

Alternatives to the Stability and Growth Pact*

Assar Lindbeck

IIES, Stockholm University and IUI[†]

Dirk Niepelt

IIES, Stockholm University[‡]

May 19, 2004

Abstract

We discuss alternatives to the Stability and Growth Pact (SGP). Motivations for the pact relate to domestic policy failure as well as cross-country redistribution, international demand externalities, and strategic interaction among policy makers. Since these problems are not exclusively linked to domestic budget deficits, the SGP is too narrowly focused. Moreover, the SGP does not sufficiently acknowledge informational limitations and political restrictions. We argue that robustness and political implementability should be guiding principles for the design of alternatives to the SGP, and we discuss implications of these principles: Constraints should apply to fundamental target variables (such as capacity utilization and the debt quota); they should apply at the European level (with decentralized mechanisms breaking down the constraints to the national level) if they are to address spillover effects; and their interpretation and implementation should be delegated.

1 Introduction

The Stability and Growth Pact (SGP) of EMU is an attempt to let internationally agreed institutional constraints compensate for inadequate incentives of fiscal policy makers. The contemporary problems with the implementation of the SGP dramatically illustrate, however, that the motivations underlying the pact are likely to collide in some circumstances with (other) national policy targets, for instance ambitions to dampen the business cycle, smooth tax distortions, and fight unemployment. A large literature has predicted such conflicts. But are these conflicts bigger than necessary? And if so, what could be alternatives to the SGP? Considerations that should guide the design of such alternatives are at the center of this paper.

The design of institutional constraints must start from a characterization of the problems that such constraints should address. To identify these problems, we compare in Section 2 the incentives of fiscal policy makers both before and after the introduction of the common monetary policy in the European Union to those in a hypothetical benchmark with (“ideal”) coordinated policy choices. Our discussion incorporates a range of arguments that have been proposed in

*We thank seminar participants at IIES for helpful comments.

sgp2.tex

[†]SE-106 91 Stockholm, Sweden. E-mail: assar.lindbeck@iies.su.se

[‡]SE-106 91 Stockholm, Sweden. E-mail: dirk.niepelt@iies.su.se

the literature. In particular, we identify potential problems related to domestic policy failure as well as cross-country redistribution, international demand externalities, and strategic interaction among policy makers. These problems are not exclusively linked to domestic budget deficits. A central point of the paper is therefore that the SGP (and many proposed reforms thereof) is too narrowly focused by concentrating on that variable. We instead propose institutional constraints that incorporate a wider range of variables for dealing with the problems at hand.

In Section 3, we turn to the design of such constraints. We argue that it is essential to acknowledge the lack of precise quantitative information about the economic environment, and the presence of political restrictions. Robustness considerations and concern for political implementability should therefore guide the design of alternatives to the SGP. We discuss implications of the robustness and implementability criteria along three dimensions. In particular, we emphasize the advantages of constraining ultimate rather than intermediate target variables; the benefits of formulating the constraints at the EMU rather than the national level (accompanied by mechanisms to break these constraints down to the national level) if they are to address international coordination failure; and the advantage of delegating the interpretation and implementation of the constraints.

Section 4 concludes with brief remarks on the pressing transition problem. The Appendix contains a formal discussion of the framework underlying the analysis in Section 2.

2 Fiscal-Monetary Policy Interaction in the Absence of Institutional Constraints

Our objective in this section is to characterize at a general level the inefficiencies and cross-country distributive effects that arise due to decentralized fiscal policies in a world with strongly interdependent national economies and without institutional constraints. We consider the situation in Europe both before and after the introduction of the common monetary policy, and we compare these situations to a hypothetical “Nirvana” benchmark of coordinated policy actions. Comparisons between these different scenarios allow us to identify whether inefficiencies and redistributive effects arise due to suboptimal policy coordination of national monetary and fiscal policies in general, or suboptimal policy coordination in the special case of a common monetary policy in a monetary union.

In the following, we refer to the three scenarios mentioned above simply 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 more formal characterization of the incentive structure of policy agents in the benchmark, EU, and EMU as laid out in the Appendix.

2.1 Benchmark: Perfect Policy Coordination

Our benchmark reflects the case of coordinated decision making by all fiscal and monetary authorities in EU, without commitment, where all authorities agree on the joint objective function. In our view, to assume commitment would be quite unrealistic even for the benchmark since it would be largely incompatible with democratic decision making. Our benchmark therefore differs from the constrained optimal outcome—the Ramsey outcome—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 restrictive if we allow policy makers 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 it affects future policy options and hence the welfare of future taxpayers.

