each other.

Our new HP estimates show slightly positive OGs for the boom period 2006-2008. They are consistently higher than any of the three estimates, but their average is also negative over the whole period since 2002. By construction, the average of the HP estimates should be close to zero if the period is sufficiently long and the fluctuations are reasonably regular. This is not the case here, as an exceptional crisis occurred (2009), followed by another fall in output (2012-13). Thus, our new HP method also produces a negative average for 2002-2016.

Figure 1. Output gap estimates for EA11 in real time forecasting vintages 2002-2017 for the current year (t) and for the next year (t+1)



Legend: OG = output gap; a = autumn forecast, s = spring forecast. nHP = new HP-based estimate based on real time data from the EC including forecasts for t+1; EC = European Commission OG estimate, IMF and OECD refer to their OG estimates, respectively.

The Great Crunch of 2008-09 is the most interesting episode. All real time estimates recognised it in spring 2009, including our new HP-based estimate. The change from earlier estimates was dramatic, the most negative OGs being presented by the IMF and the OECD.

Comparing our new OG estimates and those by the three institutions we need to note that the differences always come both from the differences in the estimates of the potential GDP and of the forecast for the GDP itself. It turns out that the more negative OGs by the IMF and the OECD partly stemmed from their more pessimistic GDP forecasts for 2009, which were subsequently revised upwards, while the not-so-negative OG estimate by the EC for 2009 partly reflects its comparable low estimate of the potential GDP (in the middle of the crisis), which was later revised upwards.

The large data published by the institutions together with our new estimates can be used for showing how the potential GDP estimated by the institutions and our new HP trend estimates developed over the

Great Crunch, from autumn 2007 to autumn 2013 and further to autumn 2017. These data provide an ample source for history writing as the real time data formed an important basis for economic policy. Omitting the details that can be found in the graphs in Oksanen (2018), a short summary is presented below.

In spring 2009 the downward revision for the potential GDP by the EC were significantly larger than in our nHP estimates or those of the IMF and OECD. The IMF followed with a significant revision in autumn 2009 and delivered the lowest estimates of all. The OECD kept its potential GDP estimates flat in 2009 and still in autumn 2013 its projection for potential GDP was higher than those of the other institutions. Only by the projections in autumn 2017 did its view converge to those of the others.

Our nHP-trend estimate in autumn 2017 for 2017 is a good one percentage point lower than the other three, consistently with its regular pattern.

The OG estimates for the four largest euro area countries show broadly the same patterns as for the EA11. For Germany the estimates of the institutions were mostly positive in 2007-08, but for all the other three countries almost consistently negative or zero, with the exception of the EC estimate in autumn 2008 for 2008. Their estimates for Spain were practically zero or negative throughout the boom 2005-07 while the new HP estimates are clearly positive (the issues concerning not identifying the boom in Spain in real time are not covered here).

The corresponding data for the US shows equally interesting developments over the Great Crunch. The steady growth of the US GDP from 2010 onwards, unlike the second recession occurring in the EA11, is reflected in the real time estimates and especially in their retroactive revisions (Oksanen, 2018).

1.2. Summary comparison of the real time OG estimates

We noted above that the real time OG estimates of the three institutions have been almost always negative for the EA11. There can be justified reasons for this. For example, as the OECD puts it, one of the factors behind their estimate for the unemployment gap is that the estimated equilibrium level of unemployment depends on the inflation rate (and expectations thereof). It is plausible that most of the time since 2002 unemployment has exceeded this reference level and therefore this factor tends to keep their estimate for the OG below zero. The

question nevertheless arises whether an OG estimate that is almost always negative can be interpreted as depicting a cycle; in ordinary language a cycle means that a variable fluctuates around its cyclically corrected level.

If we corrected the various OG estimates for the level over the whole period on average, the picture each of them would give of the fluctuations would not differ dramatically. Noting this, our new HP estimates have several merits. They are simple to be composed and explained, including the meanings of the relatively small number of assumptions put on top of the GDP data, and the sensitivity of the results using alternative assumptions can be easily worked out. This compares well with the PF estimates, which are based on numerous underlying assumptions, making them more complicated and less transparent.

The retroactive revisions of the OG estimates is a separate matter, significantly affected by developments after any given year. In several previous studies those revisions have been used for assessing the relative merits of the competing OG estimates. The adequacy and reasonability of those assessments is appropriate to be discussed in the context of the use of the OG estimates in policy design. This is where we turn next.

2. Using the OGs and structural balances for policy: a critical view

The primary use of the OGs is to identify the cyclical and structural components of government balances in each conjuncture. This is a centrepiece of fiscal policy making, originating from the work at the OECD since the early 1990s and fully rooted in the regular reports on all countries by all the three institutions (see Mourre *et al.*, 2014, for references).

The standard procedure is to estimate the cyclical component of the government budget balance by multiplying the estimated OG by the semi-elasticity of the budget balance (defined as the effect of movements in the GDP on the budget balance as a percentage of GDP). The latest estimate for the semi-elasticity for the EU countries is 0.50 for the EU on average, ranging from 0.31 to 0.65 across member states (Mourre *et al.*, 2014, 6). Removing the cyclical component gives the cyclically adjusted balance and subtracting one-off and temporary components gives the structural balance.

2.1. Use of structural balances in euro area policy making

The structural balances have gained a pivotal role in the fiscal policy rules for the euro area, explained in the most recent edition of the *Vade Mecum on the Stability and Growth Pact* (European Commission, 2017a, where presentation of the rules requires 224 pages).

The rules have become quite complex especially after the Great Crunch. The original Stability and Growth Pact (SGP) of 1997 focussed on the headline budget balances, but it became obvious that to be able to set sensible fiscal policy targets, the cyclical component had to be acknowledged.

As our new OG real time estimates for the period 2002-2017 are on average one percentage point higher than the ones by the three institutions, the cyclical components would be roughly 0.5 percentage points higher and the estimates for the structural balances correspondingly lower. These are the rough numbers over the whole period on average, while the corresponding figures for the differences in the OGs for the subperiods and institutions vary roughly between 0.3 and 1.8 percentage points.

Here, we do not enter into more detailed comparisons of the figures. Instead, the conceptual basis of the budget balance estimates should be clarified, questioning their usefulness and accuracy for policy design.

2.2. How to define a cyclical component in government balances?

What should we mean by the cyclical component of the budget balance? Consider a thought experiment: assume an economy in equilibrium is hit by an exogenous factor which moves cyclically; assume then that the government pursues a fiscal policy that completely eliminates the effect on the GDP; this means that the OG remains at zero through the whole cycle; obviously, the budget balance first moves in one direction and then in the other, and at the end of the cycle the equilibrium is restored. The problem is that according to the standard definition the cyclical component of the estimated budget balance is zero throughout, following from the zero OG over the whole cycle. Obviously, this does not make sense. It would be more reasonable to say that all the variation in the budget balance was cyclical as it stemmed from the specific joint effect of the exogenous cyclical factor and the countercyclical policy pursued.

This extreme example expresses a terminological conundrum. A more general concern is that the standard definitions of cyclical and structural components in government budgets ignore the effects of changes in fiscal policy on the GDP and via that to the measured OGs that are used to define and measure the cyclical components. The loop from fiscal policy to the GDP and further to the OG is missing, even though the existence of this loop is a core part of conventional economics.

2.3. Ex post revisions of the OG estimates obscuring policy

Additionally, we should recognise that the structural balance is not a reliable indicator of discrete policy actions because they are regularly changed afterwards as new data come in, leading to revision of the cyclical and structural components in government balances. Logically, a measure of a discrete policy action at any given time should not depend, even in retrospect, on what happened in the economy afterwards. The structural balance (or its change) does not fulfil this logic.

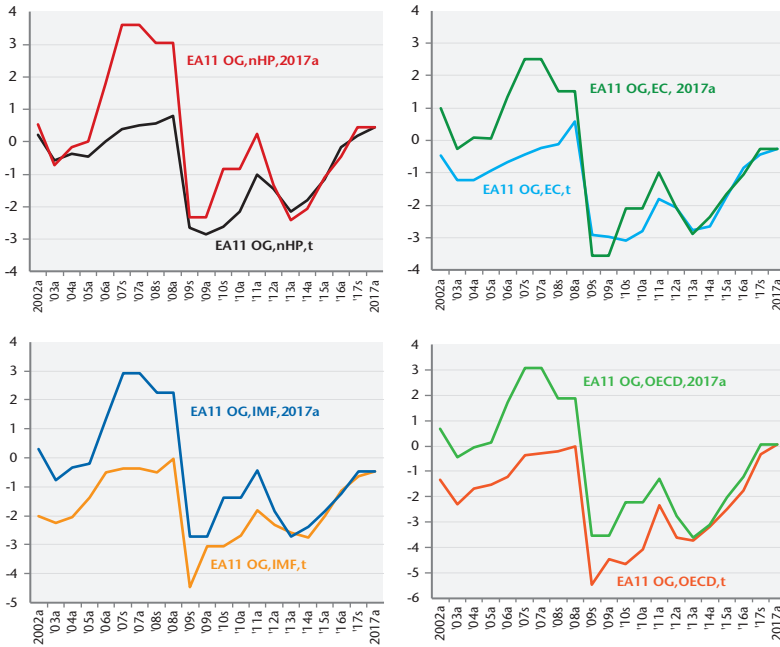
Anyway, as the structural balances are used in policy and as their revisions are directly derived from the revisions of the OG estimates, we next look at them.

Figure 2 presents the OG estimates for the EA11 for each year (t) in real time and ex post, the latter being the retrospective estimate from the data in autumn 2017. It shows that the revisions of all the OG estimates over the period 2002-2017 were indeed significant and roughly of the same magnitude (though on average greatest for the OECD). The largest revisions concern the years 2006-2008 in all of them.⁷

Our new HP estimates have the advantage that, by their construction, the main factors behind the revisions can be relatively easily tracked to the deviation of what happened to GDP growth since 2006 compared to the underlying growth rate assumed in 2006-07 when the real-time nHP estimates were calculated. The assumption on future growth in estimating our new HP trend for the EA11 was 1.5% until 2009. As the average 10-year growth fell to 0.6% by 2017, a significant retroactive revision of the OG estimates followed.

7. As we are focussing on the OG estimates for the current and next year, we should remember that the revisions come partly from replacing the forecasts for the GDP by their outcomes. However, the revisions in the OG estimates mainly stem from their intrinsic nature as measures of the cyclical phase. This is not a matter of updating the GDP data for each year, but results from what happened in the economy several years afterwards.

Figure 2. Output gap estimates for the EA11 in real time for the current year (t) and corresponding estimates in autumn 2017; new HP estimates and by institutions (European Commission, IMF and OECD)



Legend: nHP OG = new HP output gap estimate; a = autumn forecast, s = spring forecast. EC (=European Commission), IMF and OECD refer to their OG estimates, respectively.

Tracking the sources of revisions of the PF-based OG estimates of the three institutions would require going into the details of their estimation methods and parameters, including changes in them during the period investigated (as the estimates have been modified to improve their accuracy). As in almost all the previous literature, this major task is beyond the scope of the present paper.⁸

3. Did policies cause the further fall in EA11 GDP in 2012-13 and hence the revisions to the OG estimates?

As noted, the OGs for any given year, no matter how they are estimated, will always be revised retroactively. This happens irrespective of

8. Turner *et al.* (2014) study the various sources of the changes in the OECD estimates for potential output. Revisions of the OG estimates for the US and the four largest euro area countries are shown in Oksanen (2018, 39-41).

the causes of the new developments, but most importantly, the new developments include also the policies pursued and their effects, which can be significant and should in any case be of special interest for assessing those policies.

The recent Great Crunch and subsequent years is a most important episode for a study of fiscal indicators, notably the OGs. The key question is as to what extent the fall in EA11 GDP in 2012-13, which then came to be the major reason for the retroactive revisions of the OGs, was caused by fiscal policy itself.

3.1. Fiscal policy in the euro area after the Great Crunch

The crisis in 2009 was first followed by counter-cyclical fiscal policy as a combination of automatic stabilisers and discrete actions, but from 2011 onwards policy was strongly tightened (as confirmed by several sets of data, including those on discretionary fiscal measures published by the EC and Carnot and de Castro, 2015a and b, presented and reproduced in Oksanen, 2018, 43). A number of leading economists writing in Baldwin *et al.* (2015, 10-11) observe that “[T]he Eurozone as a whole saw its 2010 primary [balance] move from about minus €350 billion in 2010 to €10 billion in 2014. This was a massive contractionary shock—equal to 4 percentage points of the monetary union’s economy.” They consider that this triggered the fall in euro area GDP in 2012-13. Despite this, aggregate government deficits in the EA11 were cut over this period, while the US was growing at a rate of more than two percent in 2010-15, which was helped by running twice as large fiscal deficits as in the EA11 over 2011-14 (and in fact already in 2008-10).

The wide consensus that tight fiscal policy in the euro area in 2011-13 was harmful was later adopted also by the European Commission (2016, 2), although it added that this was at least partly inevitable as “many Member States engaged in fiscal consolidation to preserve their access to the markets at the height of the sovereign debt crisis”. This latter view is not the full picture. Baldwin and Giavazzi (2015, 47-48) showed that policy was strongly tightened also in countries that had access to the markets, with Germany’s share of tightening being more than its relative share in the euro area. In spring 2010, Germany’s government deficit was forecast at 5.0% of GDP, and it was pressed to zero by 2012 and subsequently to a surplus.

The reasons for fiscal tightness in 2011-13 are many, but from the angle of the OG estimates the short-term GDP forecasts are most relevant. They depend on a host of factors, including fiscal multipliers, i.e.

the effect of fiscal policy on GDP, perceived by the forecasters. The importance of the perceived fiscal multipliers was brought into discussion at the time by the IMF in its autumn 2012 forecasts, where it presented evidence that, early in the crisis, for the advanced economies, the multipliers were substantially underestimated. This meant that the planned fiscal consolidation led to GDP that was lower than expected by forecasters. This conclusion applied the most strongly to forecasts by the IMF itself and to a slightly lesser extent to those by the EC (Blanchard and Leigh, 2013; Mody, 2018, 371-3; Tooze, 2018, 429-30).

Later, Fatás and Summers (2018) contested the advisability of fiscal consolidation in the circumstances after the Great Crunch of 2008-09. According to them, consolidation was self-defeating, i.e. it did not decrease the deficits at all in most countries but caused a prolonged recession.⁹

3.2. Role of the OGs in designing fiscal policy

We should admit that our new HP estimates would not have revealed the strength of the boom before the Great Crash much better than the others: our new real-time OGs for those years are slightly less than one percentage point above zero. It is prudent to say that the factors behind the strength of the unsustainable boom were such that no foreseeable improvements to the OG estimation methods would convincingly prevent the repetition of the same ignorance in future.

Our discussion above of the underlying causes of the retroactive revisions of the OGs leads to the conclusion that the revisions do not necessarily disprove the use of the real-time OG estimates for policy. However, we should not underestimate the problems with the uncertainty of their level and changes from one year to the next. This uncertainty is demonstrated by the differences between the estimates from our four different sources (our nHP-based estimates and those from the three institutions), which feeds into the uncertainty of the structural balance estimates. Broadly expressed, those estimates then

9. For assessing their result correctly, we should note that the observed decrease in the deficit over the period 2011-2015 in the euro area (and elsewhere) does not disprove their conclusion. Instead, a plausible explanation is that other factors gradually turned supportive to growth and compensated for the negative effects of the fiscal consolidations (for a survey of estimates of the fiscal multipliers, see also Carreras *et al.*, 2016).

often vary in the range of \pm half a percentage point (ignoring here the much larger difference in the forecasting vintages of the year 2009).

For this reason, we should conclude that whatever improvements one could try and achieve, the accuracy of the rules set in the *Vade Mecum on the Stability and Growth Pact* (European Commission, 2017a) is an illusion. Also Busse (2016, 30-31), based on his detailed analysis of the revisions in the EC estimates for the OGs and the implied cyclically adjusted balances, considers that the errors may lead to ill-fitting policy advice and unwarranted sanctions. He adds, nevertheless, that the SGP, thanks to its political flexibility, is faring quite well in dealing with the uncertainty and revisions.

Busse's latter conclusion looks carefully balanced, but a critical eye on the complexity of the fiscal rules is still warranted. After all, is it appropriate that the rule book has become so detailed and thick, but still has to be implemented with political discretion to make sense economically? Political discretion always triggers disputes and deteriorates the reputation of all the actors as well as the rules themselves, as compromises always look bad from one angle or another. The complexity also poses a challenge to democratic decision making, as no finance minister should even try and explain them in front of their parliaments.

4. Possible use of the new OG estimates

The critical comments on using all OG estimates for measuring the structural balances apply also to the new OG estimates presented here. Therefore, they are not promoted here as substitutes for the OG estimates currently produced by the institutions (and governments) and used in fiscal policy under the current euro area rules. However, as the new OG estimates give new useful insights into the cyclical position of the economy, they can be useful in several other ways in policy design.

4.1. Proposals for smoothing asymmetric shocks

Competing views on the need and possible means for smoothing country-specific asymmetric shocks have been proposed since the very start of planning the single currency for the EU. The US was always used as the reference, with an eye on different mechanisms dampening asymmetric developments across the US states (Oksanen, 2016a). Alcidi and Thirion (2017) summarise the studies, benefitting from the recent data covering the changes in dynamics after 2008.

One key finding is that in the US smoothing is larger than in the euro area mainly due to capital market integration, especially cross-ownership of capital across the states. The other is that, in the euro area, the smoothing effect *via* the government budgets is normally larger than inter-state fiscal transfers in the US federal budget (noting, in addition, that the state budgets in the US do not contribute to it due to the common balanced budget requirement). However, smoothing worked in the euro area in normal circumstance, while all smoothing practically ceased since 2010 in the periphery (Alcidi and Thirion, 2017, 15) as the Great Crunch turned into a fiscal crisis.

Proposals for smoothing mechanisms remained subdued for the first decade of the euro, but several initiatives have been presented recently (European Commission, 2017b, 8, 12; Bénassy-Quéré *et al.*, 2018, 14-16; Andor *et al.*, 2018). Without going into detail on each of them, several problems are faced: tackling only large asymmetric shocks limits their effectiveness; using unemployment as a key indicator is problematic as it is a lagged indicator of exogenous shocks; conditionality to compliance with other schemes and rules (which can be controversial) easily leads to disputes over implementing them; even though it is declared that they should not lead to permanent redistribution, this is far from being assured.

This topic is relevant here, as Oksanen (2016a) proposed an alternative scheme where payments in and paybacks depend on the relative OGs of the member states, being, for example, proportional to half of the percentage deviation of each member state's OG from the euro area average. Importantly, his proposal contains a rule that after an agreed period, say seven years, the net balances are recorded and netted out in constant instalments over the subsequent seven-year period. This would make sure that permanent redistribution would not emerge.

Oksanen (2016a) illustrated his proposal with historical data based on OG estimates by the EC. He considered that improving the real-time OG estimates would be advisable, though not indispensable for starting the new scheme as the details could be improved afterwards. Now, it seems that using the nHP OG estimates seems encouraging, as for the two opposite countries, Germany and Spain, these would have worked better than the EC estimates before the crisis (Oksanen, 2018, 43-44).

The proposed mechanism requires only a light administration. It would dampen the asymmetric shocks to an extent comparable to the US federal budget. Being non-distributive, this would leave redistribution to policy areas that are specifically tailored for it, including by limiting their size.

4.2. Illustration of the OGs if growth falls significantly

The novel feature of our new HP application is that it makes it explicit that the prescription of the current state of the economy takes into account the perspective of GDP growth in the long term. The latter is not known by anybody, but it is useful to work on freely varied assumptions and produce alternative scenarios. As an illustration, imagine that currently, based on the forecast in autumn 2017, it is perceived that long-term growth will soon go persistently to zero. The relevance of this simple vision could be argued on several grounds, not to be discussed further here.

Assuming zero for the underlying growth in the EA11 from 2018 onwards gives the result that the nHP OG estimate for 2018 would be +3.3%, which is considerably higher than the baseline result +1.2% (which is based on 1.3% growth) and the OG estimate +0.3% of the EC in autumn 2017. And it is almost exactly equal to the retroactive estimate for 2007, the peak of the overheated boom before the Great Crunch (shown graphically in Oksanen, 2018, 45).

The high OG for 2018 produced by this thought experiment does not imply that fiscal policy should be immediately tightened. However, the new dramatic result could serve as a wake-up call for thinking seriously about long-term challenges and the required policy responses (some key elements are discussed in Oksanen, 2016b, 385-387; and Oksanen, 2018, 16-19).

5. Summary and conclusions

We have presented here new output gap (OG) estimates based on a simple statistical method, the Hodrick-Prescott (HP) filter, to distinguish the cycle from a possible change in the trend of GDP.

We showed that the HP-based estimates have often been criticised on inadequate grounds. Using the method carefully can distinguish the cycle from changes in the trend in a way that compares well with the

results of other methods. A clear advantage of the HP method is that it is simple, based only on one single-time series, GDP. As the method is simple, the results and their limitations can be easily understood also by non-experts.

The contribution here is to present a new application of the HP filter, where we insert an explicit link to the view about the economy's underlying growth in future. This does not complicate the method unduly, but it is useful in two ways. First, it links the analysis to the question of what might be happening with respect to long-term growth prospects, allowing alternative assumptions on it; this question is encountered continually, especially when a major shock hits the economy. Second, it is obvious under all OG estimation methods that the phase of the cycle always depends not only on the current situation (supplemented by the short-term forecast) and the past, but also on changes further on in the future. Our new method makes this explicit. This helps us to understand that the results are always based on assumptions on unknowns and should therefore be treated with care and caution.

The same warning is valid also for the OG estimates regularly produced and published by the three main institutions, the European Commission (EC), IMF and OECD. Even if they are based on extensive data and more complicated theories of economic behaviour and markets, this does not make them more reliable than our simple HP estimates.

The OGs are an important input for designing policies, primarily but not only fiscal policy. They are of pivotal importance in the rule book of the euro area (and the EU as a whole) and underlie important procedures in the joint decision making.

The problem with the OGs produced in all the three institutions, the EC, IMF and OECD, is that their estimation methods are liable to criticism on several grounds. Some of the criticism is well-founded, like pointing out that the real-time OGs have been negative almost without exception. This has triggered doubt that this might have caused a bias towards increased public debt. Not taking a definite position on this possible causality, we consider that there is at least a terminological problem, as in ordinary language a cycle refers to fluctuations on both sides of a specified benchmark for which the average over a long enough period is a natural first choice. This is what the HP filter by its construction brings to the picture.

As the retrospective revisions in the OG estimates have been widely used as a criterion of their reliability, we emphasise that the revisions do not necessarily indicate weaknesses in their construction. The recent history before and after the Great Crunch of 2008-09 is a case in point. The revisions of all the OG estimates, extending backwards to 2002, were the consequence of the fall in EA11 GDP not only in 2009 but also in 2012-13.

The present paper remains critical towards using the OG estimates—old and new—for deriving the structural balances in government budgets and conducting fiscal and other policies based on them. However, the OG estimates based on the forward-looking HP filter can be useful in identifying and measuring the state of the economy and they give new elements for designing policies and adjustment schemes.

