

IMPROVING THE SGP: TAXES AND DELEGATION RATHER THAN FINES

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Abstract

We analyze motivations for, and possible alternatives to, the Stability and Growth Pact (SGP). With regard to the former, we identify domestic policy failures and various cross-country spillover effects; with regard to the latter, we contrast an “economic-theory” perspective on optimal corrective measures with the “legalistic” perspective adopted in the SGP. We discuss the advantages of replacing the Pact's rigid rules backed by fines with corrective taxes (as far as spillover effects are concerned) and procedural rules and limited delegation of fiscal powers (as far as domestic policy failures are concerned). This would not only enhance the efficiency of the Pact, but also render it easier to enforce.

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1 Introduction

The Stability and Growth Pact (SGP) of EMU is an attempt at letting internationally agreed arrangements compensate for inadequate incentives of national fiscal policy makers, as reflected in cross-country spillover effects or domestic policy failures. As dramatically illustrated by the contemporary problems of implementing the SGP, such arrangements may be in conflict with the pursuit of other national policy targets, for instance ambitions to dampen the business cycle, smooth tax distortions, or fight unemployment. In fact, a large early literature predicted that such conflicts *had to* arise at some point. What is less clear, however, is whether revisions of the SGP, or alternatives to the Pact, can mitigate these conflicts, and what such revisions or alternatives might be. These questions are at the core of this paper.

From an economic-theory perspective, the most appealing response to spillover effects is a system of corrective taxes. By internalizing the consequences of spillovers, such a system ensures an optimal trade-off between national policy targets on the one hand and the ambition to correct spillovers on the other. The SGP, in contrast, largely reflects a legalistic perspective according to which policies causing unfavorable spillover effects should be forbidden and violations punished. We argue in this paper that this legalistic view constitutes the background for important deficiencies of the SGP, related to its suboptimal incentive structure and difficulties in enforcing its rules. Naturally, an ideal set of corrective taxes is hardly operational, due to the lack of precise quantitative information about the economic environment and domestic policy failure. But a simple corrective tax system may be feasible, and the SGP therefore offers room for improvement.

In contrast to spillover effects, domestic policy failure can only partially be addressed by corrective taxes (unless politicians themselves can be taxed). Direct constraints on policy makers constitute an alternative. Such constraints are costly, since they imply a loss of policy flexibility. We share the rather common view that the rigid rules embodied in the SGP are excessively costly, since they impose unnecessarily tight restrictions. While several proposed reforms of the SGP imply some improvements in that respect, they do not resolve the fundamental conflict between policy flexibility and the ambition to counteract policy failures. Limited delegation of fiscal powers to fully accountable committees, in contrast, does offer a conceivable solution. A priori, neither delegation nor other measures to address domestic policy failure need to be imposed on the supranational level. Nevertheless, supranationally imposed measures could be in a country's best interest, if domestic policy failure extends to the constitutional level.

The remainder of the paper is structured as follows. In Section 2, we compare the incentives of fiscal policy makers before and after the emergence of EMU. We identify potential problems with fiscal policy choices in EMU, related to spillover effects as well as policy failures. In the former case, we distinguish between cross-country redistributions of income, international demand externalities, and strategic interaction among policy makers. In Section 3, we discuss alternative arrangements to address spillover effects and policy failures, and mechanisms for enforcing such arrangements. Section 4 concludes. The Appendix contains a formal discussion of the framework underlying the analysis in Section 2.

2 Fiscal-Monetary Policy Interaction

Our objective in this section is to characterize the problems arising as a result of decentralized fiscal policies in a world with interdependent national economies. For this purpose, we consider the situation in Europe both before and after the introduction of the common monetary policy. For analytical reasons, we also compare these situations to a hypothetical “Nirvana” benchmark of fully coordinated policy actions. Such comparisons allow us to identify whether the introduction of the monetary union did create new problems, or rather accentuated already existing problems.

In the following, we refer to these three scenarios as “EU” (the situation in the European Union before the introduction of the monetary union), “EMU” (the situation in the European Union after the introduction of the monetary union), and “benchmark” (the situation with “ideally” coordinated policy choices). Our discussion is based on a formal characterization of the incentive structure of policy agents in the benchmark, EU, and EMU as presented in the Appendix.

2.1 Benchmark: Perfect Policy Coordination

The benchmark reflects the case of fully coordinated decision making by all fiscal and monetary authorities, aiming at maximizing some agreed-upon joint objective function subject to optimizing household behavior. Such international policy coordination may appear esoteric, even as a benchmark, but the EU Treaty (the Amsterdam Agreement) on which the SGP is built in fact expresses ambitions to pursue union wide objectives by means of close policy coordination (see, for example, Article 99 of the Treaty). Moreover, coordination need not actually be conducted in terms of maximizing some abstract agreed-upon objective function. Rather, it may consist of an informal process of bargaining and compensatory side payments.¹

To make the benchmark comparable with the EU and EMU scenarios analyzed below, we assume that policy makers cannot commit. The benchmark therefore differs from the constrained optimal outcome—the Ramsey allocation—which requires commitment. To simplify the exposition, we confine the analysis of the interaction between fiscal and monetary authorities to a single period. This is not very restrictive, since policy makers are allowed to “care” for state variables at the end of the period. For example, policy makers may have preferences over the stock of government debt at the end of the period to the extent that this debt affects future policy options and, hence, the welfare of future taxpayers.

In a world where national economies are interconnected, national fiscal or monetary policies influence economic outcomes in other countries. We shall say that *spillover effects* arise if the policy choices by one authority directly influence variables entering in the objective function of other authorities. We will talk about *policy mediated spillover effects*, if the policy choices by one authority indirectly, via induced policy responses by a third authority, influence variables entering in the objective function of other authorities. In the benchmark case, all direct spillover effects are fully internalized and, therefore, do not cause any deadweight losses, because all

¹A prerequisite for gains from coordination to be exploitable is that authorities have some common perceptions about how the world works; such (common) perceptions may not always be present, however.

authorities agree on the joint objective function. By the envelope theorem, the same also holds for policy mediated spillover effects.

2.2 EU: Decentralized Fiscal and Monetary Policies

We characterize the situation before the introduction of the common monetary policy as decentralized decision making by monetary and fiscal authorities without commitment. The assumption that fiscal authorities cannot commit seems indisputable. After all, fiscal policies are at the core of political controversies and bargaining in national politics and hence, commitment would largely be incompatible with democratic decision making. Our parallel assumption with regard to central banks deserves further comment, however, given that central banks in the pre EMU era seemed less inclined to implement expansionary policies than the respective fiscal authorities. But this does not imply that central banks were committed to decision rules. Rather, it conforms well with the view that delegation of monetary policy to Rogoff (1985)-type “conservative” central bankers (with limited commitment like any other official) gave rise to the observed behavior.

We assume that central banks move after fiscal authorities, thereby capturing the notion that central banks can adjust their instruments in a much more flexible fashion. This does not imply that central banks are forced to straighten out the macroeconomic mess that might be left by fiscal policy makers. Since there is no commitment, and since there will be “later” governments and central banks around, central bankers rather have the last word in each period. In the light of economic circumstances, including fiscal policy, they have the freedom to determine inflation or exchange rates at their discretion.