One example is to use the new OG estimates in designing a scheme for smoothing country-specific asymmetric shocks in the monetary union, an old topic that has emerged again after the Great Crunch. The reform proposals presented so far encounter several problems. They are not effective for smoothing and, most seriously, they fuel suspicion that they would lead to large permanent transfers, and thereby nourish mistrust and disputes. A quasi-automatic transfer mechanism based on relative OGs proposed here could be more efficient and help smoothing both large and small asymmetric shocks. The proposal contains a provision for reviewing the net transfers periodically so that no permanent transfers would take place.

Another broad contribution of the new HP filter presented here is that it allows for deriving new OG estimates that can reflect a wide range of views about future long-term growth prospects. This can be helpful for recognising the risks of permanent changes that are not incorporated in past data and short-term forecasts. This is useful for tackling in a constructive manner the long-term sustainability of public finances.

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EURO AREA MACROECONOMICS WHERE DO WE STAND 20 YEARS LATER?¹

Catherine Mathieu and Henri Sterdyniak

Sciences Po, OFCE

For almost 20 years, euro area countries have been sharing a single currency. The drawbacks of the euro area framework were highlighted by the widening of imbalances prior to the 2007 financial crisis, and thereafter by the huge impact of the financial crisis, the public debt crisis in Southern European countries, and the Great Recession. Prior to and after the crisis, EU institutions and Member States (MS) have not been able to implement either a common economic strategy or satisfactory economic policy coordination.

This led neither to a bursting of the euro area, nor to a substantial change in its functioning. Euro area institutions were adapted, through the European Stability Mechanism, the Fiscal Treaty, the “first semester”, the European Central Bank’s support to MS, and the banking union. These adaptations were painful.

In mid-2018, the economic situation had clearly improved at the euro area level. However, the following question remains unsolved: can the functioning of the euro area be improved, accounting for divergent situations, interests and views in MS?

The paper recalls proposals from EU institutions and from MS. We present and discuss a number of proposals made by economists to improve the euro area policy framework: relying on financial markets to control domestic economic policies, introducing a euro area budget and a minister of finance, moving towards a federal EU with increased democracy, and last, improving economic policy coordination.

Keywords: Fiscal policy, policy coordination, EMU governance

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For almost 20 years, euro area countries have been sharing a single currency. The drawbacks of the euro area framework were highlighted by the widening of imbalances prior to the 2008 financial crisis, and thereafter by the huge impact of the financial crisis, the sovereign debt crisis in Southern European countries, and the Great Recession. Prior to and after the crisis, EU institutions and Member States (MS) were not able to implement either a common economic strategy or satisfactory economic policy coordination (see, for instance, Mathieu and Sterdyniak, 2014).

This led neither to a break-up of the euro area, nor to a substantial change in its functioning. Euro area institutions were adapted, through the European Stability Mechanism (ESM), the Fiscal Compact (TCSG), the “European semester”, the European Central Bank’s (ECB) support to MS, and the banking union. These adaptations were painful: Southern MS public debt remained under the threat of speculation for a long time period; economic recovery was delayed by the fiscal austerity recommended or requested by EU authorities; and several MS were placed under surveillance. Greece is still in a difficult situation. This is also the case to a lesser extent for Italy.

In 2018, the economic situation had clearly improved at the euro area level: euro area GDP grew by 2.7% in the last quarter of 2017 on a year-on-year basis, but GDP grew on average by a mere 0.6% per year from 2007 to 2017 (against 2.3% per year in the previous decade). The unemployment rate hit 7.8% in December 2018 (against 7.3% in early 2008, but 12.2% in early 2013). The scars of the crisis remain: unemployment rates are still elevated, especially in Greece (+11 percentage points as compared to 2007), Spain (+6 percentage points), and Italy (+4.5 percentage points); public debts have risen sharply; income inequalities and precariousness have risen in many countries; and many countries (France and the Southern countries) are suffering from de-industrialisation.

Can the functioning of the euro area be improved, accounting for divergent situations, interests and views among MS? Section 1 recalls proposals from EU institutions and from MS. Section 2 presents and discusses several proposals made by economists to improve the euro area policy framework. Some economists rely on financial markets to control domestic economic policies, some are in favour of the introduction of both a euro zone budget and a minister of finance, some are in

favour of moving towards a federal EU with increased democracy, and last, some advocate better economic policy coordination.

1. Projects from EU institutions and from Member States

EU Treaties and reforms implemented since the crisis have led to a complicated and unsatisfactory euro area architecture. Euro area economic policy is run by the ECB, a federal institution, by the European Commission (which deals with the whole EU), by the Euro zone Council and the Eurogroup (two informal intergovernmental bodies), by the European Council and the Council of the European Union (two intergovernmental bodies involving non-euro area countries), by the European Parliament (democratically elected, but at the EU level, and with limited powers), by the Fiscal Pact and the ESM (which result from inter-governmental treaties) and, when needed to help and supervise MS in difficulty, by the quartet of the European Commission, the ECB, the IMF and the ESM. The main decisions are made through agreements between the European Commission and MS, without any real democratic debate.

This framework, the financial crisis and the Great Recession, followed by the debt crisis in Southern economies, have initiated numerous project reforms of the EMU, by EU institutions, MS, policy makers and academics. Projects emanating from EU institutions generally tend to increase their powers. They face reluctance from MS, who wish to keep their powers and autonomies: Northern MS reject any increases in EU transfers; smaller countries wish to keep their specificity, and refuse the hegemony of larger MS. EU institutions generally tend to place MS under surveillance as concerns macroeconomic management or structural reforms, which comes into contradiction with domestic democratic sovereignty, as can be seen from the Greek crisis or Brexit. Besides, EU institutions do neither want to question the Stability and Growth Pact and the Fiscal Compact, nor the absence of explicit coordination between fiscal and monetary policies.

1.1. Towards a deep and genuine economic and monetary union?

Several texts by EU institutions (EC, 2012, Van Rompuy *et al.*, 2012, Juncker *et al.*, 2015) suggest substantial steps towards more federalism:

- “All major economic and fiscal policy choices by a MS should be subject to deeper coordination, endorsement and surveillance

process at the EU level". The possibility of different economic or social strategies is not accounted for.

- The need for strengthened fiscal discipline is reasserted, together with the need for *ex ante* fiscal policy coordination. But, with the Fiscal Compact requesting fiscal policies to be run in automatic mode, how coordination could be implemented is unclear.
- The Commission wishes to be entitled to oblige an MS to revise its budget plans or to modify its budget implementation and to be entitled to halt EU payments to MS that do not take the corrective action requested by the Commission.
- Short-term government borrowing could be mutualised under the auspices of a European Treasury. But as MS have no problem to borrow in the short-term, they cannot agree to lose this freedom.
- The "euro area should have a fiscal capacity to absorb asymmetric shocks". Specific discretionary policies should be raised at the EU level. This is an awkward suggestion, once MS have been deprived of their ability to implement discretionary fiscal policies. But MS cannot accept to lose entirely their fiscal autonomy.
- "An insurance mechanism aiming to absorb specific shocks could be settled within euro area MS, based on output gaps or unemployment insurance schemes. However, transfers should be temporary, each MS would be alternatively beneficiaries or contributors from time to time. This mechanism should neither introduce moral hazard, nor reduce incentives to implement structural reforms".
- The macroeconomic imbalance procedure should become more binding and would recommend structural reforms and also tackle the case of MS with excessive surpluses.
- A new convergence and competitiveness instrument (CCI) should be introduced in the EMU. MS would sign an agreement with the EU, committing to implement structural reforms, which would allow them to benefit from a financial reward or from indulgence for their fiscal deficits.
- "[MS] need flexible economies, yet relative price adjustment will never occur as quickly as exchange rate adjustments. Financial markets prevent MS to use the fiscal tool. So, euro area countries need to pool private risks via the banking and financial union. In the medium term, when economic structures have converged,

a mechanism of fiscal stabilisation of the euro area as a whole could be established.” Thus the European Commission recognises that the euro area framework will remain unstable for a while; many conditions need to be met before setting up a satisfactory stabilisation mechanism. Business cycle convergence would be achieved through financial diversification. Should a country suffer from economic imbalances, this would not be a problem, since economic agents would hold financial assets from other MS. However, empirically the economic impact of this channel is very weak (Clévenot and Duwicquet, 2011).

- The banking union should be achieved (since the de-nationalisation of banking systems would lower the risks of financial fragility and instability). No financial transaction tax (FTT) or separation between deposit banks and markets and business banks is suggested.
- The achievement of the capital markets union would be the priority, as it would facilitate risk diversification and giving SMEs access to finance (but it is the role of banks to finance SMEs). EU institutions recognise that eliminating national barriers could create new financial risks. Therefore, they advocate a single supervisor for European capital markets.
- The EU should have a single seat at the IMF (although this request may look surprising, after Greece, Ireland and Portugal were requested to ask for IMF support during the crisis, which showed a lack of solidarity and homogeneity in the area).

The proposals to issue Eurobonds guaranteed by all MS as well as the ECB's guarantee for public debt were not kept, due to the German veto of unlimited and unconditional commitments. But it seems difficult to strengthen the euro area without such commitments.

On 26 September 2016, the EU Council agreed on the implementation of National Productivity Boards responsible for the diagnosis and analysis of productivity and competitiveness developments, which is problematic in the light of current national institutions of negotiation and bargaining between social partners. It remains unclear if each national council will be expected to make recommendations to improve domestic competitiveness or if, in the case of Germany for instance, the German council will be expected to recommend substantial wage increases in Germany to reduce intra-area imbalances.

In May 2017, the Commission published a *Reflection paper on the Deepening of the Economic and Monetary Union*. The paper points out the disagreements between MS in favour of more solidarity and those claiming more responsibility of each MS; the text recognises the persistence of economic and social divergences, and growth weakness in some MS, but does not draw any conclusions in terms of global economic strategy. The text recognises that the euro area architecture and governance have become complex and difficult to manage. The reform proposals address mainly three axes:

- The Commission wishes to complete the banking union by setting a common fiscal mechanism to support the Single Resolution Fund and the European Insurance Deposits Scheme. However, some MS refuse any additional solidarity, especially if unlimited; other MS wish to keep the capacity for rescuing domestic banks; it would be costly to set up a sufficiently large fund able to intervene in any event, without “using public money”. These issues arise only because euro area countries lost their monetary sovereignty; because there is no clear separation between deposit and credit banks and market banks; and because some MS (Greece, Italy, Spain) still suffer from the crisis, or are condemned to low growth, which weakens their banks.
- The Commission is proposing the capital markets union, with the view that firms will have access to more innovative and diversified funding, but the 2007 crisis has shown the risks entailed by financial innovations and diversification.
- The Commission suggests lowering the share of public debt held by domestic banks, and to consider this debt as risky, which should have a counterpart in banks’ capital requirement. EU banks would thus have the incentive to reduce and diversify their public debt portfolios. Thus, in theory, a government could restructure public debt without putting domestic banks in trouble.² Simultaneously, one or several, synthetic assets would be introduced, supposed to be safe and relying on government bonds securitized portfolios. These assets would be owned by banks or EU financial institutions. Financial engineering would be relied upon to build and assess such safe portfolios, with senior

2. However, this measure would not have prevented the crisis. In Spain and Ireland, domestic banks held very little amounts of public debt before the crisis. They have diversified too much away from government debt to more profitable lending to households (thanks to John FitzGerald for pointing this out).

tranches containing necessarily a lot of German, Finnish, and Dutch bonds, and few Italian, Portuguese or Spanish bonds. The report admits that the two former measures would however lead banks to reduce the share of government bonds in their balance sheet, which could “disrupt not only the functioning of their home financial systems. It would potentially also impact on financial stability for the euro area as a whole”. Obviously, interest rate spreads would rise strongly in the euro area if Italian or Spanish banks were buying huge amounts of Northern countries’ bonds.

These proposals would contribute to fragmenting the euro area between countries considered as safe or unsafe. It would undermine government borrowing, which would be deprived of a guaranteed funding by its domestic banks and financial institutions. This fragility would enhance speculation. Fiscal discipline would rely on financial markets’ surveillance and on financial engineering, although the 2007 crisis showed the limits of this approach. How would one assess the probability of events such as a sovereign default by France, Spain or Italy, which depend not only on the domestic situation but also on the ECB’s and other MS responses? The Commission seems to try to break the link between national Treasuries and domestic financial intermediaries, so as to restrict their ability to issue bonds.

- The text advocates MS convergence, but often confuses convergence, coordination and compliance with arbitrary rules. The Commission wishes to set “...a strong link between related reforms, the use of EU funds and access to a potential macroeconomic stabilisation function”. The CCI is again envisaged as “a dedicated fund to provide incentives to Member States to carry out reforms”.
- The text envisages a macroeconomic stabilisation mechanism for the euro area, under such conditions that it would play a very limited role: “The function should not lead to permanent transfers, minimise moral hazard, and not duplicate the role of the European Stability Mechanism (ESM) as crisis management tool. Access to the stabilisation function should be strictly conditional on clear criteria and continuous sound policies, in particular those leading to more convergence within the euro area. Compliance with EU fiscal rules and the broader economic surveillance framework should be part of this”.

- The EU architecture should be strengthened and more democratic. However, the text does not suggest the introduction of euro area specific institutions, but rather hopes that all MS will join the euro area. The Eurogroup could become an instance of the Council, with a full-time president. The ESM could become a European Monetary Fund (EMF), incorporated in the legislative framework of the Treaties. A euro area Treasury could be in charge of fiscal and economic surveillance in the euro area, of managing the macroeconomic stabilisation mechanism, and of coordinating the issuance of safe European assets. Fiscal rules could be simplified.

1.2. A strengthened project?

Recently, the European project was strengthened by four elements. Since 2015, some economic recovery had been underway in the euro area. Greece refused to leave the euro area. The UK did not succeed to define a clear and dynamic Brexit strategy, which discredits the alternative of leaving the EU. The EU showed unity in both the Greek crisis and Brexit. In both cases, strong positions won.

Last, the EU strategy has been strengthened by Emmanuel Macron's victory in the French Presidential election in 2017. Macron's projects for a European overhaul, in particular in his Sorbonne speech (26 September 2017) attracted a lot of interest in Europe: "The time when France proposes is back".

According to Emmanuel Macron, France, viewed as the "bad pupil" of the euro area class, should commit to a strict fulfilment of its European commitments, cut its public deficit and implement structural reforms, to show the euro area that France is a reliable partner. However, France cannot be blamed for having run policies with harmful effects for euro area partners: France did not run an excessive external surplus; domestic competitiveness neither improved nor deteriorated strongly; and the French public debt was not subject to speculative attacks.

In a second stage, renewed trust between France and Germany will allow them to lead a "group for European overhaul", i.e. a group of euro area countries agreeing to move towards a rapid convergence in fiscal, taxation and social areas.

Emmanuel Macron proposed, in his electoral programme in 2017: "to create a budget for the euro area with three functions (investments

for the future, emergency financial assistance and responses to crisis). Access to this budget will be conditioned on fulfilling common rules in tax and social areas (to avoid dumping in the euro area). A Minister of Economy and Finance of the euro area will be responsible for the euro area budget, under the control of a Parliament of the euro area, bringing together European parliamentarians of the Member States". This budget would be funded by digital and environmental taxation, a financial transactions tax and a fraction of the corporate income tax (CIT). It seems unlikely that France may obtain the implementation of a substantial euro area budget, with an explicit stabilization target, after having agreed to pass under the "Caudine Forks" of EU constraints. The risk is that MS should abandon as a counterpart any independent fiscal policies. The euro area Minister, responsible for stabilization, would have a right of control on national budgets and could ask for budget corrections if he considers them not to comply with the treaties. But EU institutions have always denied the need for and the effectiveness of fiscal stabilization policies and claimed instead that MS reach full employment by fiscal consolidation policies and structural reforms. Will this Minister be able to impose expansionary fiscal policies in countries running excessive current surpluses? Emmanuel Macron did not clearly question the fiscal rules of the Maastricht Treaty and of the TSCG. However, he asked Germany to abandon its "fiscal fetishism".

Establishing a Parliament of the euro area is supposed to democratize the area, but it would not be possible to complicate the EU framework by introducing euro area specific institutions.

At the same time, Emmanuel Macron still supports the traditional French proposals. The European Pillar of social rights should define minimum levels for health coverage, unemployment insurance and a minimum wage (taking into account the unequal development of MS). A common base and harmonisation of CIT rates should be settled to combat tax optimization, but this proposal will face opposition from several MS (Ireland, the Netherlands, Belgium).

The euro area would be split into two, between countries accepting the renovation project, in particular tax and social convergence, and those refusing it, which is difficult to imagine, since Europe would then have three circles, even four if Brexit leads to create around the EU a circle of countries linked by a customs union. Moreover there is currently no agreement among EU people (not even among core countries) to move towards more integration. In the current situation, few

peoples will agree that their budget, taxation systems and reforms of their social systems should be decided by a federal body.

Emmanuel Macron has two contradictory positions. On the one hand he wants to drastically transform the French economy and move it towards a more liberal functioning. On the other hand, he asks the other MS to get closer to France, in setting floors for tax rates, social protection, and minimum wages, and in settling protectionist measures and industrial policies.

The Meseberg declaration, signed by Angela Merkel and Emmanuel Macron on 19 June 2018, is a compromise text. Germany supported the French proposal to set up a euro area budget to promote “competitiveness, convergence and stability”. However, the size of this budget is not specified. Expenditure should come in substitution to national expenditure; public debt reduction remains a priority. It is not said that this budget could be run in deficit. The stabilisation function would not mean permanent transfers. Strategic decisions on this budget would be made by euro area MS, but expenditure would be managed by the Commission.

Eight MS (the Netherlands, Finland, Ireland, Estonia, Latvia, Lithuania, Denmark and Sweden), dubbed the New Hanseatic League, criticized the euro area budget proposal;³ they refuse any increase in EU expenditure and transfers, and any EU-level taxation, as well as far-reaching transfers of competence to the European level. For these countries, the priority is to meet the requirements of existing fiscal rules and to implement structural reforms at country level. They propose to complete the single market and the banking union, to develop the capital markets union (to foster cross-border private risk-sharing). A framework for sovereign debt restructuring should be explored. The EU budget should account for budget constraints and provide incentives for structural reforms.

Hence, sharp contradictions remain among MS on many issues. Some stress the need for macroeconomic coordination, social and tax harmonisation and solidarity between MS. Others stress the need to fulfil the current fiscal rules and to accept financial markets’ discipline. A euro area ministry is considered either as a way to impose fiscal discipline and structural reforms, or as a way to centralise fiscal policies, or as a coordination instrument for autonomous economic policies.

3. Austria, Belgium, Luxembourg and Malta express similar considerations.

In June and December 2018, the Eurozone Summits brought together all EU27 leaders. The principle of strengthening the banking union was enacted, but in order to meet the German request, the risks of current national banking systems will have to be reduced before they are shared. The ESM should establish a credit line, as a safety net to the Single Resolution Fund, of the same size as the Fund itself. Any contribution from the ESM to banks should be reimbursed by the banking sector in three (or possibly five) years. Its introduction, after 2020, will depend on the evolution of risks in national banking sectors. Political negotiations on the European deposit guarantee scheme could begin, but its implementation will also depend on risk reduction. The plan to limit government bonds in banks' assets and to encourage banks to hold a securitized asset was not mentioned. Ambitious steps should be made by mid-2019 for the capital markets union.

The name and the statute of the ESM will not change. The ESM will be able to open a credit line to MS in trouble, provided they have run sound fiscal policies and are not under a macroeconomic imbalance procedure. The ESM Treaty will oblige introducing a collective action clause (CAC) in government bonds. Finally, the ESM is supposed to facilitate dialogue between a MS in trouble and its private creditors, without a strict obligation of debt restructuring. The ESM and the Commission will collaborate in assessing the situation and in negotiating measures requested from a MS requesting ESM assistance. The euro area budget will be a part of the EU budget; its size is not specified. It will be limited to the competitiveness and convergence instrument. No agreement was reached on public investment or macroeconomic stabilization schemes (particularly as concerns unemployment insurance). In short, *much ado about nothing*.

One challenge for any major reform (such as implementing transfer mechanisms between countries in counterpart for increasing EU institutions' control of domestic fiscal policies) is that it would require a change in the Treaties, MS unanimity, and in several countries a referendum, with no guarantee as to the results, as EU construction is not currently popular.

2. The debate among economists

Economists have diverging views on European issues. Should MS live with high public debts or should they try to reduce them? Should the objective be to place MS under surveillance and to compel them to

implement structural reforms, to avoid non-cooperative policies inducing negative externalities, or to facilitate economic policy coordination? Economists have diverging views on the reliability of national governments, EU institutions and financial markets, but also on the political project: should the EU move towards a federal union or remain a Nation-States union?

2.1. Financial markets supervision?

Public debts in advanced economies have risen sharply during and since the 2008 financial crisis. The rise was smaller for the euro area as a whole than for other economies (the US, the UK, Japan, Table 1). The rise in public debts was due to developments in finance capitalism and to the deepness of the crisis, and not to over-expansionary fiscal policies run before and since the beginning of the crisis (Greece being the only exception). Public deficits and low interest rates offset insufficient private demand, which was weakened by the decrease in the wage share in value added, by the fall (in relative value) of needed investments, and by a rise in income inequalities. In view of low interest rates and inflation, current public debt levels are not generating higher interest rates or any crowding-out effect for private investment. It would be detrimental for output growth to cut public debts as long as the reasons why debts rose remain and as long as public debt cuts cannot be offset by significantly lower interest rates. The euro area already runs a large current account surplus and cannot expect to be able to offset a fall in domestic demand by a higher external surplus, without destabilising the world economy.

Many economists and policy makers (especially in Germany) rely on financial markets to ensure fiscal discipline in Europe. The high public debt levels and the memory of the Greek partial default make it more likely for public finances to remain under financial market supervision in the coming years. But this surveillance is unsatisfactory: financial markets have no macroeconomic perspective; their views are self-fulfilling, and they are aware of it; they do not try to account for all information available, but only for elements which are “in the mood of time”; and they are schizophrenic, requesting simultaneously economic growth strategies and fiscal consolidation. They have their own judgement on appropriate economic policies, with a liberal bias. There is no evidence that financial markets are able to judge public debt sustainability and the relevance of public deficits. Financial market

regulation is necessarily imperfect. A country may run an over-expansionary policy for some time, but markets will react only when they estimate that the debt level is excessive, i.e. too late. Macroeconomic regulation cannot be restricted to fiscal discipline: markets cannot oblige countries running too restrictive policies to borrow. Markets were blind in the case of Greece before 2007, and have been too strict for Italy and Spain since 2011.

Table. Public debts and deficits

% of GDP

	Public debt, Maastricht criteria		Public balance		
	2007	2017 (and max.)	2007	Highest deficit 2007-17	2017
Germany	64	65 (81)	0.2	-4.2	0.9
France	64	97	-2.5	-7.2	-2.6
Italy	100	132	-1.5	-5.3	-2.1
Spain	36	98 (100)	1.9	-10.5	-3.1
The Netherlands	42	58 (68)	0.2	-5.4	0.7
Belgium	87	104 (108)	0.1	-5.4	-1.5
Austria	65	79 (84)	-1.4	-5.3	-1.0
Greece	103	180	-6.7	-15.1	-1.2
Portugal	68	126 (131)	-3.0	-11.2	-1.4
Finland	34	63	5.1	-3.2	-1.4
Ireland	24	70 (120)	0.3	-32.1	-0.4
Euro area	65	89 (94)	-0.6	-6.3	-1.1
UK	44	87	-2.6	-10.1	-2.1
USA	64	108	-3.5	-12.7	-5.0
Japan	183	240	-2.8	-9.8	-4.3

Source: Ameco.