Lack of Policy Coordination Optimal policy choices by a fiscal policy maker maximize his objective function, subject to the expected optimal policy choices by all other fiscal authorities and the expected policy responses by all national central banks. As a consequence, the incentive structure of fiscal policy makers in EU differs from the benchmark in two important respects; see the respective first-order conditions (1) and (2) in the Appendix. First, policy makers in EU *do not internalize spillover effects*. Second, when accounting for the welfare effects of their policy choices on their own objectives, policy makers in EU *do not only consider the direct effects*, but also the indirect effects due to induced policy changes by subsequently moving authorities. Clearly, the source of the first difference, namely that policy makers do not take spillover effects into account, is a conflict of interests: Authorities maximize their individual objective functions rather than a joint (supranational) objective function. The same conflict of interests is at the source of the second difference, namely that decision makers consider the responses to their own actions by other authorities. For if incentives were fully aligned, authorities would not have to worry about the induced policy responses by other policy makers.

With conflicting interests among policy makers, direct spillover effects are no longer internalized and, therefore, have social welfare implications. We distinguish between three types of such consequences:

- i. The general equilibrium effects of policy choices by each authority redistribute wealth across households and countries. While such so-called pecuniary externalities do not create

efficiency losses, they might be problematic from a global welfare point of view, depending on the distributional preferences.

- ii. Efficiency losses due to general equilibrium effects do occur if authorities are non-atomistic (a natural assumption) and exploit their market powers. With multiple non-atomistic policy makers, this results in strategic interaction.²
- iii. Finally, efficiency losses due to general equilibrium effects may also occur as a result of non-internalized aggregate demand externalities, if nominal prices or wages are sticky. The consequences of these demand externalities are reflected in output gaps and unemployment rates.

The (non internalized) *policy mediated* spillover effects that arise if policy makers move sequentially have parallel social welfare implications.

Evaluated by the joint objective function, policy choices in the benchmark implement an allocation on the (second-best) Pareto frontier. Since the decentralized equilibrium must satisfy additional incentive compatibility constraints, it must rank weakly lower than the benchmark case, if evaluated according to this objective function. If, in contrast, the welfare comparison between the two equilibria is based on the preferences of individual policy makers, the outcome in EU must be weakly worse for at least one authority. In fact, all authorities may potentially rank the decentralized equilibrium lower than the benchmark allocation, due to the deadweight losses discussed above.

Domestic Policy Failure Up to this point, we have discussed problems arising due to the different policy objectives of authorities. Other complications may be characterized as agency problems: Politicians do not always act in the best interest of society, in particular because the electorate is not fully informed about the consequences of policy. These agency problems are aggravated by the fact that different citizens have conflicting interests, and politicians themselves also have a limited knowledge about the functioning of the economy. As suggested by a large literature on domestic fiscal policy failure,³ fiscal policy choices may therefore be inefficient, even in the absence of spillover effects and strategic interaction at the international level.

2.3 EMU: Decentralized Fiscal Policies, Centralized Monetary Policy

We characterize the situation after the introduction of EMU as decentralized decision making in the fiscal field, combined with centralized monetary policy (once more without commitment)—with the newly established European Central Bank (ECB) replacing national central banks. In the first stage, all national fiscal authorities move simultaneously, while the ECB follows in the second stage.

The economic environment under EMU differs threefold from the EU case. First, the ECB pursues an objective function accounting for the effects on the whole EMU area, while national

²Dixit and Lambertini (2001) analyze the strategic interaction between a common central bank and national fiscal authorities with different inflation and output bliss points.

³For surveys of the literature in this field see, for example, Alesina, Roubini and Cohen (1997) on political business cycles and Alesina and Perotti (1995) or Persson and Tabellini (2000) on dynamic common-pool problems.

central banks pursue the interests of their respective countries. Second, each country loses one policy instrument (the national interest rate or the exchange rate, depending on the design of national monetary policy). Finally, the move from EU to EMU implies various structural changes in the economies. Demand externalities become stronger, if the common currency fosters cross-border market integration and, therefore, international interdependence. Pecuniary externalities become more pronounced to the extent that a government's borrowing in Euro bonds more strongly affects the interest rate of other national Euro debtors than when national capital markets are segmented by national currencies. Pecuniary externalities also become stronger, if unsophisticated investors do not properly differentiate between the default risk of different countries, as long as they issue their debt in Euros, thereby driving up the cost of funds for more responsible governments.

Lack of Policy Coordination Optimal policy choices by a fiscal policy maker now maximize his objective function, subject to the optimal policy choices by all other fiscal authorities and the policy response by the ECB. As a consequence of the changed economic environment, the incentive structure of fiscal policy makers in EMU differs from the EU case in two respects; see the respective first-order conditions (2) and (3) in the Appendix. First, since closer international linkages increase the spillover effects across decision makers and countries, *larger spillover effects* remain unaccounted for in EMU. Second, fiscal policy makers anticipate *induced policy responses by the ECB* rather than by domestic central banks, in particular their own one.

With respect to the first difference, the implications are straightforward. We previously argued (in the discussion of the EU case) that spillover effects do not only have distributive implications, but also cause deadweight losses if policy makers exploit their market powers or if demand externalities are present. This suggests that the efficiency costs of non-internalized spillover effects are larger in EMU than in EU.

Turning to the second difference, the move from EU to EMU also changes the nature of policy mediated spillover effects. These effects change character because policy responses by the ECB to the developments in any member state have immediate implications for the monetary conditions in the whole EMU area. Depending on to which fiscal variables the ECB responds, various policy mediated spillover effects may be present, giving rise to distorted fiscal policy choices (relative to the benchmark or EU) and deadweight losses along several dimensions.⁴ For instance, fiscal policy makers may be tempted to issue more Euro denominated debt, or even debt in any denomination, than in the EU case. The reason is that they may anticipate the ECB to soften its monetary policy stance in response, in order to depreciate the real value of the outstanding debt, or to stimulate the economy that is depressed by high distorting taxes (to pay for the debt service).⁵ In both cases, deadweight losses arise because individual governments do not take the negative consequences of higher equilibrium inflation in other countries into account. If not only policy makers, but also investors, correctly anticipate the ECB's response, it has no "real" effects, but simply results in an inflationary bias similar to that analyzed by Barro and

⁴If the ECB responds to EMU wide averages of variables, it will react more strongly to policy choices by large countries than by small countries. Taken by itself, this means that fiscal policy makers in small countries are less likely to internalize the effects of their policies on EMU-wide monetary conditions.

⁵See Chari and Kehoe (2004) and Beetsma and Bovenberg (1999) for such arguments.

Gordon (1983): Equilibrium inflation is pushed to the level where the ECB is no longer willing to further devalue outstanding debt or stimulate the economy at the cost of higher inflation. As a consequence, all fiscal policy makers (and the ECB) end up being worse off.

Another type of policy mediated spillover effect arises if the ECB is expected to act as a lender of last resort and purchase public debt from the banking system, say, whenever the prospect of an imminent sovereign default leads to a liquidity crisis.⁶ In that case, the ECB's response has real effects since, effectively, part of the burden of the crisis country's public debt is borne by other member states. As a consequence, a common-pool problem arises: Anticipating the course of action, fiscal authorities once more issue too much public debt and equilibrium inflation expectations rise, fuelled by the anticipation of a monetary bail out.

A final spillover effect may arise if the ECB responds to an EMU wide cost-push shock by raising the interest rate. In this case, individual governments might have an incentive to increase their budget deficit to mitigate the effects of the monetary contraction. Deadweight losses arise because fiscal policy makers do not take into account the negative consequences of the ECB's response to their expansionary policy stance—even higher interest rates—on the objectives of other fiscal policy makers. In equilibrium, fiscal policy in each country is expansionary, but output remains depressed due to the ECB's contractionary policy stance.⁷

Domestic Policy Failure The move from EU to EMU also affects domestic fiscal policy failure. First, two watchdogs against policy failures—domestic central banks and international foreign exchange markets—disappear. Second, the abolition of national central banks removes possibilities for mitigating the costs of domestic policy failures, thereby *encouraging* responsible fiscal policies. First consider the watchdog issue. Absent national monetary policy, fiscal authorities are freer to overheat or depress the economy, which might generate higher macroeconomic volatility since periods of overheating must be followed by periods with restrictive policies. Moreover, the role of financial markets as watchdogs on domestic fiscal policies changes character. In EU, market expectations of “irresponsible” fiscal policies were rapidly reflected in the exchange rate, presumably because investors expected national monetary policies to accommodate fiscal problems, with depreciation as a result. At the same time, the threat of such immediate market responses on the foreign exchange market probably deterred some irresponsible policies in the first place. In EMU, this threat no longer exists. With price reactions to fiscal policy choices now confined to the bond market, the incentives for “responsible” fiscal policies might fall.

Turning to the second point, the abolishment of national central banks eliminates a domestic lender of last resort with powers to inflate away nominal government debt in times of crisis, for instance when the debt level seriously threatens intergenerational equity objectives. Since the ECB is less likely to intervene in response to a national crisis than a domestic central bank, the move from EU to EMU might *strengthen* the incentives of national fiscal policy makers for prudent fiscal policy choices. Similarly, the abolition of national monetary policies under

⁶See Uhlig (2002). He also discusses how the incentives for prudent bank regulation are affected when the ECB becomes the lender of last resort.

⁷See Uhlig (2002). In contrast to most spillover effects proposed in the literature, this effect suggests a critical role for deficits as opposed to government debt.

EMU eliminates the option to devalue as a final escape route. This might also restrain governments (and unions) from pursuing inflationary policies, since such policies have contractionary (and thus unemployment creating) effects on the tradeable sector, if devaluations are no longer feasible.⁸

The move from EU to EMU thus has various, and potentially opposing, consequences for the extent of domestic policy failure and thus for macroeconomic stability and intergenerational redistribution. The net effects are unclear from a theoretical point of view. Nor is the empirical evidence conclusive. Fatás and Mihov (2003) report signs of a “fatigue” in fiscal consolidation efforts after the introduction of the common monetary policy in 1999. But whether this fatigue, reflected in laxer fiscal policies, is related to changed strategic incentives or rather represents a reaction to the preceding exceptional efforts to qualify for EMU membership, remains unclear.

Summary How important are these potential problems in EMU? The prevalence and importance of domestic policy failure is widely acknowledged. In contrast, there is less consensus on the importance of international repercussions of fiscal policies, although it seems clear that the move from EU to EMU most likely rendered these effects quantitatively more important. The existence, and strength of these direct spillover effects is also crucial for the importance of spillover effects transmitted by fiscal policy responses. In contrast, it is not crucial for the importance of spillover effects transmitted by monetary policy responses. These effects already arise if the arguments of the ECB’s objective function, e.g. average inflation in the EMU area, are affected by fiscal policy choices. Clearly, an assessment of the importance of spillover effects transmitted via monetary policy responses depends on one’s view about the ECB’s policy strategy, in particular whether inflation is the ECB’s sole target variable, and whether the ECB is fully committed. As emphasized, in our view, the ECB can neither commit, nor is it perfectly insulated against political pressures to pursue objectives other than inflation targeting. To the extent that fiscal policy makers exploit these features of central bank behavior, an inflationary bias or a dynamic common-pool problem might arise. Under the alternative assumption that the ECB can actually commit, and is only concerned about inflation, such an inflationary bias or dynamic common-pool problems cannot arise.

Regardless of whether international repercussions are quantitatively important, politicians seem to have taken their existence seriously when conceiving of the SGP. A cynic might say that their arguments were simply excuses for ambitions to keep certain countries, such as Italy or Greece, outside of EMU—an attempt to keep the “bad apples out of the EMU basket.” But this argument triggers the question *why* policy makers wanted to block the access for these countries, if not for the reason that they regarded international repercussions as important.

3 Corrective Mechanisms

We have identified two potential problems related to fiscal policy choices in EMU, namely a lack of policy coordination in the presence of spillover effects, and domestic policy failure. We now

⁸In those countries whose central banks in the EU strictly pegged their currencies to the D-Mark and therefore had no flexibility in their monetary policy choices, the move from EU to EMU would tend to reduce the sensitivity of monetary conditions to (fiscal) developments to a lesser extent.

turn to the question of how these problems may be addressed.

3.1 Correcting for the Lack of Policy Coordination

Coordination The apparent solution to problems associated with a lack of international coordination is, of course, to coordinate. In practice, however, coordination that is sufficiently far-reaching to solve the problems associated with international economic dependencies is hardly the optimal solution, since it creates a number of new problems. For once, far-reaching coordination by governments of different countries might, in the presence of policy failures, turn into coordination against citizens, a point made by Persson and Tabellini (1995) or, in the presence of credibility problems of governments, into coordination against the ECB, a point made by Giavazzi (2004). More generally, the substantial transfers of power to officials required for successful coordination bear significant risks, in particular of abuse of power and of misjudgement due to insufficient information among decision makers (a Hayek-type argument). The obvious way of minimizing these risks is to limit government intervention on the supra-national level to those issues for which coordination is expected to be particularly beneficial. Such partial coordination might be a more “robust” arrangement than far-reaching coordination, since it limits the danger of large-scale political mistakes. Moreover, it is in better accord with visions of decentralization of power, citizens’ political participation, and political accountability.⁹

Corrective Taxation In principle, a system of elaborate Pigouvian taxes (plus transfers) is an alternative to fully-fledged policy coordination.¹⁰ However, such an “ideal” Pigouvian system is subject to the same type of problems as far-reaching coordination. The same robustness argument would therefore point to a more limited Pigouvian system than the theoretical benchmark.

Such a more limited Pigouvian system would tax (subsidize) those policy outcomes considered to be at the source of the most important spillover effects to other countries. What these variables are, depends on the type of spillover. From the *demand externality* point of view, output gaps (or unemployment rates) are particularly relevant, since they are connected to direct spillover effects via trade. From the point of view of *strategic interaction* with the ECB, the public debt quota is particularly relevant, since it increases the incentive for the ECB to loosen its monetary policy stance, as discussed earlier. The output gap or the deficit quota may also be relevant tax bases, to the extent that negative output gaps or positive deficit quotas may trigger contractionary monetary policy responses by the ECB that affect all member countries. Finally, from a cross-country *redistribution* point of view, output gaps and public debt are particularly relevant, the latter since it affects the cost of the debt service across countries.¹¹ To the extent

⁹This argument is different from the “subsidiarity principle”, according to which centralization is acceptable only if it yields better solutions to the problems at hand. Our point rather relates to the trade-off between gains from coordination and the loss of other values, such as decentralization of power and national political accountability.

¹⁰By Pigouvian taxes, we mean marginal taxes (subsidies) of the same size as marginal negative (positive) externalities.

¹¹Taxes on a country’s debt quota might appear problematic, due to large variations in the debt quota across countries, and difficulties in affecting the quota within a reasonably short time. Nevertheless, the debt quota should be taxed if considered to be an important source of spillover effects. At the same time, countries with

that some of these variables, for instance unemployment rates and output gaps, are notoriously difficult to measure, indicators such as inflationary tendencies in product and factor markets might also be relevant variables. Theoretically, taxes on these various “source” variables are equivalent to (sets of) taxes on other variables closely linked to the sources. However, these links are not always well understood, nor are they likely to be reasonably stable over time. A robustness argument therefore implies that the Pigouvian taxes should apply as directly as possible to the targeted sources of the most important spillovers.