Letting markets freely set public debt interest rates, according to their default fears, would maintain arbitrary interest rate spreads in the EU. It would restrain fiscal policy (a country could be prevented from running the needed policy, in order to reassure markets), and it would reduce monetary policy efficiency. On the one hand, the EU would claim that the Greek case was an exception, and that from now on no euro area country will default. On the other hand, the EU would rely on markets to assess how serious MS commitments are. Interest rate spreads would be arbitrary, costly (should Italy pay each year 1.2% of its GDP to financial markets to offset an alleged default risk?) and may

become self-fulfilling. Conversely, the financial markets' weight is considered today by leading classes, Northern countries, and the EU technocracy as a guarantee against deviating policies, and hence they refuse to reduce the financial markets' power.

A country that is keeping monetary sovereignty, and issuing bonds in its own currency, is of course subject to the financial markets' judgement, but the effect is different. Markets do not fear government default, and hence do not anticipate a crisis, but may anticipate a currency depreciation, which is a normal phenomenon. This will not inevitably raise interest rates (which would lower growth) but may induce exchange rate depreciation (which may be expansionary).

Numerous proposals aim to strengthen financial markets' surveillance. German economists and policy makers demand that principles of no-solidarity between MS and no-guarantee by the ECB be re-asserted, that the possibility for a country to default (and even to exit the euro area) be explicitly written in EU Treaties, and that a MS supported by the ESM be automatically obliged to restructure its public debt; so, strong signals would be sent to financial markets to be more vigilant.

In May 2018, 154 German economists (including Hans-Werner Sinn and Jürgen Stark) refused a "Europe of liabilities" or a "Europe of transfers".⁴ Under the principle of the responsibility of each country, they refuse an EMF, which would help countries that did not undertake the necessary reforms; and they refuse a Single Resolution Fund for bank failures and a European Deposits Insurance Fund, which would relieve bankers and national supervisory bodies of their responsibilities. They propose to promote structural reforms, to consider the possibility that a country leaves the euro area, to declare that public debts are risky. The ECB should end its programme of buying government securities; voting rights of the largest MS in ECB bodies should be increased; and Target2 balances should be regulated. Asymmetric shocks would be offset by portfolio diversification allowed by the capital markets union.

Delpla and von Weisäcker (2010) and De Grauwe (2012) had suggested that public debts be split into two categories: a "blue" debt, collectively issued and guaranteed, with a ceiling of 60% of GDP for each MS, and a "red" debt. Each MS would also be allowed to issue a red debt under its own responsibility. Such a red debt would bear a high interest rate, which would be a strong disincentive to issue public

4. In an open letter published in the *Frankfurter Allgemeine Zeitung*.

debt above 60% of GDP. But the 60% limit is arbitrary. It was breached since 2007 by almost all euro area countries, for legitimate reasons. According to us, one should not offer speculators new possibilities to bet against different kinds of public debt.

Fourteen German and French economists (Bénassy-Quéré *et al.*, 2018) published a text on 17 January 2018: “Reconciling risk sharing with market discipline: A constructive approach to euro area reform” which recognizes “the persistent financial fragilities” of the euro area, but in fact proposes to accentuate their causes by weakening even more the States and by increasing financial markets’ influence. In order to account for an especially widespread view among German economists and policy makers, the fourteen economists accept the strengthening of a so-called “market discipline”, as if markets were not the ones to be disciplined. These economists make six proposals, which are in line with the Commission’s views:

- 1) *Penalise banks having too much debt of their origin country in their assets.*
- 2) *Provide a device for an orderly restructuring of public debt.*

Like the Commission, the fourteen economists propose claiming that euro area MS public debts are risky, that they may be restructured, and that banks holding these bonds take risks that should be assessed according to the MS considered. Such a declaration would have three consequences: public debts would effectively be more fragile, MS would not be sure to issue safe bonds anymore, and speculation on public debts would be encouraged. The authors propose bank deposits to be guaranteed at the EU level, but the insurance premium paid by banks on these deposits would vary depending on the “specific risks of the country”.

- 3) *Replace the current fiscal rules by a new simple one (see below).*
- 4) *Set up a Fund to help Euro area MS to absorb the most serious economic crises.*

Countries could benefit from this Fund only if they followed a fiscal rule defined as in point 3) and the European semester recommendations. To avoid permanent transfers, this Fund would receive national contributions, which would rise with previous help received from the Fund. Thus, countries having previously experienced difficulties would finance countries currently in difficulty. A country having requested support from the Fund would pay higher contributions for a long time period, and so it would hardly be supported.

5) Offer investors a synthetic risk-free financial asset alternative to national public debt (see above).

6) Reform the institutional architecture of the euro area.

The paper makes no recommendations on how to improve the coordination of euro area economic policies, to reduce imbalances between MS, to launch a large investment programme required by the ecological transition, to reduce the instability induced by financialisation, or to refocus the banking and finance sectors' activity towards lending to public and productive investment rather than speculating on public debt.

The 14 economists' proposals were criticized by Messori and Micossi (2018), two Italian economists, with arguments close to ours: "their proposals heighten the risk of financial instability and weaken euro area defences against financial shocks".

2.2. Public debt centralisation?

A simple solution would be to introduce a European Debt Agency (EDA), which would issue a common debt for all euro area countries. This debt would be guaranteed by all MS and would be considered as safe by financial markets; its market would be broad and liquid, hence it could be issued at very low interest rates. The proposal of an EDA may be seen from two different perspectives: either as a way to impose EU fiscal rules on MS or as a way to ensure MS autonomy in fully protecting them from financial markets. In the first perspective, the EDA would supervise domestic fiscal policies and would be entitled to deny financing to *over-lax* countries, leading the latter to have to sell domestic bonds on markets, at higher interest rates. The EDA would raise the same problems as the SGP, even more strongly. What would be its democratic and economic legitimacy? What would be its assessment criteria? How would the EDA decide that a country runs an excessive deficit, if the country considers that such a deficit is necessary to support domestic output or to rescue domestic banks? Would it implement rigid automatic rules (a country would be entitled to loans from the EDA of up to 60% of its GDP) or softer ones (a country would be entitled to loans from the EDA, except in exceptional circumstances)? The EDA would benefit neither virtuous countries (the latter have no difficulty to borrow) nor countries in difficulty, which the EDA would refuse to lend to. The EDA makes sense only, in the second perspective, if it accepts to finance all public debts. Northern countries

refuse such a system on moral hazard grounds: lax MS would have no more incentives to cut their public debts.

Schulmeister (2013) suggested the introduction of a European Monetary Fund (EMF), which would finance MS through issuing euro-bonds guaranteed by the MS and the ECB. The EMF would maintain long-term interest rates below GDP growth. Individual MS financing would not be subject to a numerical constraint, but would be agreed within the EMF by MS Finance ministers. This proposal hands over to finance ministers the responsibility of agreeing on public deficit targets for each country, which is problematic (what should be done in case of divergent macroeconomic strategies?), and undemocratic (each finance minister would impose in its national Parliament the fulfilment of the target set at the European level).

The German Council of Economic Experts (Doluca *et al.*, 2012) had suggested the introduction of a European Redemption Pact, *i.e.* a fund to guarantee the repayment of the share of public debts above 60% of GDP. Countries with debt exceeding 60% of GDP would place the share of their debt over 60% of GDP in a Redemption Fund (RF) and, in counterpart, would transfer irremediably tax revenues allowing for debt repayment over 25 years. Countries would transfer guarantees to the fund, such as a fraction of their gold reserves. Moreover, they would commit to implement structural reform programmes and would fulfil the Fiscal Pact in bringing rapidly their structural deficit down to 0.5% of GDP. With these guarantees, the fund could borrow at interest rates without risk premium. The debt-to-GDP ratio would thus fall rapidly. But the proposal does not address the impacts of these restrictive policies on output, making the implicit assumption that the fiscal multiplier is nil (Mathieu and Sterdyniak, 2014). Similarly, the proposal does not consider the possibility that euro area economies might go through slowdown episodes in the next 25 years, which may require softening the restrictive stance of fiscal policies. The proposal resides on a postulate: optimal fiscal policy consists in stabilising the structural deficit at 0.5% of GDP (and hence government debt at 14.3% of GDP under a nominal GDP growth at 3.5%) and refusing any discretionary fiscal policy.

The ESM was introduced through an inter-governmental agreement. It could be enshrined in the EU Treaties and transformed into an EMF (European Monetary Fund). According to some authors, the EMF would control (and impose) that fiscal policies fulfil the SGP and the Fiscal Pact.

This surveillance would be done via an automatic process, *i.e.* without accounting for the economic situation, without any political intervention from MS. MS would entirely lose their fiscal autonomy. In the same vein, other authors propose introducing a Euro Area Finance and Economy Minister, a Commission's vice-president, who would chair the euro group. The minister would manage a euro area Treasury, to finance euro area common public spending, macroeconomic stabilisation spending and transfers within MS. This raises a question of democracy: how would this minister be appointed: through a democratic political choice or on the basis of the current technocratic consensus? For some authors, this ministry should facilitate the coordination of MS economic policies. For some others, the euro area minister should have the capacity to oblige countries to modify their budget plans if they are not in conformity with EU rules. Last, for some other authors, the euro area ministry would define the policy needed at the euro area level, and then policies needed at each country level, with no fiscal autonomy for MS, which is not acceptable from a democratic point of view and is not realistic if MS economic situations differ.

Bofinger (2018) wrote: "The monetary union is an unfinished building with a supranational monetary policy and 19 independent national fiscal policies. Thus, the only way to make it stable is to go ahead with political integration. With the transfer of fiscal policy responsibilities to the supranational level, fiscal discipline of the member states would be enforced by a democratically legitimised euro area finance minister and not by myopic financial investors". But Bofinger does not explain the principles under which the Minister would set MS fiscal policy and what would be his democratic legitimacy to intervene to impose this fiscal policy on MS.

3. Changing the fiscal rules?

The SGP and TSCG fiscal rules are arbitrary. They can oblige countries with insufficient demand to run restrictive fiscal policies, although the latter cannot be offset by lower interest rates. Fiscal policy should target employment (keeping it at or bringing it back to a satisfactory level), while allowing inflation and interest rates to remain at satisfactory levels. According to the functional theory of public finance, public

debt and deficit should be derived from this target (see Box 1 and Mathieu and Sterdyniak, 2012), and not from arbitrary rules.

Box. Functional theory of public finances

A certain level of government debt and deficit may be necessary to ensure a satisfactory demand level. If one writes:

$y = a + d + cy - \sigma(r - g) + k(h - l)$ $\dot{p} = \pi y$ $\dot{h} = d$, with y , GDP level (in deviation from potential level), d , public deficit, a , private demand, r , the interest rate, g , nominal growth trend, h , public debt as a % of GDP, l the public debt desired by the private sector (when $r=g$).

Two situations should be distinguished:

The country controls its interest rate. Then full stabilisation can be obtained without the fiscal tool, with the interest rate:

$r = g + (a + k(h - l))/\sigma$. A negative demand shock or an increase in the desired public debt allows for an interest rate cut (which can increase investment, and then growth). A positive demand shock can be offset by a rise in the interest rate (which is detrimental to investment) or by a restrictive fiscal policy (which is more relevant). The rule is: fiscal policy must allow to maintain unemployment at its natural level and an optimal interest rate.

In the long run, the debt ratio is stable so: $d=0$ $r=g + k(h-l)/\sigma$. The country has a trade-off between interest rate and public debt levels. A restrictive fiscal policy may be implemented if it allows for the interest rate to decrease.

The country does not control its interest rate, because the interest rate is already at 0 or because the country belongs to the euro area, short term fiscal policy is: $d = -a + \sigma(r - g)$

If this policy is implemented and if stabilisation is perfect, there is no link *ex post* between the deficit and the output gap, which remains nil. Let us note also that in this case government borrowing is considered as structural according to the OECD or the EC methods, which does not make sense.

In the long run, $g = 0$ and $h = l + \sigma(r - g)/k$. The long-term public debt level is not arbitrary, but depends on private agents' wishes: debt must equal desired debt at the optimal interest rate, i.e. the rate equal to the growth rate.

This simple model shows that a fiscal rule like $d = \bar{d} - \lambda y - \mu(h - \bar{h})$ cannot be proposed, since it would not allow for full stabilisation and since the government cannot set a debt target independently of private agents' saving behaviour. The public debt level desired by private agents is likely to have increased during the crisis, since households wish to hold fewer risky financial assets and companies wish to deleverage. In structural terms, population ageing implies that demand for safe public assets increases.

Some economists have proposed accounting tricks to circumvent SGP rules and the Fiscal Treaty. For instance, not to account for unemployment-related expenditure or public investment in the 3% GDP rule for the deficit, to set up temporary funds in good times to allow for higher deficits in bad times, or to introduce a temporary debt in bad times to be redeemed in good times, etc. According to us, it would be better to write simply: a public deficit is acceptable if the inflation rate is below the target, when the interest rate is below the normal level (*i.e.* according to the golden rule, potential growth plus the inflation target), and when the external deficit is below the target.

Claeys *et al.* (2016) propose that public expenditure (excluding interest payments, unemployment insurance benefits, exceptional expenditure, public investment, but including fixed public capital consumption) may not rise more rapidly than the ECB's inflation target (2%) plus medium-term potential growth less a correcting term of 0.02 times the share of the debt above the 60% target. However, a country may choose to raise its public expenditure if it raises tax revenues at the same time, or to cut tax revenues if public spending is cut at the same time. This rule is in fact a structural balance rule. A country, such as France, where public debt stands at 100% of GDP, should set a target for public expenditure growth 0.8 percentage point below potential output growth, *i.e.* it should improve by 0.4 percentage point each year its primary structural government balance, until its debt comes down to 60% of GDP. This rule may seem relatively satisfactory, since it lets automatic stabilisers play, and since it becomes less binding if inflation is below 2% (1 percentage point of inflation below the target allows to increase public spending by 1%, *i.e.* an additional 0.5 percentage point for the structural deficit). But the arbitrary 60% of GDP target for public debt remains. Should the main objective of French fiscal policy be to bring debt down to 60% of GDP within 20 years, *i.e.* to run average primary fiscal surpluses of 2 percentage points of GDP, when the 60% figure is arbitrary and below debt ratios in countries outside the euro area? These 2 percentage points could be better used (for example, for the ecological transition). The impact of permanent fiscal consolidation on output is not assessed. Discretionary fiscal policies remain forbidden. The rule does not set an equilibrium level for the primary fiscal balance and so does not bring debt to a long-term equilibrium. A country with a 100% of GDP debt ratio and a primary structural deficit of 1% of GDP will have to increase its primary structural balance each year. After 18 years (under the assumption that

the interest rate is equal to output growth), its debt will fall below 60% of GDP and the primary structural surplus will reach 4.5% of GDP. The rule gives no indication on what should be done once the debt reaches 60% of GDP: keeping it at that level, which means bringing rapidly the structural surplus to balance, or maintaining a substantial structural surplus forever.

Bénassy-Quéré *et al.* (2018) suggest replacing existing fiscal rules by a new *simple* rule: “nominal [public] expenditures should not grow faster than long-term nominal income (that is, the sum of potential output growth and expected inflation), and they should grow at a slower pace in countries that need to pay down their debts.” But the authors also say that countries would be entitled to raise their expenditures, if they raise their structural tax revenues. The rule is thus equivalent to: “the structural deficit should remain stable, and even diminish in countries where the public debt level is too high”. But will a country be entitled to increase public expenditure or cut taxes to support output in times of economic slowdown? The rule should clearly state that discretionary, and defined as temporary, measures are allowed. Let us assume that a country wishes to promote pension funds. In the short and medium term this may lead households’ savings to rise, and, at fixed interest rates and exchange rates, this may require a rise in the equilibrium structural public deficit. This is not taken into consideration in the proposed rule. How should excessive debt ratios be defined, knowing that public debts rose since the crisis because of the needs of macroeconomic regulation? Then the text says: “If a country passes a budget with spending above the target, all excessive spending must be financed by junior sovereign bonds, first to be restructured in case a debt reduction is deemed necessary”. But the so-called excessive expenditures should be financed by a guaranteed public debt, if these reflect the need for output stabilisation. Financial markets should not be asked to fine countries raising public expenditures even if the latter are needed for macroeconomic stabilisation or for rescuing banks or companies in a difficult situation. The proposal relies on an irrelevant financial innovation: advanced economies would issue sovereign bonds, while announcing there are unsafe assets. No advanced economy outside the euro area ever did such a thing. How can it be imagined that a large economy, such as France, may default, even partially? According to which criteria? The enforcement of the rule would be done under the control of an independent fiscal committee, itself supervised by an independent committee at the area

level. Will this authority have to comply with the Commission's estimates and stick blindly to the rule, or will it be able to have its own estimates and evaluate policy based on macroeconomic relevance? Besides, like the previous rule, this rule does not have any long-term stability. It simply tells us: once a satisfactory debt ratio has been reached, the structural balance may be stable, but its level is not defined. Any fiscal rule should lead to stable debt and deficit levels consistent with the macroeconomic equilibrium.

3.1. A euro area fiscal capacity?

Some economists consider that the euro area could implement stabilisation mechanisms at the euro area level, managed by a euro area minister, but this is an illusion, as the European Commission minimizes the size of output gaps (Mathieu and Sterdyniak, 2015), denies the implementation of discretionary policies and sticks to automatic fiscal rules. But many shocks or imbalances are country-specific. Implementing stabilisation tools at the euro area level would be dangerous if, as a counterpart, countries have to abandon stabilisation policies to bring their structural budget (as measured by the EC) in balance and should wait for the Commission's green light to implement a stabilisation fiscal policy.

A two-step procedure is often proposed: The Commission would set the broad fiscal stance of the euro area, and would then verify the compliance of all MS budgets. But this could make sense only if the SGP and the Fiscal Treaty were abandoned, and the full-employment target in the euro area re-affirmed. However, this proposal is irrelevant if euro area cyclical developments and objectives differ too much. Why say that fiscal efforts should be neutral in the euro area if countries with fiscal room for manoeuvre refuse to run expansionary policies, while countries in depression have to fulfil EU constraints?

Some propose implementing transfers between MS to ensure that countries in good economic situations finance countries in depression. Accounting for Northern countries' reluctance, this system should avoid permanent transfers, and each country should be in turn a net contributor or receiver. Can a system on average in balance have a visible macroeconomic impact? Some propose basing these transfers on output gap differentials, since, for a given country, the output gap is

by construction nil over a long time period. But they forget that the output gap is a vague and unobservable concept, a measure that can be criticized, and fluctuates over time (Mathieu and Sterdyniak, 2015). As could be seen after the 2008 crisis, when a crisis occurs at year N , potential output growth estimates are reduced for year $N-1$, $N-2$, ... Should there be re-payments each time the Commission's estimates are revised? Should a country in depression wait for EU funds to support its economy, and meanwhile implement a pro-cyclical restrictive policy? Last, potential output growth, according to Commission estimates, fluctuates very closely with observed output growth, and hence transfers would necessarily be small.

Some propose the unification of unemployment insurance systems, unemployment expenditure being the most pro-cyclical category of public expenditure. But national systems differ widely from one MS to another (allowance levels and duration; accounting or not for the family situation), and in many MS are run by social partners, who would not agree on a unification done under the Commission's leadership. The unemployment concept would have to be standardized (what about recipients of vocational training, disability pensions, early retirement schemes, or part-time unemployment schemes?). A country having made efforts to reduce its unemployment rate would refuse to pay for countries with high unemployment, blaming these countries for not having undertaken the necessary reforms.

Some propose transfers between countries based on the differences between the observed and the structural unemployment rates. But how to assess the structural unemployment rate, which according to the Commission's estimates varies like the observed unemployment rate? Transfers based on differences in unemployment rates would entail permanent transfers between countries. To avoid this, proposals restrict transfers to unemployment regimes, applying them only to the newly unemployed and for a limited time period (Dullien, 2017). Transfers are generally small and become nil if the depression lasts and hits all euro area MS. Transfers are expected to be nil for each country in the long term, and thus may have only a limited impact. Others suggest a reinsurance unemployment system, based on short-term unemployment developments, normalized according to their past volatility, with MS contributions depending on the extent to which they previously resorted to the Fund (Dolls and Lewney, 2017, Aparisi de Lannoy and Ragot, 2017). Social transfers cannot be based on

complicated mechanisms, so re-insurance would have no direct impact on unemployment benefits, but only an *ex post* impact on the financial equilibrium of unemployment regimes.

The proponents of this proposal argue that it would have had stabilisation properties in the past. In particular, Germany would have been a net beneficiary in the beginning of the 2000s, which assumes that the other MS would have agreed to pay for the German internal devaluation strategy. Also, this system would have softened the recession in Southern economies after 2010, as if the EU, requesting fiscal austerity, would have offset it at the same time by unemployment benefit transfers. These authors assume that these transfers would be entirely consumed by households (Dolls and Lewney, 2017). Let us consider the case of France. Unemployment benefits were not cut after the crisis, despite the rise in the public deficit; and they would not have been larger if the EU mechanism had been in place. At best, the mechanism would have reduced the UNEDIC's financing needs. So, its impact on activity would have been weak, if not nil.

Some economists (CAE, 2016) admit that the implementation of this mechanism requires the convergence of domestic labour markets, to be implemented by a European minister of labour. But a convergence towards which model and decided by whom? Should labour market flexibility be promoted (labour contracts revised in permanence, precarious jobs, flexible wages) or a stable labour market (companies and employees linked with long-term contracts, companies caring for maintaining their workers' skills and investing in specific skills). Should wage flexibility be promoted through wage bargaining at the company level, or on the contrary through sector agreements or national agreements based on the "golden rule" of wage growth, i.e. the inflation target plus average productivity growth in the economy, as the European Trade Union Confederation recommends?

3.2. A federal and democratic euro area?

Some economists recommend a move toward a more and more federal EU (or euro area). They admit that technocracy currently prevails in the EU, with a lack of democracy and a liberal bias, but they consider that a more democratic federalism could be introduced. The euro area would have a substantial budget and own resources; it could finance EU common goods (military defence, research, infrastructure, migration policy), and transfers between countries, both structural and cyclical, including to deal with all or part of macroeconomic stabilisation.

In *"Pour un traité de démocratisation de l'Europe"*,⁵ Hennette et al. (2017) propose a new Treaty. It would establish a Parliamentary Assembly of the euro area, involving members of the national parliaments and of the European Parliament. This Assembly would supervise the euro area summit and the Eurogroup. But there is already a European Parliament. It is not realistic to introduce a new structure and duplicate all EU institutions with euro area institutions. This assembly would vote the various documents of the European Semester (the Report on Mechanism Alert, MS Stability Programmes and National reform programmes, EDP reports), directives, ESM assistance programmes and Memoranda of Understanding. This would represent on the one hand many elements that are dealt with at the EU level, and so the process would duplicate European Parliament activities; and on the other hand, it would cover fields that are currently domestic prerogatives: should EU Parliament members be asked to vote on each MS Stability programme and National reform programme? The proposal does not clearly set out the powers that would be attributed to the euro area, as compared to the EU and to countries. It does not say if the SGP and the Fiscal Treaty would continue to apply. What would be the assessment criteria for national budgets: adequacy with the economic context, or with the Fiscal Treaty? The proposal plans to put public debt below 60% of GDP in common, which implies necessarily that countries with debts higher than 60% of GDP launch a redemption process, without any economic justification. Should unmanageable constraints be accepted to ensure Germany's agreement? The authors claim that their project could be adopted by a subset of member countries, which makes no sense, given the powers of their new assembly on the Eurogroup. Contrary to what the authors suggest, this Treaty would need to be ratified by European citizens. According to the project, the Parliament would manage a common euro area budget. This budget would be financed by four taxes levied at European level: a corporate income tax, a high income tax, a high wealth tax and a carbon tax. It would represent 4% of euro area GDP, of which 2 percentage points would be used to finance the ecological transition, to host migrants and to finance higher education, and 2 percentage points would be given back to national budgets to reduce national taxes and help the poorest. The text specifies that net transfers between countries would be limited to 0.1% of GDP, probably to convince Germany, but how would net transfers be

5. Information in English about the proposal may be found at: <http://tdem.eu/en/treaty>

measured if taxes and half of the expenses are common? The proposal does not clearly say whether the euro area budget could be run in deficit if needed for stabilisation purposes.

Aglietta and Leron (2017), in *La Double démocratie* (The twin democracy), make a proposal for a European budget amounting to 3.5% of GDP, which would finance European common goods (such as fighting against climate change), would have own resources (such as a carbon tax and a financial transaction tax), and could issue euro-bonds. A European Fiscal Agency would assess the economic and fiscal situations of MS and would make recommendations for necessary adjustment, which would be determined by a fiscal commission (bringing together elected national parliament representatives), adopted by the Council and implemented by MS governments. This will allow changing the Fiscal Compact. But what principles would guide this process: debt or deficit criteria, or full-employment targets, and what scope (how to handle differences in competitiveness)? Although the second element of the proposal is problematic, the first element is interesting, setting up a specific field for EU action, with dedicated funding.

Fourteen European economists (Andor *et al.*, 2018) published a call for a “democratic renewal of the eurozone”. They propose a jump to democratic federalism, to a “real European executive that is democratically accountable before a parliament of the eurozone and leads economic policy with expertise and a larger degree of political autonomy”. The call however did not deepen the meaning of democracy in a federal EU: can a population be constrained by decisions made in a Parliament where its representatives are a minority? How to account for different interests, situations and institutions in MS? Should the subsidiarity principle be forgotten? The text suggests the appointment of a European Commissioner, in charge of fiscal and monetary affairs for the area, who would chair the Eurogroup and make executive decisions. But the extent of his/her powers is not defined: would he/she be able to amend budgets voted by National Parliaments? Certainly, the Commissioner would be accountable to the euro area Parliament, but how can one imagine that peoples would agree to entrust to a foreign Commissioner and to such a Parliament powers over their budget, public expenditure and their taxation? Moreover, it is unclear if current budget rules would be maintained. Will the Commissioner be a watchdog verifying that budgets are consistent

with the European rules, or a conductor who will coordinate all countries' economic policies? For the rest, the project is unrealistic. The euro area budget should start with a small size, of the order of 1% of GDP, but it should secure the financial system, and finance a new cohesion policy for countries facing structural competitiveness problems (education, university, training, justice), doing this without duplicating European structural funds; it should encourage surplus countries to run social policies; it should finance defence, innovation, and the environment, and be open to non-euro area members. "While under the control of the Commission, this budget should, however, sit outside the EU budget". This budget would basically duplicate the budget of the Union, to do what the EU does not currently do. But why would governments, reluctant to increase the budget of the Union, create a parallel budget? This budget would be financed by taxes and by issuing debt, the text saying strangely that it will be a risk-free asset, "complementing the constrained capacity of MS to issue safe assets. This will be crucial if member countries were to default on their national sovereign debt": the non-guarantee of national public debts is not questioned. The financial sector is expected to "perform its stabilizing and risk-sharing function"; this is hardly what it has done in the past. Finally, the text includes the project of a small unemployment insurance scheme at the euro area level. On the whole, the text offers little reflection on economic policies coordination, on the linkage between national and European democracy.

3.3. A Europe with more solidarity?

Many economists claim for more solidarity, with more transfers, in the euro area. According to us, the euro area's functioning cannot durably rely on transfers between Northern countries (in good economic situations and with large current account surpluses) and Southern countries (with high unemployment rates). Northern countries' populations would not accept it. Southern countries cannot offset bad economic situations with transfers, which would place them under the control of Northern countries and of the European Commission. Transfers between countries should take place only in exceptional circumstances or in the framework of development policies. Each country should find a satisfactory economic model, which today requires differentiated strategies.

The EU is not a country. There is no European solidarity, contrary to national solidarity. National characteristics remain, and people are attached to them. There is no agreement today between MS citizens to move toward a social Europe, a taxation Europe, a fiscal Europe, a political Europe, insofar as this would imply undermining national institutions.

Accounting for current disparities in the EU and for the willingness of EU institutions to cut public expenditure, it may not be obvious to raise common EU expenditure. Many countries are reluctant, either because they do not want to pay for the others, or because they want to keep their national specificities. In military defence, for instance, France and East European countries may not have the same priorities. Migration policies differ, due to demographic and labour market prospects. In higher education and research, there is a contradiction between spending EU funds where they are the most efficient and the desire of each country to develop them at home.

The EU hesitates between an intergovernmental functioning and a federal model, which the Commission and the Parliament tend to promote. Can we imagine that major economic and social decisions be made at the EU level, by the Commission, the Council or even the Parliament, without accounting for national votes and debates? Can we imagine a federal power that is able to account for domestic specificities in a EU made of heterogeneous countries? In our view, accounting for current disparities in the EU, economic policies should be coordinated between MS and not decided by a central authority. EU institutions should first show that they are able to implement an efficient strategy, before the peoples accept to increase powers at the EU level.

3.4. A Europe with several circles?

Brexit, the deviations of some Central and Eastern European countries (Poland, Hungary), and the reluctances of Denmark and Sweden could be incentives to move towards a EU in several circles.⁶ The first circle would include euro area countries agreeing new sovereignty transfers, and would build a political, social, taxation, and fiscal union. This would be a step toward a democratic progress: a euro area Parliament, a EU Commission accountable to the Parliament. The second circle would include EU countries that would not wish or be able to join

6. This is what Emmanuel Macron advocates in his speech at the Sorbonne.

the first circle. Last, a third circle would include countries linked to the EU with a free-trade agreement: Norway, Iceland, Liechtenstein, Switzerland, as of today, and the UK and other countries (Turkey, Ukraine...) tomorrow.⁷

This project raises many problems. The Commission is not in favour of it because it would undermine the EU move towards “an ever closer union”. Non-euro area countries are hostile to such a project where they would be marginalised as “second-class” members. EU institutions would have to be split between euro area institutions functioning in a federal mode, and EU institutions continuing to function in a Union of Member States mode, with a EU Parliament and a euro area Parliament, EU and euro area commissioners, EU and euro area budget and financial transfers, etc. There is no certainty that all euro area MS would wish to be in a first circle where tax and social harmonisation would be imposed; one would have to choose between accepting compromises so that Ireland, the Netherlands, Luxembourg, and the Baltic countries agree to join or have a euro area itself with two circles. The members of the third circle would be in an even more difficult situation, if they had to comply with regulations over which they would have no say. Thus many issues would have to be tackled four times (at the restricted euro area, euro area, EU, and free-trade agreement levels). Depending on the issue, a member state could choose its circle, and it would rapidly become an “à la carte” Europe. This is hardly compatible with democratisation at the EU level, which would rapidly require a different Parliament for each field. Besides, there is no agreement among the people of the EU, even in the euro area, to move towards a federal Europe, with all the convergences and losses of democratic control that this would entail. In the current situation, few peoples will accept that a federal body decides their budgets, tax systems, and reforms of their social systems.

3.5. Unconventional proposals

QE for people proponents suggest that the ECB should support economic activity, by giving a given amount of money to each euro area citizen each month. This proposal does not make much sense. The ECB cannot distribute money without a counterpart. This is not the Central Bank’s role; this is the role of fiscal policy. Such a policy would

7. See proposals by Pisani-Ferry *et al.* (2016) or Demertzis *et al.* (2018).

have to be agreed between MS, and be a transfer payment from domestic budgets. A bank must have assets equal to liabilities. The ECB's balance sheet would be in deficit, i.e. a debt that would be affected to MS, the ECB's shareholders, and would come on top of government debt.

For the same reason, the proposal asking the Central bank to buy a substantial amount of public debt, before cancelling them (or keeping them at a 0 interest rate forever) cannot be implemented. Because this proposal implies that in counterpart the ECB would issue bonds, hence transforming government debt into ECB debt (see for instance the PADRE proposal, by Pâris and Wyplosz, 2014). Here too, the ECB's balance sheet would show a deficit, which would be added to government debt. The ECB would not pay dividends to MS, but would be subsidized by them. The savings in terms of interest payments for MS would be offset by the loss of dividends received from the ECB and from the amount of the subsidy that would be paid to the ECB. This would be a mere accounting trick.

Some consider that a fiscal money should be issued by the government and accepted for tax payments (Bossone *et al.*, 2015, Kalinowski *et al.*, 2017⁸). The government could thus support output, by paying civil servants, social benefits and suppliers, with this money. However, contrary to what the proponents of this proposal claim, this money would be part of the public deficit and debt. The authors do not specify whether this money would be a full currency, or whether retailers would be obliged to accept it in payment even for imported products. There is no guarantee that economic agents would be ready to own it. It would be either fully convertible (agents would exchange it rapidly for euros as it would not yield any interest rate); or not convertible, which would mean that two currencies would circulate, with parallel exchange rates, a black market, instability risks, and complications for transactions. This is only a way to circumvent the deficit and debt criteria.

3.6. Coordinating policies in the EU

In advanced economies, the system, which worked until 1999 and still works in the US, the UK and Japan, is based on unity between the government, the central bank and commercial banks. The central bank is the lender of last resort for the government and banks. The govern-

8. The project is part of the programme of the new Italian Government under the name of "mini-bots".

ment can issue sovereign bonds without limit; these bonds are considered as safe and benefit from as low as possible market interest rates. This system allows the State to guarantee the banking system.

The introduction of the euro area had led to a hardly manageable structure. MS need to run more active fiscal policies because they have lost control over their interest rates and exchange rates. In addition, since 1973 and even more since 2008, the macroeconomic equilibrium requires a certain level of public deficit and debt. However, in a single currency union, current imbalances in one country may affect the other MS. Therefore, excessive deficits (or surpluses) should be avoided, but how to define them? Last, financial markets' current functioning makes it necessary for public debts to become safe assets again, while at the same time Northern countries deny giving unlimited guarantees to their partners.

Euro area countries should again become able to run the public deficits needed for their macroeconomic stabilisation needs and to issue safe public debts, at an interest rate controlled by the ECB. The mutual guarantee of public debts should be entire for countries agreeable to submitting their economic policy to a coordination process. This coordination cannot consist in fulfilling arbitrary rules. It should be done through a negotiation process between countries. Coordination should target GDP growth and full employment; it should account for all economic variables; and countries should follow an economic policy strategy allowing them to meet the inflation target (at least to remain within a target of around 2%, which may be increased in time periods when a strong recovery is needed), to meet an objective in terms of wage developments (in the medium-run real wages should grow in line with labour productivity), and in the short-run adjustment processes should be implemented by countries where wages have risen too rapidly, or not sufficiently.⁹ Internal devaluation strategies (such as offsetting employers' social contributions cuts by increases in VAT) should be implemented only by countries having a specific competitiveness problem. Countries should announce and negotiate their current account balance targets; and countries running high external surpluses should agree to lower them or to finance explicitly industrial

9. But the adjustment should not be done through the introduction of an automatic link between the minimum wage and the current account, as proposed by IAGS (2014). If a country runs of current account deficit due to a financial or housing bubble, the effort should not bear first on lower paid workers.

projects in Southern economies. The process should always reach unanimous agreement on a coordinated but differentiated strategy. The Treaty should maintain an effective process in the event where no agreement is reached. In that case, the new debt issued by countries outside the agreement would not be guaranteed, but such a case should never occur.

The ECB should maintain interest rates below the GDP growth rate to reduce the public debt burden. Simultaneously, the ECB should give incentives to banks both to abstain from speculative activities (in particular by a financial transactions tax and by the separation of deposit banks from market activities) and to finance productive activities (especially re-industrialisation and the ecological transition).

National fiscal policies would be facilitated if a European budget financed public investment and more generally European common goods (such as fighting against climate change) by common resources (such as a carbon tax and a financial transaction tax), and by the issuance of euro-bonds. But this should not be a pretext for adding constraints on national budgets.

Economic policy coordination should not raise difficulties after negative demand shocks (global or specific); it should not target objectives lacking an economic rationale (such as a structural public balance in equilibrium or a public debt below 60% of GDP). Coordination may be harmful for a country having to implement a supply side policy after a negative supply shock. On the contrary, coordination will be impossible if a group of countries set non-cooperative targets, such as large competitiveness gains or a large current account surplus.

Besides, a political choice needs to be made. Does the EU want to maintain and develop its social model, with its specificity in terms of social and fiscal systems, with labour rights, and with ecological objectives, or is its project to oblige reluctant countries to accept the constraints of a liberal globalization?

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FISCAL IMPLICATIONS OF THE ECB'S PUBLIC SECTOR PURCHASE PROGRAMME

Harmen Lehment

Kiel Institute for the World Economy

The large Public Sector Purchase Programme (PSPP), which the ECB started in 2015 for monetary policy purposes, had major side effects on fiscal policy. One concerns the programme's uncommon seigniorage effects. We find that the PSPP not only led to partly negative seigniorage gains, but also produced super-seigniorage gains resulting from negative interest rates on the excess reserves that were created by the programme. Another effect of the PSPP is its interference with fiscal debt management, thereby making fiscal budgets more vulnerable to changes in short-term interest rates. Finally, the experience with the PSPP suggests that fiscal policy should prepare for a greater role in fighting future recessions.

Keywords: Central bank asset purchases, seigniorage gains, debt management, monetary-fiscal cooperation.

In the face of persistently weak inflation dynamics, the European Central Bank (ECB) Governing Council decided on 22 January 2015 to adopt a Public Sector Purchase Programme (PSPP) to stimulate demand via lowering long-term interest rates. This paper intends to examine this unprecedented policy measure by the ECB and its potential impacts on fiscal and monetary policies.

The PSPP has led to a massive change in the ownership of public sector bonds. By the end of 2017, bonds on the order of 1,900 billion euros had moved from the private sector into the hands of the ECB and the national central banks (NCBs). These purchases had strong fiscal implications. The PSPP has increased the fiscal exposure to interest rate risk in the member countries of the euro area, as the programme has turned long-run obligations of the State (such as government bonds)

into short-term obligations (central bank liabilities paying variable deposit rates).

The PSPP led to super-seigniorage gains for the euro area national central banks (NCBs): additional interest income from the acquired public sector securities and also interest income stemming from negative interest rates on excess reserves. Interest income on the PSPP portfolio was particularly large for NCBs in countries with high interest rates such as Italy and Spain, whereas it was negative for the Bundesbank, which had to purchase public sector securities with negative interest rates.

In April 2018, borrowing via a country's NCB had no advantages over short-term borrowing via government securities, as the interest rates on short-term government securities were below the banks' deposit rate. For States with relatively high country risks, the ability to borrow at the deposit rate may, however, turn into an advantage, if the country risk were to increase. Borrowing at the deposit rate provides a backstop against increasing country risk.

It appears that three years of huge asset purchases by the Eurosystem had no sustained effect on the term premium and level of long-term interest rates, which raised substantial doubts about the effectiveness of the PSPP.

The rest of the paper is organised as follows. In part 1 we give an overview of the PSPP and the relative size of the purchases of public sector bonds by national central banks in the euro area. In part 2 we analyse the seigniorage gains that have resulted from the PSPP so far. In part 3 we discuss the effects of a normalization of monetary policy on seigniorage gains. In part 4 we analyse the fiscal risks that result from the accumulation of high excess liquidity due to the PSPP. In part 5 we address the question whether the PSPP has reached its limits. In part 6 we discuss whether the experience with the PSPP suggests a closer cooperation of monetary and fiscal policy in the future. In part 7 we highlight the main results and policy implications.

1. The PSPP—an overview

In the face of weaker-than-expected inflation dynamics and signs of reduction in inflation expectations even at relatively long maturities, the ECB Governing Council decided on 22 January 2015 to adopt a Public Sector Purchase Programme (PSPP) to increase the size of the

Eurosystem's balance sheet and change its composition (Andrade *et al.*, 2016). The PSPP is part of a larger Expanded Asset Purchase Programme (APP), which also includes the Asset-backed Securities Purchase Programme (ABSPP), the Covered Bonds Purchase Programme 3 (CBPP3), and the Corporate Sector Purchase Programme (CSPP). Monthly purchases under the APP, which started in March 2015, amounted to 60 billion euros from March 2015 to March 2016, 80 billion euros from April 2016 to March 2017, 60 billion euros from April 2017 to December 2017, and 30 billion euros from January 2018 to September 2018. With about 80 percent of the purchases, the PSPP is by far the largest purchase programme of the APP.

The spectrum of securities covered by the PSPP includes securities with a residual maturity ranging from 1 to 30 years.¹ In terms of overall breakdown, the intended allocation of the total purchases under the PSPP is 90% to government bonds and recognized agencies, and 10% to securities issued by international organisations and multilateral development banks.² Purchases are to be split across eligible euro area jurisdictions according to the ECB's capital key, and conducted with the aim of maintaining market neutrality. To preserve normal secondary market functioning, purchases were initially subject to a security-specific issue-share limit of 25% and an issuer-specific limit of 33% in terms of nominal value. In September 2015, the Governing Council decided to increase the security-specific limit also to 33%, subject to a case-by-case verification that doing this would not create a situation whereby the Eurosystem would have a blocking minority for the purposes of collective action clauses, in which case the issue share limit would remain at 25%. The security-specific limit for international organisations and multilateral development banks was raised to 50% in April 2016.

In line with the Eurosystem's regular monetary policy operations, the PSPP is coordinated centrally by the ECB, but implemented in a decentralised fashion. To this end, the ECB buys directly 10% of the total amount, and the remaining 90% are purchased by national central banks.³ Each national central bank restricts its activity to domestic bonds issued by both the central governments and recognised agencies of their jurisdictions. Since the recalibration of the programme in December 2015, NCBs also purchase euro-denomi-

1. Initially the range was 2-30 years.

2. Until April 2016 the ratios were 88% and 12% respectively.

3. Until April 2016 the ratios were 8% and 92% respectively.

nated marketable debt instruments issued by regional and local governments located within their jurisdiction. Purchases are allocated across issuers from the various euro area countries on the basis of the ECB's capital key. In case the envisaged amounts to be purchased in a jurisdiction cannot be attained, NCBs will conduct substitute purchases in bonds issued by international organisations and multilateral development banks located in the euro area. These purchases will be subsumed under the 10% allocation to international organisations and multilateral development banks, which will be purchased by some NCBs and be subject to profit and loss sharing. Purchases of domestic bonds by NCBs are not subject to profit and loss sharing.

By the end of 2017, the cumulated asset purchases under the PSPP amounted to 1,900 billion euros, of which about 1,700 billion euros were purchases of national public debt securities and about 200 billion euros purchases of supnationals' debt securities.

Table 1 lists the cumulative purchases of national public debt securities under the PSPP for the ten largest European Monetary Union (EMU) member countries in absolute terms as well as in relation to the respective country's GDP and its public debt. As can be seen from column 2, the size of purchases relative to GDP has varied among the listed countries. There are two main reasons for this. First, the size of the purchases is intended to follow the capital key of the Eurosystem, which depends not only on a country's GDP but also on the size of its population. Countries with a low per-capita income benefit from this arrangement, as their share in the Eurosystem's profits and also their ability to purchase public sector bonds under the PSPP is higher than it would be with a capital key that depended only on GDP (Heinemann, 2017). This explains why Italy and Spain in particular were able to purchase a larger amount relative to GDP than countries with higher per-capita income such as Germany and the Netherlands. The second reason for the difference results from constraints concerning the permissible scope of purchases under the PSPP, in particular the share limits that have been set. In particular, this factor explains the relatively low purchases of Irish asset under the PSPP relative to GDP. With official holdings of Irish bonds already bloated by previous interventions between 2010 and 2014 in the context of the banking crisis, this meant that the ECB was obliged to taper the amount it was spending on Irish bonds much earlier than was required for other sovereign bond markets (*Irish Times*, 2017).

Table 1. Cumulative NCB purchases of securities under the PSPP for the ten largest euro area countries (Dec. 31, 2017)

	Amount in billion euros	Relative to GDP (%)	Relative to public debt (%)
Germany	459.3	14.1	21.9
France	375.7	16.4	16.9
Italy	326.7	19.0	14.3
Spain	230.3	19.8	20.3
Netherlands	102.8	14.1	24.9
Belgium	65.5	15.0	14.1
Austria	52.0	14.1	17.7
Portugal	31.1	16.1	12.5
Finland	29.2	13.0	21.7
Ireland	25.3	9.2	12.0

Public debt figures refer to the 3rd quarter 2017.

Source: ECB; Statistical Data Warehouse.

The relation of public sector purchases to public debt is shown in column 3. For countries with a debt/GDP ratio above 1 (Italy, Portugal and Belgium), the figure is below that of column 2. For the other countries with a debt/GDP ratio below 1, it is accordingly above the figure in column 2. As can be seen, the ratio of cumulated purchases to public debt is highest for the Netherlands (where it reached almost 25 percent), Germany and Finland. For countries with a high debt/GDP, the ratio of cumulated purchases to public debt is in the range of 12-15 percent.

2. Seigniorage gains from the PSPP

The purchase of public bonds by national central banks leads to an additional interest income. When this income is transferred to the government via the distribution of central bank profits, the public budget benefits from a resulting seigniorage gain.

Table 2 shows the interest income on public sector securities that have been acquired under the PSPP for the national central banks of four countries (Germany, Ireland, Italy and Spain), which publish the respective figures in their annual reports.⁴

4. Most of the national central banks in the Eurozone only provide information on aggregate interest income, and do not specify interest income from the PSPP as a separate item. The table does not include the seigniorage income of the ECB, which is distributed to the NCBs.

Table 2. NCB's interest income on PSPP portfolio

Mn euros	2015	2016	2017
Germany	-11	-78	-258
Ireland	20	84	128
Italy	358	1 427	2 845
Spain	371	1 514	2 470

Sources: Central bank annual reports and annual accounts, various issues.