The tax rates imposed under this limited Pigouvian system would reflect the external social marginal costs of the implemented policies, inducing governments to internalize the spillover effects of their actions without forcing particular values of the taxed variables upon them. While the tax *rates* would depend on economic circumstances, including the wealth distribution across countries, they would not be directly related to the level of the taxed variable in a given country.¹² Clearly, the purpose of this arrangement is to allocate the resulting debt and deficit quotas, output gaps, or other sources of spillovers to those countries where their social value is highest (or the social cost is lowest). Since the system would generally result in an unbalanced budget of the Pigouvian program, the surplus or deficit could be distributed among member countries.

There is a close parallel between a Pigouvian tax system and a system based on markets where governments can trade permits assigning the right to conduct policies resulting in spillover effects. In such a system, the total amount of permits is fixed by the supra-national authority, and each country obtains an initial endowment of permits. Trading of permits then takes place, and market prices adjust to equilibrate the demand and supply for the permits. The resulting equilibrium allocation is identical to the allocation under the Pigouvian tax system, if both systems generate the same incentive and wealth effects, i.e. if (i) the Pigouvian tax rates are identical to the market clearing prices and (ii) each country’s net tax payments under the Pigouvian system are identical to its net expenditure on permits under the tradeable permit system.

Operational Corrective Taxation Since tax rates (in the Pigouvian system) or market clearing prices (in the tradeable permits system) need to reflect the external social marginal costs of policy outcomes, the determination of the tax rates or the number of permits, and the distribution of tax revenue or initial endowments of permits, requires that a complex optimization problem be solved. In reality, this is hardly feasible (in an uncontroversial way). In practice, tax rates or permit quantities, as well as the distribution of tax revenue or initial permit endowments, must therefore be determined in a more ad-hoc fashion, possibly by a trial-and-error process. One drastic simplification would be to impose the same Pigouvian tax rate on a particular variable in all countries.¹³ In the tradeable permits case, this would correspond to a *single* (multilateral) rather than many bilateral markets for permits on that particular variable. This approach would be particularly natural, if demand externalities and problems of strategic

high debt quotas could, however, receive lump sum transfers. In this way, the income effects of the tax could be neutralized without forgoing the desired incentive effects.

¹²This implies, for example, that a country with a very high budget deficit may still pay zero corrective taxes, provided that the social marginal cost of deficits is deemed to be negligible and the tax rates are thus set to zero.

¹³Such an outcome would also be expected for political reasons. Political factors render it very difficult to differentiate institutional constraints across countries.

interaction are considered to arise in proportion to the EMU *average* of particular variables—as might be a reasonable approximation in the case of demand externalities arising from output gaps, and an even more reasonable approximation in the case of the effects working via policy responses of the ECB. Another simplification concerns the distribution of the surpluses of Pigouvian programs or, alternatively, of the initial endowments of tradeable permits. For instance, such distributions might be proportional to the GDP of each country.

While a Pigouvian tax system is theoretically equivalent to a tradeable permits system (even in the ad-hoc forms), the former is likely to be more operational than the latter. The reason is that, due to informational and other limitations, many of the variables to be affected by the systems are in reality not fully under government control. Take, for example, the case of permits for deficits, as suggested by Casella (1999). Since governments only have imperfect control over the size of their deficits during a given fiscal year (and indeed do not know the exact outcome until after the end of that year), they may have incentives to either accumulate excessive permits for precautionary reasons, or take the risk of ending a period with fewer permits than required. To address the latter point, the system might be extended to allow for ex post markets for permits, or intertemporal trade in deficits. This, in turn, would require additional safeguards, for example progressive fees as suggested by Casella, to avoid that governments exploit the option of intertemporally substituting permits. Otherwise, the intended influence over contemporaneous deficits would easily be lost. Another problem with the permit solution is that large countries like Germany may act oligopolistically in the market for permits. These problems could be avoided under a system of Pigouvian taxes, since the regulating authority does not lose direct control over the price/tax on the activity to be regulated in such a system.

The SGP may, in fact, be characterized as a form of corrective tax system, if fines in connection with violations of the SGP are interpreted as taxes meant to increase the costs of certain actions rather than completely deter them. However, the SGP constitutes a very crude approximation to an operational Pigouvian tax system, because of three significant shortcomings. First, the Pact is only tied to one variable, namely the deficit, which is unlikely to be the only, or even the most important, variable in the context of international spillover effects. Second, the Pact's incentive structure is asymmetric because surpluses are not rewarded.¹⁴ Third, the incentive structure is also discontinuous, since it imposes zero marginal costs of deficits except at some specific deficit quotas, starting with three percent. Asymmetry and discontinuity, in turn, imply that the SGP does not lead to an equalization of the marginal costs and benefits of deficit reduction across countries.

The background for choosing such a crude approximation to a Pigouvian tax system is most likely a legalistic view, where fines are seen as punishments, designed to deter the violation of rules. According to this view, it is “more natural” to forbid certain actions and punish violations than to influence behavior via the price system. Another reason for *not* choosing corrective taxes might be that they are believed to interfere too strongly with national policies. Neither view is convincing—the first because it neglects the efficiency losses due to discrepancies between marginal costs and benefits of adjustments in policy, the second because it is far from obvious that taxes more severely restrain national autonomy than fixed rules such as the SGP.

¹⁴To the extent that fines are refunded to countries that did not violate the constraints, there is some weak form of symmetry.

3.2 Correcting Domestic Policy Failure

Transparency Since asymmetric information between politicians and the electorate is at the heart of domestic policy failure, enhancing transparency and information is a natural way of addressing the latter. Suggestions along these lines, in particular to create a “Sustainability Council for EMU”, have recently been made by Fatás, Hughes Hallett, Sibert, Strauch and von Hagen (2003).¹⁵ Such reforms may turn out not to be sufficient, however. Therefore, we discuss additional potentially useful devices.

Corrective Taxation Policy failure can be interpreted as a form of externality from politician’s actions on society at large. This suggests Pigouvian taxation as the optimal corrective approach, in parallel to our previous reasoning on how to deal with international spillovers. In contrast to the case of spillovers, however, Pigouvian taxes should now be paid by *politicians* rather than countries. As this is clearly not feasible, a second-best solution may be that countries instead pay Pigouvian taxes to an international authority, so as to indirectly influence politicians’ behavior. Naturally, this approach requires that politicians are not indifferent about the effect of the corrective tax on the government’s budget. For example, if the policy failure is reflected in a tendency of governments to incur too large budget deficits, then deficits could be taxed, thereby increasing the marginal effect of government spending on the deficit. *If* politicians care at least to some extent about government deficits (albeit not sufficiently from society’s point of view), the tax would make it more costly to “buy votes” via deficit spending and thus, discourage such spending.

As shown by the example of a tax on deficits, Pigouvian taxes that are designed to mitigate international spillover effects may to some extent also help mitigate domestic policy failure, in the sense of tending to “work in the right direction” also for the latter problem. In general, however, international spillover effects and domestic policy failure will require different corrective taxes.

Rules Another approach is to impose rules *directly* constraining politicians’ behavior. These rules could either be of a procedural type, for example strengthening the powers of parliamentary budget committees or the treasury; or they could constrain fiscal policy instruments or outcomes, for example by imposing ceilings on expenditure levels or budget deficits.¹⁶

In the presence of a spending or deficit bias, there is a clear case for procedural rules. Constraints on policy instruments or outcomes, in contrast, are more problematic. Although expenditure ceilings tend to strengthen the powers of the treasury relative to the spending departments, which might be useful, such constraints can easily be circumvented by creative book keeping or by switching from transfers to tax concessions. More importantly, constraints on fiscal instruments or outcomes impinge on the possibility to use fiscal policy in a flexible manner, which could create serious costs for society. To minimize the corresponding cost-benefit

¹⁵The task of the Council would be to report its assessment of the member states’ fiscal policies to the public and the European Parliament.