The interest rates on public sector securities vary substantially among the member countries of the euro area. Accordingly, one can expect that NCBs of countries with relatively high interest rates experienced particularly high seigniorage gains. This is confirmed by Table 2. The NCBs of Spain and Italy received a positive interest income on their PSPP securities in the period 2015-2017. The interest income for the Irish NCB was positive as well. In contrast, the German Bundesbank recorded a negative income on its PSPP portfolio in each year. The reason is that the interest rates on German public securities were not only the lowest in the euro area, but were negative even for bonds with longer maturities. As the interest income from the PSPP does not fall under the profit and loss sharing agreement of the euro area, the seigniorage gains and losses from the purchase of PSPP securities remain fully with the national central banks, and subsequently increase or reduce the scope for a transfer of central bank profits to the national government.⁵

To get a full picture of the seigniorage effect of the PSPP, one should also consider its effect on the monetary base. The purchases of public bonds, together with other measures of the Expanded Asset Purchase Programme (APP), led to large excess liquidity (Baldo *et al.*, 2017). As excess liquidity has been subject to negative interest rates (-0.1% from June 2014; -0.2% from September 2014; -0.3% from December 2015; -0.4% from March 2016), the increase in excess liquidity led to an additional interest income for the NCBs. This means that currently there is a “super seigniorage effect”: the Eurosystem receives not only revenues from the assets it has purchased (the normal seigniorage) but also an additional interest income on its liabilities.⁶

5. It should be noted that a NCB's purchase of bonds with negative maturities does not necessarily imply a worsening of a country's fiscal position. To the extent that the PSPP leads to lower interest rates for public sector bonds, the resulting benefit of lower interest payments for the remaining public debt may offset the loss from the NCB's negative seigniorage gain.

6. The interest income on NCB's liabilities can be considered as a tax on banks (if negative interest rates cannot be passed on to customers) or on bank customers (if negative rates are passed onto them).

As interest income on excess liquidity is subject to profit and loss sharing in the Eurosystem, the seigniorage gain of a NCB depends on the total excess liquidity of the Eurosystem. While the Eurosystem does not publish interest income on excess liquidity, the NCBs' seigniorage gain can be roughly estimated using information on the total excess liquidity, the negative interest rate and the country's capital key.

The excess liquidity of the Eurosystem increased by about 1,500 billion euros in the period 2015-2017.⁷ Taking average figures rather than end of year figures for 2017, the increase would be approximately 1,250 billion euros. With a negative interest rate of 0.4%, this means that the expansion of the excess liquidity during this period would yield an additional interest income to the Eurosystem on the order of 5 billion euros in 2017. According to the capital key this implies an additional interest income of 1.3 billion euros for the Bundesbank, 0.9 billion euros for the Banca d'Italia, 0.6 billion euros for the Banco de Espana and 0.1 billion euros for the Central Bank of Ireland.

To what extent can the increase in excess liquidity and the resulting interest income be attributed to the PSPP? As about 92 percent of the extension of the Eurosystem's balance sheet can be attributed to the APP (the balance sheet expanded by about 2,250 billion euros from end 2014 to end 2017, with assets for monetary purposes rising by about 2,070 billion euros), and as the share of the PSPP in the APP was about 82 percent, it is plausible to attribute 75 percent of the additional interest income from excess liquidity to the PSPP, i.e. 3,750 billion euros. According to the capital key of the Eurosystem, this implies for 2017 an additional interest income of 960 million euros for the Bundesbank (which more than compensates the losses from the negative yield of the PSPP portfolio), 660 million euros for the Banca d'Italia, 470 million euros for the Banco de Espana and 60 million euros for the Central Bank of Ireland.

An additional point to be considered is the Eurosystem's interest income on euro-liabilities against non-euro area residents. These liabilities increased massively from 48 billion euros at the end of 2014 to 355 billion euros at the end of 2017, and are similar to the holdings of excess liquidity (Baldo *et al.*, 2017)—heavily concentrated in financial

7. The current account (including minimum reserve holdings) and the deposit facility together rose from 367 billion euros at the end of 2014 to 1,882 billion euros at the end of 2017. Subtracting the minimum reserve holdings (106 billion euros at the end of 2014 and 123 billion euros at the end of 2017) one obtains an increase in excess liquidity by 1,498 billion euros. Source: Eurosystem.

centre countries. As can be seen from Table 3, the bulk of these liabilities is held with the NCBs of three countries: Germany, France and the Netherlands. As the Eurosystem's claims against non-residents have not increased in this period, this suggests that the expansion of the liabilities against non-residents is a result of the APP. According to Baldo *et al.* (2017), more than 50% of APP purchases occurred with counterparties belonging to banking groups whose head institution was situated outside the euro area. To the extent that the returns from the asset sales are not placed with banks in the euro area but end up at NCBs of the euro area, as may *e.g.* be the case for bond sales by foreign monetary authorities, this is shown by a respective increase of liabilities against non-euro area residents.

Table 3. Central bank liabilities to non-euro area residents in euros (end of year)

Billion euros

	2014	2015	2016	2017
Austria	0	1	1	1
Belgium	1	1	2	8
Finland	0	1	2	3
France	28	15	36	53
Germany	12	27	117	200
Netherlands	1	4	21	37
Ireland	0	0	0	1
Italy	0	0	3	2
Portugal	0	0	0	0
Spain	0	0	2	3

Sources: Central bank annual reports and annual accounts, various issues.

Taking a closer look at the Bundesbank, which accounts for more than 50 percent of the liabilities against non-euro area residents, we find that interest income from negative interest rates on this item amounted to 963 million euros in 2017 (Deutsche Bundesbank, 2018). This income remains fully with the Bundesbank, as it is not subject to the profit and loss sharing of the Eurosystem.⁸ Again the question then is to what extent the increase of the liabilities against non-euro area residents can be attributed to the PSPP. Considering that 90-95 percent

8. Profit and loss sharing with respect to items on the liabilities side of a NCB's balance sheet is restricted to interest income on central bank money (currency and deposit liabilities to euro area credit institutions).

of the liabilities against non-residents in 2017 are due to increases since the beginning of 2015, and that the Bundesbank's claims against non-residents did not increase in this period, it is plausible to attribute 90-95 percent of the resulting interest income to the APP. With a PSPP share of about 81 percent of the Bundesbank's APP purchases, approximately 75 percent of the interest income on liabilities against non euro area residents in 2017, i.e. 720 million euros, could then be attributed to the PSPP.⁹

3. The effect of a normalisation of monetary policy on seigniorage gains

The observation of substantial seigniorage gains raises the question whether these effects are permanent or just transitory. One main consideration is that the seigniorage gains that resulted from the PSPP were a by-product rather than a target of the ECB's policy, the latter being guided by the aim of a medium-run inflation rate of below but close to 2 percent in the euro area. This means that future seigniorage gains will very much depend on the course of the ECB's policy in the coming years.

There is currently intensive discussion about the normalization of the ECB's policy. Will normalization mean returning to monetary policy as it was prior to the financial crisis, or will there be a "new normal" that would entail different monetary policies (Claeys and Demertzis, 2017)? The most likely approach for the ECB seems to be to follow the procedure of the Fed. This consists of the following steps: (1) terminate asset purchases, (2) gradually raise short-term interest rates, and (3) gradually reduce holdings of public bonds by not reinvesting the principle in securities that are maturing.

Concerning the termination of the PSPP, the ECB already decided to terminate purchases by the end of 2018. During this period the cumulated purchases of public sector securities and the resulting seigniorage gains will still increase.

With respect to a rise in interest rates, the ECB has announced that it will keep its rates at the present level for some time after the expiration

9. The loss of 258 million euros on the Bundesbank's PSPP portfolio in 2017 would thus be more than compensated by the PSPP-induced interest earnings on excess reserves and on euro liabilities against non-euro area residents, which according to our estimates sum up to about 1,680 million euros, resulting in a net surplus of around 1,420 million euros.

of the APP. It is to be expected that the initial interest rate hikes will concern the deposit rate. Raising the deposit rate from its current level of -0.4% to 0% would remove the present positive interest income on the Eurosystem's deposits. The fiscal benefit of the PSPP will then be limited to the return on the public sector securities that have been acquired in the context of the programme. NCBs with a negative return on their PSPP portfolio, such as the Bundesbank, would face a loss from the PSPP at this stage. A subsequent increase of the deposit rate into positive numbers would lead to further negative seigniorage effects. As interest rates on the securities purchased under the PSPP are fixed for a prolonged period of time, the payment of positive interest rates on the NCB's deposits would reduce the net interest income from the PSPP—which thereby may turn negative also for NCBs that bought securities with positive rates of return.

A rise in the deposit rate will in particular affect the interest income of NCBs in financial centre countries. As shown above, these NCBs currently benefit from the negative interest rates on liabilities against non-euro area residents, which are not subject to profit and loss sharing within the Eurosystem. This in particular concerns the Bundesbank, whose liabilities against non-euro area residents reached an amount of about 200 billion euros by the end of 2017. A swing from a negative to a positive deposit rate would accordingly lead to a substantial negative swing in the Bundesbank's income account, which would have to be fully borne by the Bundesbank.

With the existing large excess liquidity, an increase in the deposit rate cannot be avoided if the ECB wants to raise money market rates. Raising just the main refinancing rate (MRFR) will not lead to higher money market rates, since high excess liquidity has made the refinancing of minimum reserve requirements largely obsolete. Since the start of the APP, money market rates have followed the deposit rate rather than the MRFR. The deposit rate, therefore, has become the core interest rate instrument of the ECB, and this is likely to remain the case as long as substantial excess liquidity prevails.¹⁰

Removing the current excess liquidity through an unwinding of the PSPP will take considerable time. A remarkable feature of asset purchase

10. In the United States, which has large excess reserves from its previous quantitative easing programmes, the last one ending in October 2014, interest rates on required reserves (IORR) and the interest rates on excess reserves (IOER) have been set at the same level. Since December 2015 they gradually rose from 0.25% to 2% in June 2018.

programmes such as the PSPP is that they are not symmetrical with respect to accumulating and reducing assets. It is relatively easy for central banks to buy public sector securities, even in high quantities, but there are major reservations when it comes to selling them. The main concern is that selling bonds in large amounts could provoke a new financial crisis. Another concern is that a sale of bonds before maturity could result in negative income effects for the central banks if the bonds were sold with a loss. In light of these concerns, an unwinding of the PSPP is likely to occur mainly by not reinvesting the principle in maturing assets. Since the PSPP portfolio includes mainly assets with a long duration, the unwinding of the PSPP would then be a lengthy process (the PSPP portfolio can include bonds with maturities of up to 30 years). In addition, it is not yet clear when such an unwinding will start. The Fed only began unwinding its quantitative easing programme in autumn 2017—three years after the end of the last purchase programme.

Removing the current excess liquidity by raising the minimum reserve ratio does not seem to be likely either. The Eurosystem's minimum reserve ratio was at 2 percent until January 2012. Since then, this ratio has been lowered to 1 percent. The total minimum reserve requirements for euro area banks amounted to 123 billion euros at the end of 2017. Raising the minimum reserve ratio to the earlier level of 2 percent would, thus, only remove a small fraction of the Eurosystem's excess liquidity, which amounted to 1882 billion euros at the end of 2017.

4. High excess liquidity: fiscal risks for the euro area

The PSPP has increased the fiscal exposure to interest rate risks in the member countries of the euro area. Governments usually finance themselves by issuing both securities with short duration and securities with long duration. Purchases of long-term government bonds through the PSPP alter the profile of the interest rate exposure: the PSPP turns a long-term obligation of the State (government bonds) into a short-term obligation (central bank liabilities paying interest at the deposit rate). This increases government exposure to short-run interest rate changes. Basically, the case is similar to the case in which the government itself replaces long-term borrowing by short-term borrowing (Williamson, 2017). In the latter case, an increase in short-run rates affects public budgets directly through higher interest

payments on short-term securities, in the former case indirectly through lower profit transfers from the NCB.¹¹

From a fiscal perspective, borrowing short-term via a liability of the country's NCB has advantages over short-term borrowing via the issue of government securities if the deposit rate is below the interest rate on short-term securities. Two effects have to be considered here. The first is that short-term government securities, such as treasury bills, have an advantage over excess liquidity, since the latter can be held only by a restricted set of financial institutions, while treasury bills are more widely held and are useful as collateral in financial transactions (e.g. repurchase agreements) in ways that reserves are not (Williamson, 2017). The second effect concerns country risk. While interest rates on short-term government securities differ in the euro area due to country risk, the deposit rate is the same for all countries. Thus the higher the country risk, the higher is the probability that borrowing at the common deposit rate is cheaper for the government than borrowing via the issue of short-term securities.

Comparing the April 2018 market rates of government securities with a residual maturity of 3 months in the euro area (World Government Bonds, 2018), we find relatively high negative rates for Germany (-0.68%), Netherlands (-0.63%) and France (-0.51%) and relatively low negative rates for Italy (-0.47%) and Portugal (-0.41%). While these figures reflect country risk, they are still below the deposit rate of -0.40% also for the countries with relatively high country risk, meaning that borrowing at the deposit rate does not provide a fiscal advantage. Nevertheless, being able to borrow at the deposit rate may turn into an advantage if country risk should increase in the future. Short-term borrowing through the NCB in the context of the PSPP thereby creates a backstop against increasing country risk.

The risk of rising interest rates on excess liquidity and other NCB liabilities resulting from the APP has led to an increase in central bank

11. Governments could react to the increased exposure to short-run interest rate changes that result from the PSPP by an opposite operation, i.e. by reducing their own short-term borrowing and increasing long-term borrowing instead. This would work in the direction of steepening the yield curve, thus weakening the impact of the PSPP. Greenwood *et al.* (2014) find that this happened in the context of the Fed's quantitative easing programmes.

Andrade *et al.* (2016, pp. 46-49) obtain a similar result for the euro area in 2015. For Italy, the Ministry of Economics and Finance reports an increase of the average life to maturity of total public debt from 76.62 months in January 2015 to 82.95 months in March 2018 (MEF, 2018).

risk provisions.¹² From a fiscal perspective, this reduced central bank profits so that seigniorage gains from the APP in the years 2015-2017 were only partly passed on to governments. Yet, in case of an acceleration of inflation pressure in the euro area, which would necessitate a substantial increase in the deposit rate, current risk provisions may not be sufficient.

The strong increase of excess liquidity that resulted from the PSPP and other programmes of the APP also affects fiscal risks that are associated with TARGET imbalances. The increase in excess liquidity is not distributed uniformly over the euro area but is heavily concentrated in financial centre countries, such as Germany, France, and the Netherlands (Baldo *et al.*, 2017).¹³ This preference for financial centre countries resulted in rising TARGET claims of their NCBs against NCBs in other countries, such as Italy, Spain, and Portugal (Eisenschmidt *et al.*, 2017).

Rising TARGET imbalances imply an increasing fiscal burden for TARGET surplus countries in the case that a country with a TARGET deficit would leave the Eurosystem and not honour its obligations. But this *per se* would not necessarily constitute an argument against the PSPP. To the extent that the programme stimulates economic activity, it tends to reduce the probability of a crisis that would force member countries to leave the Eurosystem. Moreover, by shifting public bonds from the hands of the private sector to national central banks, it may reduce the probability of speculative, self-fulfilling attacks on member countries with high public debt.

5. Limits to the PSPP

The large size of the PSPP has led to a discussion of the limits of the programme. As shown by Claeys and Leandro (2016), constraints are provided by the guidelines that the ECB has set itself. The guidelines concern the eligibility of securities and the maximum share of a security issue that can be bought by the Eurosystem. The maximum share was imposed to preserve market neutrality and to prevent the ECB

12. The Bundesbank (2017, p. 76) explicitly mentions the risk of interest changes resulting from the APP as a reason to increase its risk provisions.

13. Baldo *et al.* (2017) show that more than 50% of the purchases under the APP occurred with counterparties from outside the euro area. Those non-euro area investors tend to manage their euro holdings in financial centres of the euro area. But also euro area residents from non-financial centre countries such as Italy are reported to have invested the returns from their bond sales in financial centre countries (Banca d'Italia, 2017, p 14).

from having a blocking minority in a debt restructuring involving collective action clauses, as the ECB did not wish to be in a position in which it had the power to block a potential vote on the restructuring of the ECB-held debt of a euro-area country (Claeys and Leandro, 2016, pp. 5-6). Share constraints have been relevant for countries with low debt/GDP ratios such as Germany, where the Bundesbank had to purchase short-term securities with negative rates, as its share in long-run bonds with positive interest rates had already reached the limit.

To overcome the present constraints to the PSPP, one option would be to change the ECB's guidelines with respect to both the eligibility of securities and the permissible maximum shares. In fact, the ECB has changed the original guidelines at various occasions to increase the permissible volume of purchases:

- It expanded the list of national agencies that are eligible for purchases under the PSPP
- It increased the duration of eligible securities from 2-30 years to 1-30 years
- It removed the requirement that eligible securities must have a return above the deposit rate
- It raised the issue share limit, which was originally at 25 percent, to 33 percent for debt securities not containing collective action clauses; for debt securities by supranational issuers the share was even raised to 50 percent.

A further change of the guidelines, however, would give rise to the question what is the worth of the ECB's self-imposed limits if they are changed whenever they are reached. This suggests that the present PSPP has largely exhausted the ECB's potential for conducting such a policy. It is hardly conceivable that in case of renewed weak demand the ECB would be in the position to launch a second PSPP of a similar size as the current programme.

Apart from the limits that the ECB has set itself, there are also limits to the effectiveness of a monetary policy that seeks to stimulate demand via a reduction of long-term interest rates. The explicit task of the PSPP was to lower long-term rates through a reduction of the term premium.¹⁴ The announcement of the PSPP on 22 January 2015 and

14. Long-run rates can be decomposed into three components: the current short-term rate, the expected future short-term rates and the term premium, which reflects duration risk. While before embarking on the APP the ECB focused on lowering medium and long-term interest rates through providing information on its intended future path of short-term interest rates (forward guidance), the massive purchase of long-term securities in the market had the aim to reduce the term premium.

the initial purchases under the programme starting in March 2015 had the desired effect: the yield of euro area 10-year AAA bonds fell from about 0.6% at the beginning of January to about 0.2% in April 2015 (ECB, 2018).¹⁵ This reduction was, however, not maintained. By April 2018, the yields had again increased to around 0.6%—the same level as before the announcement of the PSPP. As short-term interest rates declined in this period,¹⁶ the spread between long-term and short-term interest rates has not been reduced, despite the extremely large purchase programmes, but even increased. Iskrev (2018) decomposes observed 10-year euro area yields into expectations components and term premia. He finds that the expectations component is relatively flat, and that changes in long-term rates track closely the movements of the term premium. His estimates show that while the term premium declined in the first months of 2015, it went up at a later stage, and that in October 2017 the term premium stood at the same level as before the announcement of the PSPP.¹⁷ This suggests that the effect of the PSPP on long-term interest rates was transitory rather than sustained.¹⁸ Doubts on the efficiency of the PSPP are also supported by Elbourne *et al.* (2018), who find that the effects of unconventional monetary policy on inflation at the aggregate euro area level are economically insignificant.

6. Does the euro area need closer cooperation on monetary and fiscal policy?

The established macroeconomic policy paradigm, building on the assumption that central banks can and should control medium-term aggregate demand and inflation through interest-rate policies, is subject to increasing doubts: "... after all, look what we have done for the seven last years. We have done the most extreme monetary policies we could imagine. We've had interest rates at zero. We've used forward guidance to try to convince people that they are going to stay at zero. We've used quantitative easing to try to bring down the long

15. Andrade *et al.* (2016, p. 15) consider the full spectrum of securities purchased under the PSPP and find that the announcement and the initial implementation of the programme lowered 10-year yields by 45 basis points.

16. The yield of 1-year AAA bonds fell from -0.10 in early January 2015 to -0.66 in mid-April 2018 (ECB 2018).

17. A similar result has been found by Chadha and Hantzsche (2018).

18. Praet (2018) finds that the ECB's non-standard measures which started in June 2014 had a sizeable and lasting impact on long-term interest rates. This result is, however, largely due to a substantial decline of long-term rates in the second half of 2014, i.e. before the announcement of the PSPP.

end of the yield curve as well as the short end. And seven years into this, inflation is below target in all the major economies of the world. So you can't call this a success. The sheer amount of monetary policy and the small effect it produced is really extraordinary" (Turner, 2016).

The question then arises what could be done to make monetary policy more efficient in situations that call for an expansion of aggregate demand in order reach the inflation target. Rather than trying to push interest rates further into negative territory, a preferable way may then be to stimulate aggregate demand by raising income. In fact, there has been discussion in the context of the introduction of the PSPP about whether the ECB could pursue an income-based monetary policy in the form of direct transfers to citizens (BIS, 2015). The main reason for not doing so is that direct transfers to citizens are usually considered to belong to the realm of fiscal policy. An income-based monetary policy would, therefore, require coordination with fiscal authorities. This would be in line with standard business cycle models, which show that monetary and fiscal policy together—not only monetary policy—may be necessary for macroeconomic stabilization in the wake of a large adverse disturbance such as the global financial crisis of 2008 (Corsetti *et al.*, 2016).

Following this consideration, one could ask why fiscal policy in recent years has not done more to support the ECB in its attempt to raise aggregate demand and inflation rates in the euro area. Rather than pushing deposit rates (and money market rates) into negative territory and embarking on an asset purchase programme totalling around 2500 billion euros, why not instead agree on a much smaller expansion of the ECB's balance sheet combined with, say, tax cuts to raise euro-area aggregate demand in line with the inflation target?

One reason is the fragmentation of fiscal policy in the euro area. In contrast to monetary policy, which is centralized in the euro area, fiscal policy decisions are made at the national level, which generally complicates the coordination of monetary and fiscal policy: "The problem is that there is no common European fiscal policy, which is also not foreseen in the Treaty. The overall fiscal stance is not discussed and there is no substantive effort to co-ordinate independent national fiscal policies. Many economists have pointed out that this constitutes a significant shortcoming of our monetary union design. Economic governance of the monetary union depends only on monetary policy without any concept of a macroeconomic policy mix" (Constancio, 2015).

A main factor in this respect is that economic conditions, including business cycles, may differ substantially between EMU member countries. So at the end of 2014—before the decision on the PSPP—the German economy did relatively well, with no output gap, unemployment rates already below the pre-2008 crisis level and prospects for a continued upswing in 2015/2016 (Boysen-Hogrefe *et al.*, 2014). The German government, therefore, saw no need for providing an additional fiscal stimulus. It also did not share the concern of the ECB about the low inflation rate and resulting deflation risks. On the other hand, countries in the south of Europe with high unemployment, sizable output gaps and low—in some cases even negative—inflation rates would have basically been in favour of a fiscal expansion, but were constrained by high levels of debt and the resulting consolidation pressure.¹⁹

While it appears to be appropriate to use the current upswing in the euro area for fiscal consolidation rather than fiscal expansion, the question of a coordination of monetary and fiscal policies in the euro area may come up again in the next recession (Feldstein, 2017). In the following we discuss several aspects that will have to be considered in such a case.

The standard textbook case of monetary-fiscal coordination is the one in which government increases spending or lowers taxes, and in which the central bank provides the money that is needed to finance the resulting deficit. The assumption of the textbook case is that the central bank does not pay interest on the monetary base. While fiscal policy financed by the issue of bonds may fail to be an effective instrument to stimulate demand, as it creates a debt burden on future budgets that dampens spending (Ricardian equivalence), the financing through the issue of central bank money does not create a debt burden, as money has not to be repaid and does not involve the payment of interest by the State. The latter assumption, however, does not apply in the euro area. The ECB, like many other central banks, pays interest on reserves holdings. As shown above, with high excess liquidity the deposit rate is closely linked to money market rates. Excess liquidity at the ECB has the property of short-term debt certificates with variable interest rates.²⁰ When short-term interest rates,

19. In this respect there is a difference to the situation in 2008/09 when euro area countries were in a common deep recession and embarked on fiscal stimulation programmes even in the absence of coordination.