¹⁶For instance, the Swedish budget process includes expenditure ceilings. In the U.S., the congressional budget committee holds particularly strong powers. In the U.K., the government has adopted principles of fiscal management which are enshrined in a “Code for Fiscal Stability.”

ratio, it is important that the rules constrain the most appropriate variables, and in the most efficient way.

As argued by many authors, the constraints embodied in the SGP are unlikely to satisfy this efficiency requirement. One reason is that the constraints might prevent the automatic stabilizers from working in the most desirable fashion. They might also crowd out public investment, prevent tax smoothing or stabilizing discretionary demand management policies or, indeed, induce a fiscal contraction in the midst of a recession by the requirement to reduce deficits or the debt quota.¹⁷ Other deficiencies of the SGP are that it embodies asymmetric incentives (since it does not give incentives to behave “well” as opposed to avoiding “bad” behavior); that it only considers government debt, not assets; and that it does not account for implicit government debt such as social security obligations.¹⁸ The European Commission has acknowledged some of these problems and suggested a more discretionary approach in the implementation of the SGP (Commission of the European Communities, 2004).

Many proposed reforms of the SGP respond to these criticisms by suggestions to tie the Pact’s constraints to alternative deficit measures, or using combined measures of the government’s financial position. In particular, some proposals argue in favor of constraining the cyclically adjusted deficit or the average budget deficit over the business cycle. Alternative proposals are to allow countries with smaller debt quotas to run larger deficit quotas (European Economic Advisory Group, 2003; Commission of the European Communities, 2004), or to allow countries to run (larger) deficits, only if they recorded sufficiently high surpluses during the last few preceding years.¹⁹ All alternatives but the first would presumably need some amendments. If governments do indeed procrastinate or, alternatively, expect to be replaced, constraints on medium-run or accumulated budget deficits would not prevent governments from running too small surpluses in “good” times. By forcing subsequent governments to pursue restrictive fiscal policies even during a recession, a medium-run deficit constraint may therefore come in conflict with ambitions to stabilize the economy. Requiring governments to run budget surpluses during booms might help avoid this problem.

To reduce the risk that the SGP may crowd out government investment, Blanchard and Giavazzi (2003) have argued that there is a case for constraining deficits net of public investment. This proposal has several advantages: First, government investment often gives rise to future financial returns, for example in the case of investment in energy production. In that case, increased government debt does not accurately reflect the change in the government’s wealth

¹⁷See, for example, Blanchard and Giavazzi (2003), Buiter, Corsetti and Roubini (1993), European Economic Advisory Group (2003), or Fatás and Mihov (2003) for discussions. Naturally, these arguments assume, that fiscal stabilization policy is, on balance, useful. While there is a broad consensus on this issue with respect to automatic stabilizers, there is controversy on whether discretionary fiscal policy also contributes to macroeconomic stability. The latter is probably true in extreme recessions or booms, while experience suggests that fine-tuning of the business cycle is rather hazardous. See also European Economic Advisory Group (2003) for a discussion of fiscal stabilization policy.

¹⁸The notion of generational accounting is designed to incorporate the two latter considerations, see Auerbach and Kotlikoff (1987). Another problem with the SGP relates to the improper treatment of inflation: The nominal deficit, divided by the price level overstates the real deficit since it neglects the inflation induced depreciation of real government debt.

¹⁹In contrast to the proposal by the European Economic Advisory Group (2003) to condition the deficit constraint on the level of debt, the latter proposal implies that fiscal policy is not constrained by budgetary decisions in the distant past.

position, and deficits do not necessarily point to any policy failure. More generally, allowing governments to finance productive public investment by bond issues does not induce contemporary voters to neglect the welfare of future generations, but rather the opposite.²⁰ Second, if the central aspect of domestic policy failure is a bias of government spending in favor of current as opposed to capital spending, the Blanchard and Giavazzi (2003) proposal helps mitigate that bias, although only partially since, for example, investment in human capital does not enter in the capital account. Finally, the proposed adjustment would not require any changes in the Treaty underlying the SGP, making it easier to implement.

Delegation of Authority Delegation of authority constitutes an alternative to rules that reduces the conflict between policy flexibility and ambitions to counteract policy failures. Such delegation allows for flexibility, because all available information can be accounted for at the time decisions are taken, in contrast to the case of rigid rules. This is achieved without sacrificing ambitions to counteract policy failures, as long as the agents in charge face appropriate incentives.

Delegation of monetary policy to a Rogoff (1985)-type conservative central banker has not only helped mitigate problems of time-inconsistency, but also remove the influence of party politics in national monetary policy. In a parallel fashion, delegation of fiscal policy might reduce the extent of policy failure. In particular, delegation of fiscal policy might mitigate the risks of pronounced political business cycles and counteract tendencies to “unsustainable” policies, i.e., policies drastically redistributing wealth from future to current generations. In spite of these similarities, the delegation of fiscal policy is necessarily quite a different matter than delegation of monetary policy. Naturally, the reason is that one fundamental purpose of fiscal policy is to allocate resources and distribute income in accordance with voters’ preferences. In other words, fiscal policy is at the core of the democratic process, to a much larger extent than monetary policy. This implies that the possibility of delegation to agencies outside the political sphere is much more limited for fiscal policy than for monetary policy. Delegation of the latter generally involves a hand-over of all relevant instruments to an administratively independent central bank (although governments have prescribed the general policy targets and, in some countries, even the numerical target such as a certain rate of inflation). Delegation of fiscal policy cannot go that far, but it can go some way.²¹

A very limited type of fiscal policy delegation would be to create a fiscal policy committee forecasting the budget outlook (similar to the Congressional Budget Office in the U.S.)²², or officially recommending the general fiscal stance, for instance regarding the size of the budget deficit. A much more far-reaching proposal is to oblige the government to *follow* these recommendations. Wyplosz (2002), for example, argues that fiscal policy committees should be given an explicit mandate of ensuring debt sustainability, and powers to limit annual government deficits by law. Similarly far-reaching is the proposal to allow fiscal policy committees to directly implement their desired deficit targets. This could be achieved by delegating the power to scale tax rates and/or spending levels up or down from their politically determined base values (see

²⁰See Bassetto and Sargent (2004) for a formal analysis of this point.

²¹See also the discussion in European Economic Advisory Group (2003).

²²See the recent proposal by Jonung and Larch (2004).

the discussion in European Economic Advisory Group, 2003). In the special case where the same scaling factor applies to all taxes and all types of government spending, politicians would largely retain control over the *structure* of taxation, subsidies, and government spending, and thus the control over Musgrave's (1959) distribution and allocation branches of fiscal policy. Control over the macroeconomic stabilization branch, in contrast, would be handed over to the fiscal policy committee. Whatever form such partial delegation of fiscal policy may take, the members of fiscal policy committees would in any case have to be accountable to political authorities—in the same way as operationally independent central banks.

Nationally or Supranationally Imposed Measures? As mentioned before, corrective taxation applied to governments rather than politicians requires some international arrangement to determine, collect and potentially redistribute the proceeds from these taxes. In contrast, other measures to correct domestic policy failure do not necessarily require any international involvement; for rules, delegation of authority, or measures to improve transparency can, in principle, be implemented by domestic legislation. To give these measures any “bite”, however, they must be difficult to reverse, i.e., they need to be enacted on a “constitutional” level. If this is not possible because national policy failure extends to the constitutional level, then *internationally* imposed constraints may play a substitute role as credible self-disciplinary devices. Like the GATT, WTO, and many other international agreements, the SGP may be regarded as such a reflection of policy makers' willingness to tie their own hands in fiscal policy matters by internationally agreed rules. In that view, the launch of EMU offered a “window of opportunity” to impose the SGP as an external commitment mechanism (European Economic Advisory Group, 2003), and let EMU-wide institutions serve as a “fiscal backbone” for countries with weak institutions (Buiters et al., 1993).^{23 24}

With regard to delegation of authority, constitutional failure gives rise to two distinct dimensions along which supranational involvement might be beneficial: Not only might delegation be *imposed* by a supranational arrangement, but countries may also choose to delegate fiscal policy decisions *to supranational bodies*. It is tempting to argue that such delegation is politically infeasible, because of the implied loss of national sovereignty. However, rigid international rules, such as the SGP, also imply a loss of sovereignty, and it is not clear which type of loss is more severe. Indeed, some international delegation of economic powers already exists today, for example to the IMF or the WTO, not to speak of the EU itself.

²³Beetsma and Uhlig (1999) propose a different explanation for the link between EMU and the SGP. They argue that the common currency is a prerequisite to render the enforcement of fiscal rules of the kind implemented in the SGP time consistent. According to Beetsma and Uhlig (1999), countries have incentives to enforce deficit constraints on other countries, only if they are harmed by deficits in those countries which they argue to be the case under a common currency.

²⁴The extent of domestic constitutional failure and thus, the need for supranational involvement, presumably varies between countries. According to Eichengreen (2004), the—internationally imposed—SGP constraints should therefore only apply to those countries that are unable to pursue sound fiscal policies on their own (as judged by an independent expert committee). Eichengreen (2004) proposes three measures of sustainability: the presence of “appropriate fiscal institutions”, “limited future pension liabilities”, and flexible labor markets.

3.3 Enforcement

Courts Nationally or supranationally imposed constraints on budget policies will not be effective in the absence of credible enforcement mechanisms triggering sanctions in case of violations of the constraints. Courts can usually not provide such enforcement because they lack the authority. Enforcement must thus rely on other mechanisms, such as norms and the threat of exclusion from membership in the supranational organization.

Norms Social norms (in society at large or in one's peer group) and internalized norms work through utility losses for the violators, either in terms of reduced status (in the case of social norms) or bad conscience (in the case of internalized norms). For instance, politicians in government might want to avoid being considered an "outcast" and thus feel obliged to obey supranationally imposed constraints. If the general public is sufficiently anxious that constraints be obeyed, the influence of social norms may be accentuated by the threat of publicity of a violation. This observation points to a potentially important role played by the media and prestigious authorities such as an international court. The proposal by Fatás et al. (2003) to create a "Sustainability Council for EMU" with the task of reporting its assessment of the fiscal policies of member states to the public and the European Parliament builds on exactly this notion of discouragement of "rule" violations via public awareness and pressure. Similarly, the European Commission has emphasized the role of peer pressure to enforce the SGP (Commission of the European Communities, 2004).

Exclusion from Membership If the general public is not sufficiently interested in a government's conduct, or if the public actually encourages a government to violate a constraint, then social norms lose their force. In that case, the necessary pressure must come from other countries. Ultimately, then, it is the threat to be excluded from the benefits of membership that can enforce obedience to the constraint. Whether this threat of exclusion is powerful depends on two factors. First, it depends on a government's net benefits from membership. Since these benefits are greater if the institutional constraints are efficient (i.e., characterized by minimum costs to the national economies), such efficient constraints are likely to be easier to enforce. Second, the power of the threat of exclusion depends on its credibility, and thus on *other* governments' net benefits of "keeping the violator in the club."

Fines versus Taxes From an economic-theory point of view, a fine is equivalent to a discontinuous tax function. From a legalistic point of view, in contrast, fines differ from taxes because only the former represent punishments of violations of rules. To the extent that the general public holds a legalistic view, the violation of a constraint and the related payment of a fine spurs much larger publicity—both nationally and internationally—than the payment of (corrective) taxes. This is the case, even if the tax payments have the same size as the fine. As a consequence, the violation of a constraint and the payment of a fine will be associated with considerable more "political drama" than the payment of a corrective tax. Since such political drama is very costly for the politicians involved, a government is likely to fight tooth and nail to avoid a formal punishment procedure, not least by manipulating the statistics. In effect,

then, fines are rarely levied in equilibrium, and the constraint loses its credibility because weak ex-post incentives undermine apparently strong ex-ante incentives. Indeed, this seems to be the situation with the SGP in 2003 and 2004.²⁵

The political drama associated with fines is accentuated by their abruptness, i.e., the fact that a small change in the constrained variable triggers a large punishment. Such abruptness is likely to be regarded as unreasonable or unfair by the country concerned and its government. Moreover, demands by such a government to be exempt from punishment are likely to find support with other governments expecting to be in a similar situation in the future. With a smooth tax function, such problems may not arise to the same extent. A tax gradually increasing in the tax base therefore mitigates two problems associated with the enforcement of SGP-type constraints, one related to the perception of fines as punishments, the other to the abrupt consequences of violations.

4 Conclusions

Proposals for reform of the SGP must start from an assessment of the problems it is supposed to solve. We have concentrated on two sets of such problems: international spillover effects, in particular through demand externalities, strategic interaction among policy makers, and pecuniary externalities; and domestic policy failures.

The SGP addresses these problems from a legalistic point of view. This is the background to the inflexibility of the rules embodied in the Pact. An economic-theory perspective on constraining economic policy instead emphasizes the importance of flexibility in the light of varying circumstances.

If the basic purpose of institutional constraints is to keep spillover effects in check, then corrective taxes on variables associated with these spillovers constitute the theoretically most appealing response. Tradeable permits for such variables are an alternative. Assuming the severity of the spillover effects to depend on the EU-*averages* of the source variables, uniform corrective taxes across countries, or multilateral markets for tradeable permits, suffice for an efficient arrangement. Naturally, a system of Pigouvian taxes or, to an even larger extent, tradeable permits, could only be implemented in a rough, less than ideal manner, due to informational limitations and various imperfections in the political process. But even in a less than ideal form, such an arrangement would significantly dominate the SGP as well as many proposed reforms of the Pact, for at least two reasons. First, it could account for *all* important spillovers. The latter do not only, or even mainly, occur via national budget deficits but also via output gaps (alternatively unemployment rates), inflationary pressure, and the stock of public debt. Second, it could more *efficiently* regulate these spillovers, due to the symmetry and continuity of the incentive structure induced by Pigouvian taxes, which leads to an equalization of costs and benefits of spillover reductions across countries.

If instead the basic purpose of institutional constraints is to correct domestic fiscal policy failures, then increased transparency and corrective taxes paid by politicians constitute the natural responses. Corrective taxes paid by countries, in contrast, only offer limited benefits. Rules

²⁵Alternatively, an arrangement built on *rewards* for non-violators as opposed to fines for violators might also mitigate the political drama. Naturally, this would require that more revenue is raised or other expenditures cut.

in the legalistic tradition make it possible to directly constrain politicians' behavior, but imply a loss of policy flexibility. The rigid rules embodied in the SGP, in particular, impose unnecessarily tight restrictions, not least because they constrain an inappropriate variable. Several proposed reforms of the SGP imply some improvements in that respect, allowing for more pronounced countercyclical fiscal policies, including less restricted operation of the automatic fiscal stabilizers. But they do not resolve the fundamental conflict between policy flexibility and the ambition to counteract policy failures. Limited delegation of fiscal powers to fully accountable committees offers a conceivable solution to this conflict. A priori, there is no theoretical presumption for *internationally* imposed measures to correct domestic policy failures. However, such internationally imposed measures might be in a country's best interest, if domestic policy failure extends to the constitutional level.