20. The Bank of Sweden (2018) explicitly uses the term “debt certificates” in its balance sheet.

including the deposit rate, become positive, the payment of interest will become a fiscal burden, similar to the burden of short-term government securities.

In such circumstances monetary financing of a fiscal impulse does not bring an advantage over financing the impulse by short-term government borrowing. Both create a similar debt burden for citizens. As shown above, the deposit rate has in various cases been above the short-term interest rates that governments in the euro area had to pay. This means that financing government expenditures via excess reserves may result in a higher debt burden for the State than financing through issuing short-term government securities.

From the monetary side, a requirement for an effective coordination of monetary and fiscal policy, therefore, is to restrict the payment of positive interest on reserves. In fact, for long periods central banks did not pay interest on reserves. There were two main reasons to introduce them: lowering the opportunity cost of holding money (Friedman, 1969) and reducing the disadvantage of bank financing versus non-bank financing such as the issue of securities. From a fiscal perspective, the payment of interest on reserves brought a respective seigniorage loss. This loss was considered to be acceptable in times when monetary policy could steer the economy with its traditional instruments. But in situations that call for a policy of monetary-fiscal coordination, seigniorage gains tend to be crucial for the success of such a policy.

To create a sustained seigniorage from a future monetary-fiscal purchase programme, the Eurosystem would have to raise minimum reserve requirements sufficiently to absorb the increase in central bank money that has been created through the open market purchase of government bonds. The increase in minimum reserves has to be sustained, and interest rates on minimum reserves have to be set at zero permanently²¹.

The fiscal side of a monetary-fiscal programme poses particular problems in the euro area, as it requires a coordination of fiscal policy among the various member countries. All 19 euro area member countries would have to agree on a fiscal package. A monetary-fiscal programme is not possible for just a subgroup of countries, as asset

21. The MRFR applying to central bank lending would remain variable as would the deposit rate.

purchases for monetary purposes under such a programme would have to be symmetrical to the Eurosystem's country keys. Even if only a single country does not agree, the programme cannot become effective.

Even if all countries agree on the need for fiscal support to attain the ECB's inflation target, it still has to be decided which form the fiscal policy support should take: tax cuts, increases in spending, and if so which ones? This may turn out to be a complicated and lengthy procedure, and a delayed decision in one country will prevent the whole programme from getting started.

One suggestion to overcome these problems is to form a fiscal union among the euro area countries, with its own budget and the right to impose taxes and issue securities. Such a suggestion, however, is subject to multiple objections, and it is not likely that a fiscal union will be created in the foreseeable future. If a fiscal union is still far away and if an explicit monetary-fiscal programme specifying the fiscal obligations of each euro area member country is also difficult to put into practice, what is left to fight the next major recession?

Fiscal support would then basically have to come in the form of voluntary contributions of euro area member countries. Experience from the financial crisis shows that in a major recession there is widespread political support for a fiscal expansion. The important point to take care of is that a fiscal expansion is not prevented by concerns that this would further increase a country's debt burden. To remove these concerns, the central bank could announce its own contribution to stabilize aggregate demand. For example, the ECB could announce a public sector purchase programme on the order of 2% of euro area GDP to prevent any negative effects of the recession on the inflation rate. This would, then, be a guideline for governments of the member countries, signalling that they can take expansionary measures on the order of about 2% of GDP without raising the debt burden.²² Considering the positive effect of the fiscal expansion on output and employment, and hence tax receipts, the debt burden would even be

22. A fiscal impulse of 2% would be somewhat higher than the fiscal impulse during the financial crisis when cyclically-adjusted general government net lending in the euro area rose from 3.30% of potential output in 2008 to 4.92% in 2010 (OECD, 2018). As the ECB country key is based not only on GDP but also on population size, the Eurosystem's purchases would be somewhat above 2% for countries with low per capita income, and accordingly the room for expansionary measures will be somewhat above 2% for these countries. For countries with high per capita income, the room for expansionary measures will be somewhat below 2%.

reduced. This would create a strong incentive for governments to provide fiscal support for fighting the recession.²³

7. Conclusion

The extent to which the initial seigniorage gains will persist depends on the future course of the ECB's monetary policy. Raising the current negative deposit rate in the course of normalizing the ECB's monetary policy will reduce the seigniorage gains from excess liquidity and other central bank liabilities. Positive deposit rates will transform seigniorage gains on these items into losses, which could result in an overall negative interest income from the PSPP, in particular for NCBs that have acquired public sector securities with low or negative yields.

While the PSPP and other programmes of the APP initially had the desired effect of lowering the term premium of long-term securities and thereby reducing long-term interest rates, this effect was not sustained. As shown by Iskrev (2018), in October 2017 the term premium was again at the level that it had attained before the announcement of the PSPP. Comparing interest rates of 10-year AAA-bonds, we find that interest rates in April 2018 are about the same as at the beginning of January 2015, before the announcement of the programme. The finding that three years of enormous asset purchases by the Eurosystem had no sustained effect on the term premium and the level of long-term interest rates sheds substantial doubts on the effectiveness of the PSPP.

As central bank interest rates in the euro area are already very low (the deposit rate being even negative) and as limits to the effectiveness of the ECB's quantitative easing policies are showing up as well, doubt can arise that the ECB will be able to fight the next recession on its own, without support from fiscal policy. Organizing fiscal support in the euro area is, however, an extremely difficult undertaking. A fiscal union does not exist, and a formal monetary-fiscal support programme

23. As mentioned above, an important requirement is that the Eurosystem raises its (non-interest bearing) minimum reserves by the same amount as the purchase programme, i.e. in this case by 2% of GDP. With a euro area GDP of around 11 trillion euros in 2017, this would imply an increase of minimum reserves by about 220 billion euros, or a rise of the minimum reserve ratio from its current level of 1% to 2.75%. The new level would be not far above the ratio of 2% that the Eurosystem applied until 2012 and would not provide a major constraint on banks' credit policy, in particular in a period of large excess reserves. In a situation of excess liquidity and negative deposit rates, a rise of the minimum reserve ratio would even strengthen the financial position of credit institutes, as it would transform excess liquidity with a negative interest rate into minimum reserves with a zero interest rate.

that would require consent by all members of the euro area will be very hard to achieve.

What may be viable is a less stringent form of monetary-fiscal cooperation in which the ECB creates a strong incentive for voluntary fiscal contributions to fight the recession. So the ECB could announce a purchase programme of, say 2% of euro area GDP (much smaller than the current PSPP) and make sure that the purchase is leading to a persistent seigniorage gain (by raising minimum reserves in line with the amount of the purchase and by keeping interest rates on minimum reserves permanently at zero). This would signal to governments in the euro area that they can take expansionary measures on the order of about 2% of GDP without raising the debt burden (as the interest payments will be balanced by the NCB's seigniorage gain).

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BANK STABILITY AND THE EUROPEAN DEPOSIT INSURANCE SCHEME

Ilkka Kiema*

Labour Institute for Economic Research

Esa Jokivuolle

Bank of Finland

Empirical evidence shows that a financial distress, faced by a bank or the whole economy, might cause large-scale withdrawals of deposits even when bank deposits are protected by deposit insurance, implicitly or explicitly guaranteed by a government. Building on Kiema and Jokivuolle (2015), we present a new model of such partial bank runs. In our model withdrawals are caused by the fear that both the bank and the government's deposit guarantee might fail in the future. Our focus is on a guarantee rather than on insurance, since the assets of deposit insurance funds might not be sufficient in large-scale systemic crises. Guarantee failure is possible because, being sovereign, the government may choose not to keep its promises. This option causes a fixed welfare cost (e.g. a reputational cost), which in a sufficiently severe crisis may be smaller than the costs from deposit guarantee payments. We also assume that, being welfare-maximizing, the government recapitalizes the bank during the early stage of the bank run. When decisions concerning deposit guarantee payments are made, recapitalization costs are already sunk costs, but the partial bank run has reduced the coverage costs that the remaining deposits might cause for the government. In this way, the depositors who withdraw funds during a partial bank run decrease the danger of a deposit guarantee failure and increase the incentives of the remaining depositors to keep their deposits in the bank. We apply our framework to the European Deposit Insurance Scheme (EDIS), and we view the reliability of the Single Resolution Fund and its backstop as the counterpart to the reliability of the government's promises. It turns out that in an asymmetric shock that affects only a single eurozone country, the EDIS improves bank stability, but its effects might be ambiguous in a systemic crisis that affects the whole Banking Union.

Keywords: Bank crises, Information induced bank runs, Deposit guarantee, Bank regulation.

* Any views expressed are those of the authors and do not necessarily reflect the views of the Labour Institute for Economic Research and the Bank of Finland.

Empirical evidence suggests that even if bank deposits are protected by a deposit insurance, implicitly or explicitly guaranteed by a government, a distress that the bank or the government faces might induce depositors to make large-scale withdrawals of deposits as in a bank run. An example of such behavior was seen in Greece during the period from 2009 to June 2012, as the aggregate amount of Greek bank deposits decreased from €245bn to less than €174bn (Spiegel, 2014). It is estimated that only one-third of the funds were withdrawn because of decreasing living standards, and that two-thirds either left the country or were stored within Greece outside the Greek banking system (ibid).¹

The Greek “bank jog”, i.e., the withdrawing of deposits only gradually, and only a part of them, would not have made much sense if depositors during the years 2009-2012 had either no trust at all or perfect trust in the deposit guarantee. This is because in the former case it would have been rational to withdraw all deposits immediately, whereas in the latter case there would have been no reason for withdrawing any deposits. These two polar opposite cases are described by the classical bank run model of Diamond and Dybvig (1983), which is a model with three periods (the period $T=0$ at which the bank makes an investment; the period $T=1$ at which a bank run might emerge; and the period $T=2$, at which the return from the investment becomes available). The model has two equilibria: in the bank run equilibrium it is rational for all depositors to withdraw their deposits from the bank at $T=1$, because all the other depositors do so, while in the other equilibrium (the one without a bank run) there are a sufficient number of depositors (the *patient depositors*) for whom it is optimal to withdraw their deposits only at $T=2$.

A famous criticism by Goldstein and Pauzner (2005, p. 1294) points to a certain incoherence in the Diamond-Dybvig model: despite the existence of the bank run equilibrium, in the Diamond-Dybvig model the mutual bank solves the problem of selecting the optimal deposit contract *assuming that a bank run will not occur*. However, the model

1. Cf. also Brown *et al.* (2016), who have studied bank run-like withdrawals of deposits in Switzerland during the crisis years 2008-2009. They compare the distress which various Swiss banks were facing with the tendency of the depositors of each bank to withdraw their deposits. According to ibid. (pp. 2-3), bank accounts in a highly distressed bank (UBS) were 23 percentage points more prone to experience an outflow of funds than accounts in a non-distressed bank. Cf. discussion below.

does not as such answer the question which equilibrium will be realized (or even yield probabilities for the two equilibria).

Goldstein and Pauzner (2005) introduce a global games framework, in which each depositor receives at $T=1$ an inaccurate signal and uses it for deducing a probability distribution for the correct signal, and further, for the revenue from the bank's investment at $T=2$.² The equilibrium of this setting turns out to be unique. A unique equilibrium has been proved to emerge also when the depositors coordinate their behavior in an exogenously given manner,³ and when the demand deposit contract is suitably modified.⁴

The subsequent literature has also identified a variety of explanations for the *partial* nature of many observed bank runs. For example, Azrieli and Peck (2012) show that a bank run might remain partial when there is more variety in consumer preferences than postulated by Diamond and Dybvig (1983). Ennis and Keister (2010) consider a setup in which depositors withdraw their deposits sequentially and the government can respond to an emerging bank run by changing its policies in order to stop the run.

Most of the literature has so far focused on bank runs that occur in the absence of a deposit guarantee, or when the deposit guarantee is only partial (*cf.* Chen and Hasan, 2006, and Silva, 2008), i.e. guarantees a sum that is smaller than the principal of the deposits. The paper which, perhaps, is closest to our approach within the earlier literature is Allen *et al.* (2018), which studies the effects of a partial government guarantee with a global games framework. The guarantee extends in *ibid.* to both period $T=1$ and $T=2$, just like in our model (and unlike most of the earlier literature).

2. Cf. also e.g. Takeda (2001), who applies a global games model to international capital flows, Moreno and Takalo (2012), who interpret the dispersion in the signals of the global games framework as a measure of bank transparency, and Silva (2008), who analyzes the effects of the design of partial deposit guarantee schemes on bank run probabilities utilizing a global games framework.

3. The equilibrium becomes unique when one postulates that the depositors coordinate their behaviour (in accordance with some exogenously given rule) on the basis of a sunspot signal (see e.g. in Peck-Shell, 2003). Cf. also Engineer *et al.* (2013, p. 534) and Dermine (2015). Dermine (2015) considers a Diamond-Dybvig style setting and postulates that the bank has also capital and not just deposits, and that a bank run emerges only when the bank's loan losses are (according to the information that becomes known in the interim period) excessively large, given the bank's amount of capital.

4. Cf. Allen-Gale (1998). Allen and Gale point out that a unique equilibrium can be found in a Diamond-Dybvig style model with a shared signal if the bank's investment cannot be liquidated and if the bank is allowed to make the contract conditional on the return, which in their model becomes known already at $T=1$, that the bank obtains at $T=2$.

However, as e.g. the bank runs in Greece in 2009-2012 suggest, not just a bank run or a government guarantee, but also depositors' *trust in a deposit insurance or guarantee* can be partial. The above-mentioned models do not analyze the partiality of trust. In what follows we shall put forward a model in which partial trust is represented by a government deposit guarantee that might, due to the government's decision not to honor its promises, fail under sufficiently extreme conditions. In our framework, the possibility of a deposit guarantee failure emerges naturally as a result of the choices made by a welfare-maximizing government. This possibility might motivate depositors to withdraw their deposits after a negative signal, but it turns out that such bank runs are always partial, and the model provides a natural explanation for their partiality.⁵

From the point of view of economic theory, the main contribution of this paper consists in our uniqueness results: we prove that our model has a unique equilibrium and that also the size of the partial bank run is unique in this equilibrium, although we do not make use of the rather complicated global games framework (*cf.* Goldstein and Pauzner, 2005). On the other hand, our representation of partial trust forces us to introduce into our model some complications that are not present in most other bank run models. For example, our uniqueness result (see Theorem 3 below) would not be valid if we assumed that the investment would always produce one of just two different revenues, as in the Goldstein Pauzner framework, or that a signal would uniquely determine in advance the revenue from the investment, as in Allen-Gale (1998, p. 1253). It is essential for our purposes that the possible revenues form a continuum and that an advance signal can only provide a probability distribution for the revenue values within the continuum.

The analysis of the depositors' trust in a deposit guarantee system has become increasingly important with the development of the European Monetary Union. The roadmap that the European Commission presented on 6 December 2017 for deepening Europe's Economic and

5. The welfare function that the government of our model is maximizing has an affinity with the representations of welfare in Hasman *et al.* (2011), Keister (2016), and Allen *et al.* (2018). In the models of Hasman *et al.* (2011) and Keister (2016), the government chooses whether to bail out banks when some depositors are in the absence of the bailout unable to withdraw their deposits. While making its decision, the government takes into account both the utility that the withdrawn deposits bring to the depositors and the depositors' utility from a public good, whose available amount is diminished by the bailout. However, we do not explicitly introduce a public good in our model. Rather, we consider a government with deep pockets and assume that deposit guarantee payments decrease welfare without explicitly considering the alternative uses of the funds that are used for such payments. See footnote 9 for some further discussion.

Monetary Union suggested that the European Deposit Insurance Scheme (EDIS) should have been implemented already by the end of 2018 (European Commission, 2017a, p. 15), and in December 2018 the Eurogroup decided to set up a high-level working group to work on the next steps of its implementation (European Council, 2018).

Since it is unlikely that the assets of a deposit insurance fund (whether national or union-wide) would suffice for reimbursing all insured depositors in a severe, large-scale bank crisis, the availability of other sources of funding is quite essential for the credibility of deposit insurance. In the case of the EDIS, such extra funding would be provided by the Single Resolution Fund and its backstop. According to the proposal of the European Commission (2017b, p. 6), the backstop will be provided by the future European Monetary Fund. As the Commission points out, the backstop “will instill confidence in the banking system by underpinning the credibility of actions taken by the Single Resolution Board” (ibid.).

Clearly, a theoretical analysis of the confidence and the credibility that the Commission wishes to strengthen would be helpful for discussions of these new tools. Wishing to focus on cases in which the assets of deposit insurance funds are insufficient, we present a model with a government deposit guarantee rather than an insurance. This simplification leaves several important questions raised by the EDIS for further work. As e.g. Bénassy-Quéré *et al.* (2018) point out, the EDIS leads to new kinds of *moral hazard* problems: the introduction of the EDIS might increase the incentives of a government to force or nudge domestic banks to buy sovereign bonds, if the costs of debt restructuring to the depositors were under the EDIS paid by EU institutions rather than by a national deposit insurance scheme. Such problems could be analysed in a generalized version of our setting.

1. Model

There are three periods ($T=0$, $T=1$, and $T=2$), and consumers who aim at maximizing their expected utility, a single bank that accepts consumer deposits, and a government. (Like most other bank run models, our model abstracts from the central bank’s actions as the lender of last resort.) There is a riskless liquid asset, which may be used for consumption at any time, and which we picture as cash money for the sake of concreteness. The consumers deposit their liquid assets in the bank at $T=0$, and they may withdraw their deposits at $T=1$ or $T=2$.

Just like in the global games framework, there is a signal η that is observed at $T=1$, and which provides the actors with information about the state of the economy at $T=2$. It is quite essential in a global games model that the possible signals form a *continuum*, since in it the signal of each depositor is an inaccurate estimate of a more accurate (but unknown) average signal. However, we do not need to postulate an infinite number of different signals. To keep things as simple as possible, we shall below assume that there are just two possible signals $\eta = G$ and $\eta = B$ (G for “Good” and B for “Bad”). Intuitively, the good signal G corresponds to a normal state of affairs, in which depositors believe that bank deposits may be withdrawn at will, whereas after the bad signal B they might lose their trust both in their bank and in government institutions.

In our model the bank is owned by a banker who aims at maximizing his profit.⁶ The government aims at maximizing expected welfare. It makes a promise of a deposit guarantee but, being sovereign, it can choose whether to respect its promise or not.

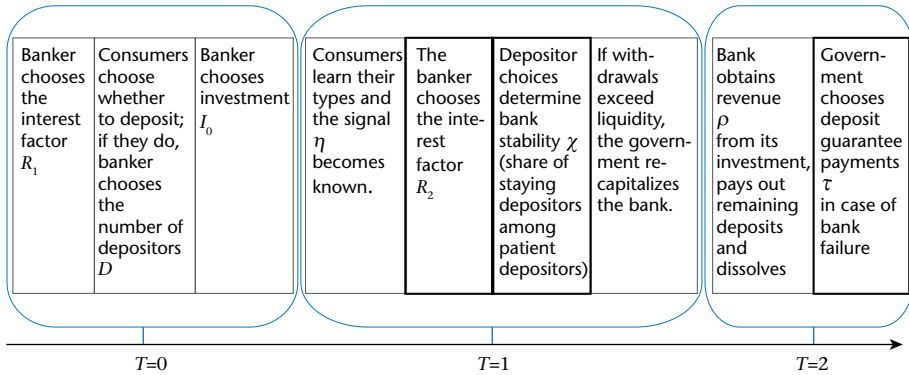
As Figure 1 illustrates, in the presence of three types of actors there are many more choices to be made than in a model in which only the depositors are free to choose between different courses of action. A general analysis of a sequential game that contains all the steps shown in the Figure below would be quite complicated, but fortunately, it is unnecessary for our current purposes.

The point of our analysis is to study the case in which $\eta = B$, i.e. the case in which the bad signal is observed, and our focus will be on the choices that are made after its occurrence. We think of the bad signal as an adverse, unexpected event, and our approach will be to first solve the model, assuming that the signal is always good, i.e. that $\eta = G$ with probability 1. Keeping the choices made before the signal unchanged, we then consider the choices that are made after it.

This procedure has two interpretations. We may think of it as corresponding to a *restricted rationality* assumption which states that the depositors and the bank behave at $T=0$ just as if the signal were known to be good for sure. The emergence of the bad signal is under this interpretation an unexpected shock that makes the agents change their strategies.

6. Our reasons for introducing a banker into our model, instead of considering the simpler mutual bank of the Diamond-Dybvig model and most of the literature building on it, will soon become obvious: we wish to consider bank failures at the last period, $T=2$, and such failures could not occur in a Diamond-Dybvig style model in which the mutual bank simply divides its wealth between the depositors at $T=2$.

The other interpretation is based on the fact that—as we shall shortly see—the equilibrium choices at $T=0$ that we present are *corner solutions*. Even when the possibility of a bad signal is taken into account, they will remain the optimal choice if the bad signal (relative to which they are suboptimal) is sufficiently unlikely. Hence, the solution that we present must correspond to a Nash equilibrium of the whole game depicted in the Figure below, also without assuming restricted rationality, if the probability of the bad signal $\eta = B$ is sufficiently low.



1.1. The timeline

The consumers form a continuum, whose size we normalize to $1 + \mu$, and which consists of μ *impatient* consumers and 1 *patient* consumers. Each consumer is allocated one unit of the riskless, liquid asset in the beginning of period $T=0$.

Impatient consumers obtain utility only from consumption at $T=1$, while patient consumers obtain utility from consumption both at $T=1$ and at $T=2$. The utility of both patient and impatient consumers is represented by the utility function u , which by assumption satisfies the familiar conditions

$$u(0) = 0, u'(c) > 0, u''(c) < 0 \quad (1)$$

and which, by normalization, is also assumed to satisfy the condition⁷

$$u'(0) < 1 \quad (2)$$

7. The motive for introducing the assumption (2) will be made clear in Section 1.4. There it will be seen that the assumption (2) restricts the weight that the government gives to consumer utility in its welfare function ((26) below).

Denoting the consumption in periods $T=1$ and $T=2$ by $u(c_1)$ and $u(c_2)$, respectively, the utility of a patient consumer is given by $u(c_1 + c_2)$ and the utility of an impatient consumer is given by $u(c_1)$. The characteristics of being patient or impatient are unobservable to others, and not yet known at $T=0$.

The banker has profitable investment opportunities that are not available to the consumers directly. Motivated by these opportunities, the bank presents the depositors with a demand deposit contract that allows them to withdraw R_1 at $T=1$ or postpone withdrawal until $T=2$. The government promotes bank stability with a deposit guarantee that applies to the deposits withdrawn in each period. The deposit guarantee is a promise that the government provides the depositors with the principal of their deposit (i.e., one unit of liquid assets), should the bank fail to do so. We shall discuss the functioning of this guarantee in Sections 1.2 and 1.4 below.

The consumers may choose between depositing and storing their wealth in the form of liquid assets. When the depositors are willing to deposit, the banker may choose any number of depositors between zero and the total number of consumers, $1 + \mu$. We denote the number of depositors by D . Since the qualities of being patient or impatient are not known, the number of the impatient depositors is

$$D_{IMP} = \frac{\mu}{1 + \mu} D \quad (3)$$

and the number of patient depositors is

$$D_{PAT} = \frac{1}{1 + \mu} D \quad (4)$$

Having received deposits, the banker uses the sum I_0 (where $0 \leq I_0 \leq D$) for an investment.

At the beginning of period $T=1$ the signal η (where $\eta = G, B$) becomes known, and the consumers learn their types (patient or impatient). The banker then specifies the interest factor R_2 that applies to the deposits which are withdrawn only at $T=2$.⁸ Knowing the signal, their own types and the deposit interest factors, the depositors choose

8. Observe that under these assumptions the banker cannot make at $T=1$ a binding commitment ($R_1, R_2(\eta)$) which would specify also the payoff at $T=2$, R_2 , and make it depend on the signal. The exclusion of this possibility is motivated not just by realism (i.e., the fact that actual demand deposit contracts do not make interest rates contingent on receiving negative economic signals) but also by our interpretation of the signal $\eta = B$. Its real-world counterparts are not meant to be well-defined economic indicator values that one could make contracts contingent upon, but various kinds of negative developments that cannot be characterized precisely in advance.

whether to withdraw. We refer to the decision not to withdraw as *staying* for short.

It is obvious that all the impatient depositors always choose to withdraw. We denote the share of the staying and of the withdrawing depositors among all patient depositors by χ and λ , respectively. Clearly,

$$\lambda + \chi = 1 \quad (5)$$

We could choose either λ or χ to be the variable that represents the choice made by the depositors. It has turned out that using χ leads to less clumsy notation. While λ would be a measure of the size of the bank run, χ can be thought of as a measure of the stability of the banking system, and we refer to it as *bank stability* for short. Clearly, the value $\chi = 0$ corresponds to the full-scale bank run of most bank run models, while the maximum value $\chi = 1$ corresponds to a no-bank-run equilibrium, in which all patient depositors stay.

If the withdrawal at $T=1$ exceeds the liquid assets of the bank, the bank can get funding through government *recapitalization*. By recapitalization we mean a procedure in which the government provides the bank with the extra liquid assets that it needs for the withdrawn deposits and in exchange receives the ownership of some share s_G of the bank.⁹ This ownership gives the government the right to receive the part s_G of the payoff of the bank at $T=2$.

If government recapitalization were the only source of funding for the banker in case of a liquidity shortage, our model would not yield a well-defined equilibrium value for s_G . However, we postulate that the banker has also the possibility to *disinvest*. More specifically, if the banker makes at $T=0$ the investment I_0 and liquidates the part ΔI ($0 \leq \Delta I \leq I_0$) of it at $T=1$, the liquidation immediately produces $\gamma(\Delta I)$, where $\gamma < 1$. Disinvestment reduces welfare, and the government prefers recapitalizing the bank to letting the banker disinvest. The outside option of disinvestment affects the equilibrium of the

9. We are assuming that the government is always able to provide the needed recapitalization. Our model does not explicitly discuss sovereign debt or taxation as sources of government funding. However, to motivate the government's ability to recapitalize, we observe that recapitalization might be a problem mainly when the bad signal relates to the whole financial sector of the deposit guarantee area, rather than just to a single bank. In this case the bank of our model should be viewed as a representative, average bank, and low values of the revenue p from the bank's investment should be viewed as counterparts of a systemic bank crisis (cf. discussion in Section 4 below). In our model the "bad" signal $\eta = B$ at $T=1$ is a signal which indicates that low revenue value p are possible, rather than a signal stating that a low value of p has been realized. Hence, it is not implausible to think that recapitalization could be funded by sovereign debt at $T=1$.

model *via* the value of s_G , which is determined by the condition that the banker would choose to disinvest if recapitalization reduced his profits more than disinvesting. This is discussed in more detail in Section 1.2.

If the investment which remains at $T=2$ is I , it produces ρI where ρ is a random variable. The probability distribution of ρ is influenced by the signal η . We assume that after each signal η ($\eta = G$ or $\eta = B$) the distribution of ρ is characterized by the density function $h_\eta(\rho)$. For the purposes of comparative statics, it is practical to assume that $h_B(\rho)$ is positive in some interval $(0, \rho_{B,max})$ with $\rho_{B,max} > 1$. This assumption implies that, after the “bad” signal, arbitrarily small returns for the investment occur with a positive probability. On the other hand, to keep things simple, we shall assume that after the “good” signal the investments are, at least to some extent, profitable in the sense that

$$h_G(\rho) = 0 \text{ when } \rho < 1 + \varepsilon \text{ for some positive } \varepsilon \quad (6)$$

i.e., when the investment I produces after the “good” signal at least slightly more than the value of the invested liquid assets.

In the (non-equilibrium) case of disinvestment, the assets of the bank will at $T=2$ consist of the return γI from the remaining investment. The bank could also have liquid assets¹⁰ that remain after the investment of $T=0$ and the withdrawals of $T=1$. The liabilities of the bank consist of χ deposits of value R_2 . If the assets suffice for the withdrawals, the depositors receive their deposits and the bank’s owners (the banker, the government, or both) get the difference between its assets and liabilities. When the assets are insufficient, the bank fails. In this case the bank is taken over by the government. As we have seen, the government has given a *deposit guarantee*, which obliges the government to provide each of the staying depositors with the principal (i.e., 1) of her deposit. As the last move of the game (which occurs only in case of bank failure), the government chooses whether to honor its promise. We postpone the more detailed discussion of bank failure, and the welfare function that the government maximizes while making its choice, to Section 1.4 below.

10. We shall shortly see that at $T=2$ there are, as a matter of fact, no such remaining liquid assets in the equilibria of the model.

1.2. Recapitalization and the bank's final payoff

We now turn to a more detailed discussion of period $T=1$. As we have seen, all the D_{IMP} impatient depositors will withdraw at $T=1$, and in our notation the number of withdrawing and staying patient depositors are denoted by λD_{PAT} and by χD_{PAT} , respectively. Remembering (3), (4), and (5), we see that the withdrawals amount to

$$R_1 (D_{IMP} + \lambda D_{PAT}) = R_1 \left[\frac{\mu}{1+\mu} + \frac{1}{1+\mu} \lambda \right] D = R_1 \left[1 - \frac{\chi}{1+\mu} \right] D \quad (7)$$

We denote the difference between the liquid assets of the bank (in the absence of a disinvestment) and the withdrawals by L , so that

$$L = D - I_0 - \left(1 - \frac{\chi}{1+\mu} \right) D R_1 \quad (8)$$

Simple algebra shows that the liquid assets of the bank suffice for the withdrawals (i.e. that $L \geq 0$) even without any disinvestment if the bank χ stability satisfies $\chi \geq \bar{\chi}$, where

$$\bar{\chi} = \frac{1+\mu}{R_1} \left(\frac{I_0}{D} + R_1 - 1 \right) \quad (9)$$

By definition, the bank's *net worth* at $T=2$ is the difference between its assets and liabilities, and as we have seen, the bank fails when this difference is negative. The bank's *final payoff* is equal with the net worth when the bank does not fail, and zero when it does. We denote the bank's final payoff by π_{BANK} and the banker's profit by π_{BANKER} . These are identical when the bank's liquid assets suffice for the withdrawals at $T=1$, and we may now conclude that they are in this case given by

$$\begin{aligned} \pi_{BANK} = \pi_{BANKER} &= \max \left\{ L + \rho I_0 - R_2 \frac{\chi D}{1+\mu}, 0 \right\} \\ &= \max \left\{ (\rho - 1) I_0 - (R_1 - 1) D - (R_2 - R_1) \frac{\chi D}{1+\mu}, 0 \right\} \quad (\chi \geq \bar{\chi}) \end{aligned} \quad (10)$$

When $\chi < \bar{\chi}$, the liquid assets of the bank are insufficient for the withdrawals. In this case there are two strategies to be considered, disinvestment and recapitalization. In a disinvestment, a part ΔI of the bank's investment changed into $\gamma(\Delta I)$ (where $\gamma < 1$) in liquid assets. We assume that the government prefers recapitalization to disinvestment independently of which one of the signals $\eta = B, G$ is realized, and independently of the size of the bank run.¹¹

11. Cf. footnote 9 above.

We also assume that, in case of recapitalization, the government prefers larger values of its share s_G as an owner of the bank to smaller ones. The latter assumption means, simply, that the government prefers obtaining the bank's payoff to giving it to the banker. Also the intuition behind the former assumption is easy to see. Disinvestment reduces the profits when ρ is sufficiently large to prevent the bank from failing, and when ρ is smaller and the bank fails, a smaller revenue from the remaining investment might correspond to larger deposit guarantee payments by the government at $T=2$. Hence, assuming that γ is sufficiently small, it makes sense for the government to recapitalize the bank instead of letting the banker destroy a part or the whole of the investment.

When extra liquidity is needed, the value of L (defined by (8)) is negative, and the necessary extra liquidity amounts to $|L|$. As our next step, we shall explain how the outside option of disinvesting determines the share s_G of the bank that the government can demand for itself in exchange for providing $|L|$. In general, a disinvestment of size ΔI reduces the remaining investment to $I = I_0 - \Delta I$ and produces $\gamma(\Delta I)$ in liquid assets at $T=0$. Using the disinvestment strategy, the liquid assets that are available at $T=1$ consist of the liquid assets $D - I_0$ that remain after $T=0$ plus the liquid assets $\gamma(\Delta I)$ from the disinvestment. These assets equal the withdrawals only after the whole investment has been disinvested (i.e. when $\Delta I = I_0$ and $I = 0$) if χ equals

$$\underline{\chi} = \frac{1+\mu}{R_1} \left[(1-\gamma) \frac{I_0}{D} + R_1 - 1 \right] \quad (11)$$

If $\chi \leq \underline{\chi}$, the disinvestment strategy would lead to the elimination of the whole investment, and if $\chi < \underline{\chi}$, it would cause bank failure already at $T=1$. Between the two extremes $\chi = \bar{\chi}$ (for which no disinvestment is needed and the remaining investment is $I = I_0$) and $\chi = \underline{\chi}$, the investment that remains under the disinvestment strategy is a linear function of χ . Hence, we may express the investment that still remains at $T=2$ under the disinvestment strategy as

$$I_{DIS}(\chi) = \begin{cases} 0, & \chi < \underline{\chi} \\ \left[(\chi - \underline{\chi}) / (\bar{\chi} - \underline{\chi}) \right] I_0, & \underline{\chi} \leq \chi \leq \bar{\chi} \end{cases} \quad (12)$$

After disinvestment, the assets of the bank would at $T=2$ amount to $\rho I_{DIS}(\chi)$ and the liabilities would amount to R_2 for each of the χD_{PAT} remaining deposits. Remembering (4), it is seen that the final payoff from the bank would be

$$\pi_{DIS} = \max \{ \rho I_{DIS}(\chi) - R_2 \chi D / (1+\mu), 0 \} \quad (\chi \geq \bar{\chi}) \quad (13)$$

This final payoff would at the same time express the profit of the banker.

The disinvestment strategy affects the equilibrium of the model, in which extra liquidity is provided by recapitalization, *via* the result (13). Under the recapitalization strategy, in which the government provides the missing liquidity and demands in exchange the ownership of the share s_G of bank, the final payoff from the bank is

$$\pi_{BANK} = \max \{ \rho I_0 - R_2 \chi D / (1 + \mu), 0 \} \quad (\chi \leq \bar{\chi}) \quad (14)$$

The share s_G of this payoff goes to the government and the share $1 - s_G$ to the banker. Hence, in this case the banker's profit is

$$\pi_{BANKER} = (1 - s_G) \pi_{BANK} \quad (\chi \leq \bar{\chi}) \quad (15)$$

while the final payoff that the government receives from the bank is

$$\pi_{GOV} = s_G \pi_{BANK} \quad (\chi \leq \bar{\chi}) \quad (16)$$

The banker will not accept recapitalization if the expected profit from it is smaller than the expected profit from disinvestment. Introducing the notation

$$E_{\rho|\eta} G(\rho) = \int_0^\infty G(\rho) h_\eta(\rho) \quad (\chi \leq \bar{\chi}) \quad (17)$$

for the expectation value of any function of $G(\rho)$ of ρ , assuming that the signal is η (where either $\eta = B$ or $\eta = G$), we may formulate the condition that determines the government ownership s_G as

$$(1 - s_G) E_{\rho|\eta} (\pi_{BANK}) = E_{\rho|\eta} (\pi_{DIS}) \quad (\chi \leq \bar{\chi}) \quad (18)$$

We conclude from (12) and (13) that the result (18) is formally valid also when $\chi < \bar{\chi}$ (i.e., in which the disinvestment strategy leads to the elimination of the whole investment and bank failure already at $T=1$) since in this case disinvestment corresponds to zero profit, implying that the government can demand the whole bank for itself and that $s_G = 1$. Our analysis of the banker's strategy is based on the result, which is implied by (15) and (18), that

$$E_{\rho|\eta} \pi_{BANKER} = (1 - s_G) E_{\rho|\eta} \pi_{BANK} = E_{\rho|\eta} \pi_{DIS} \quad (19)$$

so that the banker's expected profit-maximizing choices are identical with the ones that correspond to the disinvestment strategy (despite the fact that the recapitalization strategy is always chosen).

1.3. The signal G and some simplifications

We shall now consider the case in which the signal η turns out to be G . According to (6), this implies that at $T=2$ the investment produces at least slightly more than the value of the invested assets. Our analysis of this case justifies a number of simplifications to our model.

Although we have already explained why we may leave the banker's choice between disinvestment and recapitalization out of the game that we consider (and assume that recapitalization is always chosen), a bewildering number of choices still seem to exist in the model. At $T=0$ the banker chooses R_1 ; the depositors choose whether to deposit; if they do, the banker chooses the amount of deposits D and the size of the investment I_0 ; after the signal η the banker chooses the interest factor R_2 ; the depositors choose whether to stay or withdraw; and at $T=2$, in case of bank failure, the government chooses whether to provide the promised deposit guarantee.

However, our approach is to solve the equilibrium values R_1 , D , I_0 , R_2 and χ assuming that the good signal $\eta = G$ is observed, to assume that the choices R_1 , D , and I_0 (which are made before observing the signal) correspond to the good signal, and to investigate the game that takes place after the signal when the signal is $\eta = B$. When the case with the "good" signal is investigated, it is not necessary to consider the choice of the government at $T=2$, because this choice (i.e., whether to provide deposit guarantee payments) is made only in case of bank failure, and it turns out that after $\eta = G$ the bank never fails in equilibrium. As we stated above, under its obvious interpretation our model describes a case in which the signal $\eta = B$ is a shock that the actors have not considered while choosing their strategies at $T=0$, but the same equilibrium emerges also when the probability of the signal $\eta = B$ is sufficiently small, given the information of period $T=0$.

As our first step, we observe that a choice $R_2 < R_1$ would lead to a full-scale bank run, since for a patient consumer the utility of withdrawing is always $u(R_1)$, but the utility from staying is maximally $u(R_2)$. Accordingly, from now on we shall assume that $R_2 \geq R_1$. Similarly, if it were the case $R_1 < 1$ and that the bank obtained a positive number of depositors, the utility for them of withdrawing would be less than $u(1)$, the utility of not depositing. On the other hand, the utility of staying would be $u(R_2) > u(R_1)$ for any value of R_2 that is slightly larger than R_1 , implying that the bank could make all the patient depositors stay by

offering an interest rate $R_2 < 1$. Understanding this, the depositors would not deposit if $R_1 < 1$.

From now on, we shall restrict attention to the non-trivial case in which $R_2 \geq R_1 \geq 1$. The part (a) of the following result gives an explicit formula for the profit of the banker that applies to interest factors which are in the non-trivial range and which are “sufficiently small”. Part (b) states that there is no point for the banker to raise interest factors above the “sufficiently small” ones. The interest factor \bar{R}_M sets a limit for being “sufficiently small” and it is given by

$$\bar{R}_M = 1 + \frac{\varepsilon}{1 + \mu(1 + \varepsilon)} \quad (20)$$

where ε is the value which appears in (6). The investment I_0^* which appears in the following result is, intuitively, “of the right size” in the sense that the bank does not have to disinvest if there is no bank run, but it also has no extra liquidity after the patient depositors’ withdrawals.

Remark 1.¹² Consider some strategy of the banker in which the banker chooses $R_1 = \bar{R}_1$ and, if the signal turns out to be good, chooses $R_2 = \bar{R}_2$ where $\bar{R}_M > \bar{R}_2 > \bar{R}_1 > 1$.

- (a) The choices D^* of D and I_0^* of I_0 which maximize the expected profit of the banker after the good signal are $D^* = 1 + \mu$ (i.e., the maximal investment) and

$$I_0^* = (1 + \mu) - \mu\bar{R}_1$$

For these choices all patient depositors choose to stay after the good signal, and the profit of the banker is

$$\pi_{\eta=G}^*(\bar{R}_1, \bar{R}_2) = \rho I_0^* - \bar{R}_2$$

- (b) Consider now choosing R_1 and, if the signal turns out to be good, R_2 , where $R_2 > \bar{R}_2$ and $R_1 > 1$. With these choices the banker’s expected profit after the good signal is smaller than

$$E_{\rho|G} \pi_{\eta=G}^*(\bar{R}_1', \bar{R}_2) \text{ where } \bar{R}_1' = \min\{\bar{R}_1, \bar{R}_1\}$$

Together with our earlier discussion, Remark 1 shows that the equilibrium choices R_1 and R_2 must satisfy $1 \leq R_1 \leq R_2 < R_M$. Letting R_1 be some fixed value that satisfies $1 \leq R_1 < R_M$, we observe that a choice $R_2 > R_1$ cannot be the banker’s equilibrium choice after the good

12. An appendix containing the proofs of the Remarks and Theorems is available upon request from Ilkka Kiema (ilkka.kiema@labour.fi)

signal, since in this case a slight decrease in R_2 would according to Remark 1 increase the banker's expected profit. It follows that the only Nash equilibrium is the limiting case in which $R_2 = R_1$, it is immaterial to the patient depositors whether to stay or withdraw (since they know that the bank never fails and their utility is in both cases $u(R_1)$), and they all choose to stay so that $\chi = 1$.

We now consider the banker's choice of R_1 at $T=0$. Since in equilibrium $R_2 = R_1$, we observe that

$$\pi_{\eta=G}^*(R_1, R_1) = (1 + \mu - \mu R_1) \rho - R_1$$

Now the choice $R_1 > 1$ cannot maximize expected profit, since $E_{\rho|G}(\pi_{BANKER}^*)$ is decreasing in R_1 . Hence, the only Nash equilibrium is the limiting case in which $R_1 = 1$, it is immaterial for the consumers whether to deposit since this yields the same utility as holding liquid assets would yield, and the number $D = D^* = 1 + \mu$ of consumers, as desired by the banker, choose to deposit.

Consider now the case in which the signal unexpectedly turns out to be the "bad" signal $\eta = B$. Except for the result concerning the interest factor R_2 , which is chosen only after the signal has been observed, the above results remain valid also in this case. Remembering (3) and (4), the simplifications that apply also to this case can now be summarized as follows:

$$\begin{cases} D = 1 + \mu \\ D_{PAT} = 1 \\ D_{IMP} = \mu \\ R_1 = 1 \\ I_0 = 1 \end{cases} \quad (21)$$

We also observe that the value of L defined by (8) (which expresses the difference between the liquidity that the bank needs at $T=1$ and its actual liquidity) is now given by

$$L = \chi - 1 \quad (22)$$

implying that the bank never has extra liquidity. We saw above that the case with extra liquidity corresponds to χ values with $\chi > \bar{\chi}$. We can now conclude from (9) and (11) that

$$\begin{cases} \underline{\chi} = 1 - \gamma \\ \bar{\chi} = 1 \end{cases} \quad (23)$$

which also shows that the case with extra liquidity is impossible.

Finally, remembering (19) and (13), we observe that the expected profit of the banker can (in general, and not just after the “good” signal) be now expressed as

$$E_{\rho|\eta}\pi_{BANKER} = E_{\rho|\eta}\pi_{DIS} = E_{\rho|\eta}\max\{\rho I_{DIS}(\chi) - R_2\chi, 0\} \quad (24)$$

where

$$I_{DIS}(\chi) = \frac{\chi + \gamma - 1}{\gamma} \quad (25)$$

Armed with these simplifications, we now move to the discussion of the case in which the signal turns out to “bad”, i.e. $\eta = B$. There are three choices that remain to be considered in this case: the choice of R_2 at $T=1$ by the banker; the choice whether to withdraw or to stay, made at $T=1$ by the depositors; and the choice whether to provide the promised deposit guarantee, made at $T=2$ by the government. To proceed, we must now discuss bank failure and the government’s choice in more detail.

1.4. The deposit guarantee and the welfare function

By assumption, the welfare function that the government wishes to maximize is

$$W = \tilde{U} + \xi\pi_{BANKER} + \pi_{GOV} - (1 - \chi) - \chi\tau - \hat{F} \quad (26)$$

where the first term

$$\tilde{U} = (D - \chi)u(1) + \chi u_s \quad (27)$$

is the aggregate utility of the depositors, u_s being the utility of each staying depositor. (The withdrawing $D - \chi$ depositors include, of course, both the impatient depositors and the withdrawing patient depositors.) The next two terms correspond to the payoff that bank ownership yields to the banker and to the government. The constant multiplier ξ satisfies $\xi < 1$, which means, intuitively, that the government sees less welfare value in the assets obtained by the banker than in the assets it gets for itself.

The fourth term represents the costs of recapitalization. We saw in Section 1.2 that the needed recapitalization is always $|L|$, which according to (22) equals

$$|L| = -L = 1 - \chi$$

To explain the remaining two terms, it is necessary to discuss deposit guarantee in more detail. In case of bank failure the assets of the bank—which amount to $\rho I_0 = \rho$, since the bank cannot have any excessive liquid funds at $T=1$ in equilibrium—are divided equally

between the χ staying depositors. By assumption, the government makes an additional transfer $\tau \geq 0$ to each staying depositor in case of bank failure. The choice of the government in the game that we consider consists in choosing the value of τ . This implies that the utility of each staying depositor is

$$u_s = u(\rho / \chi + \tau) \quad (28)$$

We model the deposit guarantee as the promise that the payments to each staying depositor,

$$\rho / \chi + \tau$$

will altogether amount to at least 1 (i.e., the principal of the deposit). In other words, the government promises that transfer τ amounts to at least

$$\tau_{DEP} = \max\{0, 1 - \rho / \chi\} \quad (29)$$

The quantity \hat{F} is the counterpart of reliability of the government's promise. Being sovereign, the government can also choose not to honor its promise, but this choice causes a fixed welfare cost $F > 0$. The welfare cost represents e.g. indirect reputational costs from distrust in government institutions, and because of it the welfare-maximizing government can fail to provide the promised withdrawn deposits only when providing them is sufficiently costly. Formally, we define \hat{F} by

$$\hat{F} = \begin{cases} F, & \tau < \tau_{DEP} \\ 0, & \tau \geq \tau_{DEP} \end{cases} \quad (30)$$

We are now in the position to motivate the assumption (2), i.e. $u'(0) < 1$. We conclude from (27) and (26) that this assumption restricts the weight that consumers' utility has in the government's welfare function. In general, a welfare-maximizing government might wish to make social transfers to the depositors of a failed bank even in the absence of any deposit guarantee (simply in order to increase their utility). However, wishing to focus only on government spending that is motivated by the guarantee, we shall exclude the possibility of such transfers from our model. To exclude this, we conclude from (1) that the maximal aggregate utility that a small transfer Δc to m bank depositors could yield is $m(\Delta c)u'(0)$, while the welfare cost of those transfers is $m(\Delta c)$. Hence, the postulate that such transfers are never socially optimal may be formulated as the condition (2), i.e. $u'(0) < 1$.