If the motivations underlying the SGP relate to cross-country spillovers, so that major reforms to the SGP are necessary, transition problems arise. A first step in the reform process could then be to stick to the current 3% and 60% targets for a while, but to interpret them as reference values at the center of broader intervals, with smooth punishment and reward schemes as approximations to a (Pigouvian) tax system defined over these intervals. Taking some of the strain from the current arrangement, this transitional measure would buy policy makers the necessary time to devise a more appropriate corrective tax system.

To be effective, institutional constraints must be enforceable. In the absence of a powerful international court, such enforcement of supranationally imposed constraints largely rests on social norms and the threat of exclusion from the organization. The latter threat is more powerful if governments perceive the continuation value of a given arrangement to be high. The force of social norms, in turn, strongly depends on public opinion and thus, the general public's anxiety, potentially fostered by the media, that institutional constraints be obeyed. Since political drama renders enforcement more difficult, tax-subsidy programs are likely to dominate SGP-type rigid rules also with regards to their enforceability: taxes are better than fines.

A Appendix

A.1 Benchmark: Perfect Policy Coordination

Let the vector of all policy instruments be denoted by π , and let x represent the vector of all policy relevant variables, i.e. the variables entering the objective function of at least one fiscal or monetary authority. We represent the equilibrium relationship between these variables and the policy instruments, π , as well as household expectations about the instruments, π^e , in reduced form as $x = F(\pi; \pi^e)$. The objective functions of the authorities are given by $U_i(x)$, where $i = 1, \dots, N$ denotes fiscal authorities and $i = N + 1, \dots, 2N$ denotes monetary authorities; in particular, $i = N + 1$ stands for the Bundesbank. If policy choices are fully coordinated, welfare effects are evaluated according to an agreed-upon social welfare function, $U(x) \equiv V(U_1(x), U_2(x), \dots, U_{2N}(x))$, with $V(\cdot)$ non-decreasing in all its arguments.

A strategy of a player specifies the player's action at each information set. Since the private sector and the policy makers only move once in our setup, the strategies depend on the history of actions taken by previous players. In particular, the optimal coordinated strategy of policy makers simply amounts to an optimal response to household expectations:²⁶

$$\bar{\pi}^*(\bar{\pi}^e).$$

The subgame perfect equilibrium is characterized by

$$\begin{aligned} \bar{\pi}^{e*} &= \bar{\pi}^*(\cdot), \\ \bar{\pi}^* &= \arg \max_{\bar{\pi}} U(F(\bar{\pi}; \bar{\pi}^{e*})). \end{aligned}$$

According to the first equation, optimal household expectations are equal to the optimal policy choices. (When omitting the argument of a strategy, we imply that the strategy is evaluated at optimal actions; in the present case, the strategy of policy makers is evaluated at the optimal action of households, i.e. their rational expectations about policy.) According to the second equation, optimal policy choices maximize the agreed-upon social welfare function conditional on rational household expectations. Alternatively formulated, in terms of first-order conditions, the optimal policy choices are characterized by²⁷

$$\frac{dU(\bar{x})}{dx} \frac{dF(\bar{\pi}^*; \bar{\pi}^{e*})}{d\bar{\pi}} = \left(\sum_{i=1}^{2N} \frac{dV(\cdot)}{dU_i(x)} \frac{dU_i(\bar{x})}{dx} \right) \frac{dF(\bar{\pi}^*; \bar{\pi}^{e*})}{d\bar{\pi}} = 0. \quad (1)$$

The terms $(dU_i(x)/dx)(dF(\cdot)/d\bar{\pi})$ in (1) represent the marginal effects of changes in policy on the objective functions of authority $i = 1, \dots, 2N$. We refer to these effects as *spillover effects* on authority i , whenever the relevant element of π is not under the direct control of that authority, i.e. whenever the policy choice by one authority affects the objective of another. In the benchmark case, these spillover effects do not cause deadweight losses, since they are fully internalized due to agreement among all authorities about the overall social welfare measure $V(\cdot)$.

²⁶In the following, a bar denotes variables or functions in the benchmark case.

²⁷Throughout the analysis, we assume equilibria to be unique, differentiable, and interior. Derivatives of $F(\cdot)$ with respect to policy instruments are matrix valued; derivatives of the $U_i(\cdot)$ functions with respect to x are vector valued; and derivatives of $V(\cdot)$ with respect to $U_i(\cdot)$ are scalars. For notational simplicity, we do not explicitly distinguish between scalars, vectors, and matrices.

A.2 EU: Decentralized Fiscal and Monetary Policies

When analyzing policies in EU, we can either consider all EU countries or restrict the analysis to the ERM countries. We start with the latter case and model the Bundesbank's leading role in ERM by letting the Bundesbank move before the other national central banks. Let the vector of all policy instruments, π , be partitioned into the policy instruments of the fiscal authorities, τ , the policy instruments of the Bundesbank, ρ , and the policy instruments of all other central banks, σ . The optimal strategy of fiscal authority i , the Bundesbank, and central bank j , respectively, can be represented by functions

$$\tau_i^*(\pi^e), \rho^*(\pi^e, \tau) \text{ and } \sigma_j^*(\pi^e, \tau, \rho), \quad i = 1, \dots, N; \quad j = N + 2, \dots, 2N.$$

A subgame perfect equilibrium satisfies

$$\begin{aligned} \pi^{e*} &= (\tau^*(\cdot), \rho^*(\cdot), \sigma^*(\cdot)), \\ \tau_i^* &= \arg \max_{\tau_i} U_i(F(\tau_{-i}^*(\cdot), \tau_i, \rho^*(\cdot), \sigma^*(\cdot); \pi^{e*})), \quad i = 1, \dots, N, \\ \rho^* &= \arg \max_{\rho} U_{N+1}(F(\tau^*(\cdot), \rho, \sigma^*(\cdot); \pi^{e*})), \\ \sigma_j^* &= \arg \max_{\sigma_j} U_j(F(\tau^*(\cdot), \rho^*(\cdot), \sigma_j, \sigma_{-j}^*(\cdot); \pi^{e*})), \quad j = N + 2, \dots, 2N, \end{aligned}$$

where strategies are once more evaluated at optimal actions. According to the first equation, optimal household expectations are equal to the optimal policy choices. According to the second equation, optimal fiscal policy choices by authority i maximize the objective function of i , subject to the optimal policy choices by all other fiscal authorities (the strategies of all other fiscal authorities, denoted by $\tau_{-i}^*(\cdot)$, evaluated at rational household expectations), and the optimal monetary policy responses (evaluated at optimal household expectations and fiscal policy choices). The third and fourth conditions similarly define optimal monetary policy choices. Alternatively, the subgame perfect policy choices by fiscal authority i , the Bundesbank, and central bank j , respectively, satisfy the first-order conditions

$$\begin{aligned} \frac{dU_i(x)}{dx} \left[\frac{dF(\cdot)}{d\tau_i} + \underbrace{\frac{dF(\cdot)}{d\rho} \frac{d\rho^*(\cdot)}{d\tau_i} + \sum_{j=N+2}^{2N} \frac{dF(\cdot)}{d\sigma_j} \left\{ \frac{d\sigma_j^*(\cdot)}{d\tau_i} + \frac{d\sigma_j^*(\cdot)}{d\rho} \frac{d\rho^*(\cdot)}{d\tau_i} \right\}}_{A_i} \right] &= 0, \quad i = 1, \dots, N, \\ \frac{dU_{N+1}(x)}{dx} \left[\frac{dF(\cdot)}{d\rho} + \underbrace{\sum_{j=N+2}^{2N} \frac{dF(\cdot)}{d\sigma_j} \frac{d\sigma_j^*(\cdot)}{d\rho}}_{A_{N+1}} \right] &= 0, \\ \frac{dU_j(x)}{dx} \frac{dF(\cdot)}{d\sigma_j} &= 0, \quad j = N + 2, \dots, 2N, \end{aligned} \tag{2}$$

where the strategies and the mapping $F(\cdot)$ are evaluated at optimal actions. According to (2), decision makers in EU account both for the direct effects of their choice of policy instruments

on their own objectives and the indirect effects due to the anticipated policy responses of other authorities to their actions. In the case of fiscal policy makers, these policy responses consist of the feedback from the Bundesbank and the subsequent feedbacks from the other central banks (the terms subsumed under A_i). In the case of the Bundesbank, the policy responses consist of the feedbacks from the other central banks (the terms subsumed under A_{N+1}).