2. Solving the model

We are now ready to solve the restricted model that describes the events after the “bad” signal $\eta = B$. Solving it consists of finding the 3-tuples (R_2, χ, τ) , that correspond to its Nash equilibria. Proceeding by backward induction, we begin by solving the choice of the deposit guarantee payment τ by the government, when the values of R_2 (which is chosen by the banker) and the value of χ (which emerges from the choices of the patient depositors) have been given.

2.1. Choice of the government at T=2

The following remark, which is a straightforward consequence of (2) and (26), states that the government never makes payments to the depositors that would exceed the payments motivated by the deposit guarantee; i.e., it makes either just the promised payment τ_{DEP} or no payment at all.

Remark 2. The transfer τ that a welfare-maximizing government chooses is always either $\tau^* = \tau_{DEP}$ (i.e. the minimal transfer that is compatible with the promised guarantee) or $\tau^* = 0$.

Obviously, the choice $\tau^* = 0$ corresponds to deposit guarantee failure whenever $\tau_{DEP} > 0$. On the other hand, when the bank does not fail, and also when the assets ρ of the failed bank suffice for covering the principal of the remaining χ deposits (i.e. when $\chi \leq \rho$), (29) implies that $\tau_{DEP} = 0$. In this case Remark 2 simply states that the government does not make any extra transfers to the remaining depositors of the bank. According to the following theorem, deposit guarantee failures can occur only when the revenue from the bank’s investment is sufficiently small.

Theorem 1. If the government lets the deposit guarantee fail for some values of the bank’s revenue ρ , there is a threshold value $\bar{\rho}_{GUAR}^*$ of the revenue ρ which is such that the government lets the deposit guarantee fail when $\rho < \bar{\rho}_{GUAR}^*$ but not otherwise. The value $\bar{\rho}_{GUAR}^*$ is determined by

$$\chi u(1) - (\chi - \bar{\rho}_{GUAR}^*) = \chi u\left(\frac{\bar{\rho}_{GUAR}^*}{\chi}\right) - F$$

We can conclude from Theorem 1 that

$$\bar{\rho}_{GUAR}^* \leq \chi \quad (31)$$

as, of course, should be the case (since the deposit guarantee is not needed when $\rho \geq \chi$).

For the ease of notation, we now define $\bar{\rho}_{GUAR}^* = 0$ if it is not welfare-maximizing to let the deposit guarantee fail for any value of the revenue ρ . Given this convention, Theorem 1 implies that the set of revenue values ρ for which the government lets the deposit guarantee fail is always the (possibly empty) interval $(0, \bar{\rho}_{GUAR}^*)$. We shall still present an essential result that is concerned with the comparative statics of $\bar{\rho}_{GUAR}^*$.

Remark 3. The threshold value $\bar{\rho}_{GUAR}^*$ increases with the number χ of the staying depositors. More rigorously, the deposit guarantee cannot fail if χ is sufficiently small, and $\bar{\rho}_{GUAR}^*$ is strictly increasing in χ whenever χ is such that the deposit guarantee can fail.

Summing up, in our model the government makes only transfers that are made necessary by the deposit guarantee. Further, the values of the revenue ρ for which the deposit guarantee fails (if any) are below the threshold value $\bar{\rho}_{GUAR}^*$, and the range of such values (if any) gets larger as the number of the staying depositors increases. This is, of course, because of the rising costs that payments to a larger number of depositors cause for the government.

2.2. The choice between staying and withdrawing by the patient depositors

Having found the equilibrium choice by the government at $T=2$, we now turn to the choice that the patient depositors make at $T=1$ between staying and withdrawing. While withdrawing always produces the utility $u(1)$, the utility from staying depends on both the interest factor R_2 and the signal η that determines the probability distribution of the revenue of the bank's investment, $h_\eta(\rho)$. We shall denote the expected utility from staying (given $\eta = B$ and R_2) by $E_{\rho|B}u_S$.

Assuming that the bad signal $\eta = B$ has been observed, there are four cases to consider when evaluating u_S . Firstly, the bank does not fail if the revenue from the investment, ρ , is equal to or larger than its liabilities χR_2 . In this case each depositor receives the sum R_2 . Secondly, if $\chi < \rho < \chi R_2$, the bank's assets suffice for paying the guaranteed sum (i.e. 1) to each staying depositor despite bank failure. In this case the assets of the bank are divided evenly between the staying depositors, so that each of them receives the sum of ρ/χ . Thirdly, if $\bar{\rho}_{GUAR}^* \leq \rho < \chi$, the payments to each staying depositor amount to the minimum that is compatible with the guarantee, i.e. 1. Finally, if $\rho < \bar{\rho}_{GUAR}^*$, the government fails to honor its promise, and each staying depositor

receives only the sum ρ/χ that they would receive in the absence of the deposit guarantee. Summing up,

$$\begin{aligned} E_{\rho|B}u_S = & \int_0^{\bar{\rho}^{*}_{GUAR}} u\left(\frac{\rho}{\chi}\right)h_B(\rho)d\rho + \int_{\bar{\rho}^{*}_{GUAR}}^{\chi} u(1)h_B(\rho)d\rho \\ & + \int_{\chi}^{\chi R_2} u\left(\frac{\rho}{\chi}\right)h_B(\rho)d\rho + \int_{\chi R_2}^{\infty} u(R_2)h_B(\rho)d\rho \end{aligned} \quad (32)$$

We are now in the position to explain why bank runs always remain partial in our model. Clearly, a partial bank run makes the liabilities of the bank decrease, but due to recapitalization, there is no corresponding decrease in the revenue from the bank's investment. Hence, as Remark 3 also implies, the probability of bank failure must decrease as the number of staying depositors decreases, and a bank run stops when the expected utility from staying has become identical with the utility from withdrawing, i.e. when

$$E_{\rho|B}u_S = u(1) \quad (33)$$

Theorem 2. The bank run is partial for any interest factor $R_2 > 1$. In other words, when $R_2 > 1$, the equilibrium number χ^* of the staying depositors satisfies $\chi^* > 0$.

The monotonous decrease of bank failure probability implies that the number of the staying depositors has a unique equilibrium value. This result is due to recapitalization, and it is valid even in the absence of the deposit guarantee.¹³ When extra capital is available, the decision of some patient consumers to withdraw is not a reason for the other patient consumers to follow suit; rather, it might be a reason to stay because it reduces the remaining liabilities of the bank.

Theorem 3. Assume that the banker's interest factor choice $R_2 > 1$ is fixed. The subgame that consists of the number of staying depositors χ and the government's choice of τ has a unique equilibrium. In particular, the number χ^* of the staying depositors is uniquely determined in equilibrium.

To add further intuition to Theorem 3, one should note that the costs of recapitalization are already *sunk costs* when the government decides whether to make deposit guarantee payments. However, the earlier bank run reduces the costs that are caused by the guarantee for

13. More rigorously, the situation in which there is no deposit guarantee may be represented by putting $F = 0$ and $\bar{\rho}^{*}_{GUAR} = \chi$. The result (32) implies also that when these choices are made the attractiveness of staying decreases with χ .

the remaining deposits. Hence, the bank run serves as *commitment device*, as it increases both the government's incentives to keep its promise and the remaining depositors' expected utility from staying, and this makes the bank run stop at a uniquely determined point. Also, the following plausible result is valid.

Remark 4. In a partial bank run equilibrium the equilibrium number of staying depositors increases with the bank's interest factor R_2 . In other words, $d\chi^*/dR_2 > 0$ when the bank run is partial.

2.3. The choice by the banker

We shall now consider the first move of the three-move game after the "bad" signal. This is made by the bank, and it consists of choosing R_2 . The banker aims at maximizing his expected profit in choosing this, and the expected profit is according to (24) and (25) given by

$$E_{\rho|\eta} \pi_{BANKER} = E_{\rho|\eta} \max \left\{ \rho \left(\frac{\chi + \gamma - 1}{\gamma} \right) - R_2 \chi, 0 \right\}$$

Defining $\bar{\rho}_{BANKER}$ as the threshold value that satisfies

$$\bar{\rho}_{BANKER} = \frac{\gamma R_2 \chi}{\chi + \gamma - 1} \rho \quad (34)$$

we may express the banker's profit also in the form

$$E_{\rho|\eta} \pi_{BANKER} = \int_{\bar{\rho}_{BANKER}}^{\infty} \left[\rho \left(\frac{\chi + \gamma - 1}{\gamma} \right) - R_2 \chi \right] h_B(\rho) d\rho \quad (35)$$

Theorem 3 implies that when the interest factor value R_2 has been fixed, there is a unique value of the bank stability χ that corresponds to an equilibrium. Finding the expected profit-maximizing value of χ is a difficult task despite this uniqueness result. Assuming that the expected profit (35) is positive, there are three kinds of cases to consider.

Firstly, we remember that according to Remark 3, the deposit guarantee never fails when the number of staying depositors is sufficiently small. We let χ_M represent the threshold value that separates the χ values for which the deposit guarantee can and cannot fail. Since it must be the case that $\bar{\rho}_{GUAR}^* = 0$ when $\chi = \chi_M$, we can infer from Theorem 1 that χ_M is also characterized by

$$\chi_M (1 - u(1)) = F \quad (36)$$

We now observe that as R_2 approaches the minimum $R_2 = 1$ from above, the number of staying depositors must according to (32) and (33) approach χ_M . (Intuitively, the interest $R_2 - 1$ is a compensation for

the loss that the depositor suffers when the deposit guarantee fails, and in equilibrium this compensation approaches zero when the risk of deposit guarantee failure approaches zero.) The profit that corresponds to this limiting case is

$$E_{\rho|\eta}\pi_{BANKER} = E_{\rho|\eta} \max \left\{ \rho \left(\frac{\chi_M + \gamma - 1}{\gamma} \right) - \chi_M, 0 \right\}$$

In this case the banker takes no action to stop the bank run that is caused by the bad signal and relies completely on the government's promise as a tool for stopping it.

Secondly, considering larger values of R_2 , the maximization problem might have an internal solution for which the derivative of (35) is zero, i.e. for which

$$\frac{dE_{\rho}\pi_{BANKER}}{dR_2} = \int_{\bar{\rho}}^{\infty} \left[-\chi + \left[\frac{\rho}{\gamma} - R_2 \right] \frac{d\chi}{dR_2} \right] h_B(\rho) d\rho = 0 \quad (37)$$

Thirdly, there is another corner solution to be considered: it might be possible and optimal for the banker to increase the interest factor R_2 until there is no bank run, i.e. until $\chi = 1$. We denote the smallest value of the interest factor (if any) that suffices for this purpose by $R_{2,M}$.

3. The welfare effects of a change in deposit guarantee reliability

In our model the reliability of the deposit guarantee is represented by the cost F . As F represents the inability of the government to make binding commitments, the search for the optimal (welfare-maximizing) value of F does not seem very meaningful; after all, F cannot, by definition, be freely adjusted by the government. Nevertheless, we shall address the question of how expected welfare (relative to the probability distribution of ρ , given the signal $\eta = B$) would be affected by changes in F .

Considering the expectation value of our welfare function (36), it is easy to see that the expected consumer utility \tilde{U} is a constant, since in equilibrium the utility of each consumer is according to (33) always $u(1)$. This is because in equilibrium the risks that bank failure or deposit guarantee failure might cause to the depositors are always compensated by interest payments. Hence, we may write expected welfare as

$$E_{\rho|B}W(R_2, \chi) = u(1) + E_{\rho|B}(\xi\pi_{BANKER} + \pi_{GOV}) - (1 - \chi) - E_{\rho|B}(\chi\tau + \hat{F}) \quad (38)$$

Since we measure the reliability of the deposit guarantee by F , i.e. by the cost of breaking it, an improvement in its reliability has a direct negative welfare effect when the guarantee breaks down and which in accordance with (30) shows up as an increased value of \bar{F} . This negative welfare effect has no counterpart in the traditional bank run models in which the guarantee is always perfectly reliable and often a promise that one never needs to keep.

The rest of the terms depend on (38) the reliability parameter F indirectly, because of its influence on bank stability, as measured by χ . In addition, the final payoff from the bank—which is divided into the banker's profit π_{BANKER} and the government's final payoff π_{GOV} —depends also on the interest factor R_2 that the banker chooses, which is affected by F .

In a discussion of the aggregate effect on expected welfare, there are three cases to consider. Beginning with the easiest case, we consider the situation in which the banker eliminates the bank run altogether by choosing the smallest interest factor $R_1 = R_{2,M}$ that suffices for preventing it. In this case there is no recapitalization, the banker's profit is identical with the final payoff from the bank, and $\chi = 1$ so that (38) becomes

$$E_{\rho|B} W(R_{2,N}, \chi) = u(1) + E_{\rho|B} (\xi \pi_{BANKER}) - E_{\rho|B} (\tau + \hat{F})$$

In the no-bank-run equilibrium the increased reliability of the deposit guarantee will, according to Theorem 1, decrease ρ_{GUAR}^* , and in accordance with (33) and (32) this effect must be compensated by a decrease in the interest factor $R_{2,M}$. Intuitively, as the government takes care of improving the stability of the banking system, the bank can make its depositors stay also with a lowered interest factor. Now the positive welfare effect of the improved guarantee consists solely in the banker's increased profits.

In the other corner solution, $R_2 = 1$, and the bank run stops only when there are so few staying depositors that the government guarantee never fails. In this limiting case the number of the staying consumers has the value χ_M , which is determined by (36). Now an improvement in the reliability of the guarantee leads to greater bank stability (i.e. greater χ_M) and greater profits for the banker. It also decreases the amount of new capital that is needed at $T=1$ (i.e. $1 - \chi_M$), which is a welfare-increasing effect. At the same time, it decreases the part of the bank's profit that the banker is obliged to give to the

government at $T=2$, which is according to the welfare function (36) a negative effect.

The above analysis becomes much more complicated when one considers the internal solution in which (37) is valid. It is clear that in the internal solution the interest factor R_2 and stability χ are between the values that they have in the two corner solutions, i.e. that in the internal solution $1 < R_2 < R_{2,M}$ and $\chi_M < \chi < 1$. While it is also obvious that—keeping the interest factor R_2 fixed—an increase in the reliability of the deposit guarantee improves bank stability, it is not obvious how the derivative $d\chi / dR_2$, which according to (37) affects the expected-profit-maximizing choice of R_2 by the banker, changes as a result of a change in χ . It is even conceivable that a small improvement in the deposit guarantee reliability might motivate the banker to lower the deposit interest factor to an extent that would *increase* the size of the bank run χ . To understand this possibility intuitively, we may think of the deposit interest rate R_2 as the counterpart of all the efforts that a bank could itself make to stop a bank run. In the non-corner solution, the government and banker are both taking steps to stop the bank run, and an improvement in government interference—i.e. increased reliability of the government's deposit guarantee promise—can motivate the bank to decrease its efforts to such an extent that bank stability is actually *decreased* by the improved guarantee. Again, when the positive and negative welfare effects are weighted against each other, one must consider also the increase of the welfare cost F that emerges in case of actual deposit guarantee failure.

We may, however, observe that the three equilibria approach each other when F approaches the value for which the deposit guarantee never fails (not even when $\chi = 1$ and all depositors stay). We conclude from (36) that this will be the case when F is at least

$$F_N = 1 - u(1)$$

Considering the limit in which F approaches F_N , we observe that in the no-bank-run equilibrium (in which $\chi = 1$) the deposit interest factor $R_{2,M}$ approaches 1 from above, and in the maximal-bank-run equilibrium (in which $R_2 = 1$) the bank stability χ_M approaches 1 from below. In the limit in which $F = F_N$ one reaches the trivial equilibrium that occurs also after the good signal $\eta = G$, and in which there is no bank run although the interest factor is 1 and the depositors do not get interest for their deposits.

4. The effects of the EDIS on bank stability

We now apply the insights from our new framework to the EDIS. The natural field of application of our framework is a crisis that is sufficiently large to make the assets of deposit insurance funds insufficient, implying that reimbursing deposits may involve a political decision to provide additional funding for the reimbursement. In the case of a national deposit insurance scheme, the decision would normally be made by the government, while in the case of the EDIS the counterparts of the “government” of our model would be the Single Resolution Fund and—should the single Resolution Fund be unable to fulfill its task—its backstop. The decision to make use of the backstop would be a political decision and quite analogous with the decision that the government makes at $T=2$ in our model. More specifically, in the Commission proposal the backstop would be deployed only if the decision to deploy it were backed by 85% of the votes of the member countries (European Commission, 2017b, p. 6).

Our model allows us to give precise formulations to two opposite effects of a shared deposit insurance scheme. Firstly, consider a crisis that is restricted in size, such as a financial crisis in a single eurozone country or the crisis of a single large bank. Our framework leads to the conclusion that in the case of a restricted crisis, the shared deposit insurance scheme tends to improve the stability of the banking sector (measured by the size of bank runs). This conclusion is normally supported by referring to the better diversification that a larger insurance company or fund provides. However, in our model the shared scheme is a “diversification device” in a more abstract sense.

As already discussed earlier, the government’s costs from a deposit guarantee breakdown are in our model indirect (as they consist of reputational costs and e.g. reduced trust in government institutions), but the costs from reimbursing depositors of a failed bank are direct. The indirect costs grow when the deposit guarantee area grows, which can be represented as growth of the guarantee failure cost F in our framework, while the direct costs are not affected by the size of the deposit guarantee area. In other words, in case of a regional bank crisis we may argue that the costs from a deposit guarantee breakdown are increased by the shared deposit insurance scheme (since the “reputational” cost is now faced by the whole EU Banking Union) without a corresponding increase in costs from reimbursing deposits. In our model this should make a deposit guarantee breakdown less likely and reduce or altogether eliminate partial bank runs. (In reality it might, of

course, also happen that the national deposit insurance fund is insufficient for the needed reimbursements, while a shared deposit insurance fund suffices for them, in which case a shift to the EDIS would altogether eliminate the government decision that occurs in our model.)

On the other hand, the stability effects of introducing the EDIS might be ambiguous in a systemic crisis that affects the whole Banking Union and leads to the use of the backstop of the Single Resolution Fund. In our model there is just a single bank, and a natural way to apply the model to a crisis of the whole deposit guarantee area would be to think of the bank as a representative “average” bank and of the cost F as the reputational cost of deposit guarantee failure, divided by the number of banks in which such failures occur. Under this interpretation a change of scale would not by itself cause any changes in the above analysis, if the aggregate reputational cost F grew in proportion to the size of the deposit guarantee area. In other words, one would arrive at the conclusion that the changing size of the deposit guarantee area (e.g. shifting from a national deposit insurance scheme to the EDIS) is irrelevant when a severe, systemic crisis hits the whole area equally.

However, the “reputational cost” F represents also the depositors’ trust in the deposit insurance scheme, and such trust—as the example of the Greek “bank jog” in 2009-2012 shows—is not identical in all the eurozone countries. If under the EDIS the reputational cost and the corresponding depositor trust reflected some weighted average of member countries’ national levels of trust before the introduction of the joint scheme, we could conclude that the EDIS tends to decrease the danger of partial bank runs in the countries in which there is less trust in the national deposit insurance than in the eurozone on the average. However, the opposite might be the case in the countries in which national institutions are trusted more highly.

In addition, it might be excessively optimistic to view the trust that depositors feel for the EDIS as an average. After all, trust depends also on the ability of our model’s “government” (which is in the literal sense a government in the national deposit insurance schemes, and the backstop and other EU institutions in the EDIS) to make fast decisions. Such decisions might be more difficult for EU institutions than for national institutions in a systemic crisis e.g. because of the required 85% majority. One policy implication hence is that in order for the EDIS to achieve its full potential stability benefits, the backstop should be designed to be as credible as possible.

5. Concluding Remarks

We have considered bank runs that are caused by the suspicion that, in spite of its promises, a government might not protect deposits during a severe future crisis. In this setting, bank runs are quite different from those in more traditional models, in which they occur in the absence of a deposit guarantee and are caused by the fear that a shortage of liquidity might lead to an immediate bank failure. In the absence of a deposit guarantee, traditional models of bank runs (e.g. Diamond and Dybvig, 1983) have two equilibria: the one in which no one has an incentive to withdraw his deposits (except for immediate consumption needs) because other depositors do not withdraw theirs, and the other in which all depositors withdraw simultaneously. In contrast, we have assumed that the government always bails out banks by providing recapitalization if banks have a liquidity shortage in the absence of a crisis. Nonetheless, as the government may break its deposit guarantee in a severe crisis, bank runs may still occur.

Our model provides a simple explanation for why bank runs can be gradual and partial, as has been recently often observed, e.g. in the eurozone. As deposits are withdrawn during a bank run, the government's future liability of guaranteeing the remaining deposits is gradually reduced. This increases the government's incentive to honor its promise, because the cost of breaking its guarantee (which might be caused by e.g. reputational concerns) does not diminish like the remaining payments. This in turn decreases the remaining depositors' incentive to withdraw. Eventually, there is a unique point when the bank run stops. As an application of our model, we contrasted the EDIS with national deposit guarantee schemes and concluded that while the EDIS probably tends to improve bank stability (measured by the size of bank runs) in bank crises of a restricted size, the opposite could also be the case in a systemic crisis that affects the whole eurozone. The effects of introducing the EDIS might also differ in different countries, depending on whether the citizens have more trust in national than in EU-level institutions, or vice versa.

From the point of view of economic theory, it is worth emphasizing that the above mechanism renders the equilibrium of our model unique, although we do not make use of the global games framework that is in essence more complicated mathematically (*cf.* Goldstein and Pauzner, 2005). Our analysis could be extended in a variety of directions. For example, it would be quite interesting to study the alternatives to our postulated liquidation procedure and to introduce

monetary policy and asset markets into the model (*cf.* Allen and Gale, 1998), to study the effects of various types of government guarantees analogously with Allen *et al.* (2018), or to try to address the moral hazard problems that the EDIS might cause for the governments whose sovereign debt is held by domestic banks.

One of the interesting generalizations of our model is the following. In our model the government reduces the future cost of its own deposit guarantee liability when it provides liquidity to a bank so that the bank can weather a partial run on deposits. In this way, liquidity provision, or recapitalization, serves as a *commitment device*, which makes a deposit guarantee breakdown less likely. This works out because we have assumed that the cost of the government's liquidity provision before a crisis is a *sunk cost*. A possible extension to our analysis would be to assume that liquidity provision is not a sunk cost completely, but increases sovereign debt and contributes to the government's financial distress when the deposit guarantee is in danger of breaking down. This would most likely reduce bank stability in the setting of our model.

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