If considering the EU as a whole, we might want to relax the assumption that the Bundesbank has a leading role since, for instance, the Bank of England has also been influential within EU. If we then treat all national banks symmetrically, the first-order conditions (2) will be replaced by

$$\frac{dU_i(x)}{dx} \left[\frac{dF(\cdot)}{d\tau_i} + \underbrace{\sum_{j=N+1}^{2N} \frac{dF(\cdot)}{d\sigma_j} \frac{d\sigma_j^*(\cdot)}{d\tau_i}}_{A_i} \right] = 0, \quad i = 1, \dots, N,$$

$$\frac{dU_j(x)}{dx} \frac{dF(\cdot)}{d\sigma_j} = 0, \quad j = N + 1, \dots, 2N,$$

where the strategies and the mapping $F(\cdot)$ are evaluated at optimal actions, and the Bundesbank's optimal strategy is denoted by $\sigma_{N+1}^*(\cdot)$. With two rather than three stages in this modified game among authorities, the central banks play Nash rather than Stackelberg as in the case of the Bundesbank moving before the other central banks.

A comparison of the optimality conditions of policy making in the benchmark and EU, (1) and (2), respectively, reveals that spillover effects are no longer internalized in EU. Moreover, policy makers in EU take the policy feedback effects on their own objectives (the A terms) into account. The source of this second difference is conflicting interests among policy makers. To see this, consider the first-order conditions characterizing an equilibrium with non-atomistic policy makers that move in the same order as in the EU case and cause the same spillover effects, but share—unlike in the EU case—the objective function $V(\cdot)$:

$$\frac{dU(x)}{dx} \left[\frac{dF(\cdot)}{d\bar{\tau}_i} + \underbrace{\frac{dF(\cdot)}{d\bar{\rho}} \frac{d\bar{\rho}^*(\cdot)}{d\bar{\tau}_i} + \sum_{j=N+2}^{2N} \frac{dF(\cdot)}{d\bar{\sigma}_j} \left\{ \frac{d\bar{\sigma}_j^*(\cdot)}{d\bar{\tau}_i} + \frac{d\bar{\sigma}_j^*(\cdot)}{d\bar{\rho}} \frac{d\bar{\rho}^*(\cdot)}{d\bar{\tau}_i} \right\}}_{\bar{A}_i} \right] = 0, \quad i = 1, \dots, N,$$

$$\frac{dU(x)}{dx} \left[\frac{dF(\cdot)}{d\bar{\rho}} + \underbrace{\sum_{j=N+2}^{2N} \frac{dF(\cdot)}{d\bar{\sigma}_j} \frac{d\bar{\sigma}_j^*(\cdot)}{d\bar{\rho}}}_{\bar{A}_{N+1}} \right] = 0,$$

$$\frac{dU(x)}{dx} \frac{dF(\cdot)}{d\bar{\sigma}_j} = 0, \quad j = N + 2, \dots, 2N.$$

The last condition implies that $(dU(x)/dx)\bar{A}_{N+1} = 0$, and therefore $(dU(x)/dx)(dF(\cdot)/d\bar{\rho}) = 0$. This, in turn, implies that $(dU(x)/dx)\bar{A}_i = 0$, and therefore, $(dU(x)/dx)(dF(\cdot)/d\bar{\tau}_i) = 0$.

Absent conflicting interests, the A terms in (2) would therefore be irrelevant since $dU(x)/dx \cdot A$ would be equal to zero. Intuitively, as long as authorities share the same objective function $V(\cdot)$, they do not have to worry about the induced policy responses by other authorities, because the incentives are fully aligned, regardless of whether the authorities move simultaneously or sequentially.

A.3 EMU: Decentralized Fiscal Policies, Centralized Monetary Policy

Naturally, in EMU, all national monetary policy instruments disappear. Let $(\hat{\tau}, \hat{\rho})$ denote the vectors of policy instruments of all fiscal authorities and the ECB, respectively, subject to the constraint that (default-risk adjusted) nominal interest rates are equalized across countries. Let $U_0(x)$ denote the objective function of the ECB. Optimal strategies of fiscal authority i and the ECB, respectively, are now given by²⁸

$$\hat{\tau}_i^*(\hat{\pi}^e) \text{ and } \hat{\rho}^*(\hat{\pi}^e, \hat{\tau}), \quad i = 1, \dots, N.$$

The subgame perfect equilibrium satisfies

$$\begin{aligned} \hat{\pi}^{e*} &= (\hat{\tau}^*(\cdot), \hat{\rho}^*(\cdot)), \\ \hat{\tau}_i^* &= \arg \max_{\hat{\tau}_i} U_i(F(\hat{\tau}_{-i}^*(\cdot), \hat{\tau}_i, \hat{\rho}^*(\cdot); \hat{\pi}^{e*})), \quad i = 1, \dots, N, \\ \hat{\rho}^* &= \arg \max_{\hat{\rho}} U_0(F(\hat{\tau}^*(\cdot), \hat{\rho}; \hat{\pi}^{e*})), \end{aligned}$$

where strategies are once more evaluated at optimal actions. According to the first equation, optimal household expectations are equal to the optimal policy choices by fiscal authorities and the ECB. According to the second equation, optimal fiscal policy choices by authority i maximize the objective function of i , subject to the optimal policy choices by all other fiscal authorities and the optimal policy response by the ECB. According to the last condition, the ECB maximizes its objective function, conditional on given household expectations and fiscal policy choices. In terms of first-order conditions, the subgame perfect policy choices by fiscal authority i and the ECB, respectively, satisfy

$$\begin{aligned} \frac{dU_i(\hat{x})}{dx} \left[\frac{d\hat{F}(\hat{\pi}^*; \hat{\pi}^{e*})}{d\hat{\tau}_i} + \frac{d\hat{F}(\hat{\pi}^*; \hat{\pi}^{e*})}{d\hat{\rho}} \frac{d\hat{\rho}^*(\cdot)}{d\hat{\tau}_i} \right] &= 0, \quad i = 1, \dots, N, \\ \frac{dU_0(\hat{x})}{dx} \frac{d\hat{F}(\hat{\pi}^*; \hat{\pi}^{e*})}{d\hat{\rho}} &= 0, \end{aligned} \tag{3}$$

where strategies and the mapping from policies and expectations into the allocation are once more evaluated at optimal actions. Note that we have replaced the earlier mapping $F(\cdot)$ by $\hat{F}(\cdot)$ to represent structural changes in the economies following the move to EMU. As argued in the main text, these structural changes are likely to increase the interdependencies among, and hence spillover effects across, countries.

²⁸In the following, a hat denotes variables and functions in the EMU case.

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