In a world where national economies are interconnected, it is a common place that national fiscal or monetary policies influence economic outcomes in other countries. *Spillover effects* arise if policy choices by one authority influence variables in the objective function of other authorities. In our benchmark case, where all authorities agree on the joint objective function, such spillover effects are fully internalized and therefore do not cause deadweight losses.

2.2 EU: Decentralized Fiscal and Monetary Policies

We characterize the situation before the introduction of the common monetary policy as decentralized decision making of monetary and fiscal policy, without commitment. The assumption that fiscal authorities cannot commit seems indisputable. After all, fiscal policies are in the center of political controversies and bargaining in national politics. Our parallel assumption with regards to central banks, however, deserves further comment. Although central banks in the pre EMU era seemed less inclined to implement expansionary policies than the respective fiscal authorities, this does not imply that central banks were committed to decision rules. It rather 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. Moreover, other evidence seems to contradict the notion of commitment by central bankers. The Bundesbank provides a good example: while generally perceived to be the most hawkish and independent of the major European central banks, it was clearly under political control at least during certain periods (and thus not committed or rules based), for instance when the D-Mark was introduced in Germany’s “Neue Länder” and when Germany agreed to abolish the Mark in exchange for the Euro. Non-commitment appears even more realistic in the case of central banks of other countries.

We assume that central banks move after fiscal authorities, capturing the notion that central banks adjust their instruments in much more flexible fashion than fiscal authorities. This does not imply that central banks are forced to straighten out a (fiscal) mess that might be left by 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 about the policy mix and therefore the freedom to determine the inflation or exchange rate at their discretion.

Optimal policy choices by a fiscal policy maker maximize his objective function subject to the optimal policy choices by all other fiscal authorities and the 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, while spillover effects are internalized by policy makers in the benchmark, according to the agreed upon social welfare measure, they are *not internalized* in EU. Secondly, policy makers in EU *take the feedback effects* due to induced policy changes by authorities moving subsequently *into account*, and hence not only the direct welfare effects of their policy choices (as they do in the benchmark case).¹ We discuss the sources of these two differences and their efficiency and welfare implications in turn.

The source of the first difference, namely that policy makers in EU do not account for

¹If the analysis refers to the ERM countries rather than the EU area as a whole, then it seems reasonable to treat the Bundesbank in a non-symmetric way as compared to other central banks in the ERM area. We adopt this approach in the Appendix.

spillover effects, is that authorities maximize their individual objective functions rather than a joint supranational objective function. This raises three types of problems:

- i. Policy choices by each authority give rise to general equilibrium effects, with potential welfare implications since these effects redistribute wealth between 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 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 source of the second difference, namely the fact that decision makers account for the responses by other authorities to their own actions, is again conflicting interests among policy makers. For as long as authorities share the same objective function, they do not have to worry about the induced policy responses by other authorities because incentives are fully aligned, regardless of whether decision makers move simultaneously or sequentially; see the Appendix for a discussion. Turning to the efficiency implications of the second difference, the policy feedbacks give rise to policy mediated spillover effects: The response of one authority to the actions by another one affects the variables in the objective functions of third authorities, but these effects are not accounted for when the former authorities take their decisions. While in the benchmark case, these policy mediated spillover effects are equal to zero, in the EU case they are not. This causes deadweight and welfare losses for similar reasons as in the case of direct spillover effects.

In sum, in the EU case spillover effects redistribute wealth and give rise to aggregate demand externalities as well as strategic interaction among non-atomistic policy makers. If policy makers move sequentially, the strategic interaction is reflected in policy mediated spillover effects. Moreover, if policy makers have conflicting objectives, strategic interaction and demand externalities cause deadweight losses. According to 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 be weakly worse 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, then the outcome in EU must be weakly worse for at least one authority, due to the distributive implications of a change in the policy mix. In fact, the decentralized equilibrium may even be worse for all authorities, due to the deadweight losses discussed above.

2.3 EMU: Decentralized Fiscal Policies, Centralized Monetary Policy

As in the case of EU, we characterize the situation after the introduction of the common monetary policy by decentralized decision making (again without commitment), although now with

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

the newly established European Central Bank (ECB) replacing national central banks. In a first stage, all national fiscal authorities move simultaneously. In a second stage, the ECB follows.

There are three main differences to the EU case. One is that the ECB pursues an objective function that accounts for the effects on the whole EMU area as opposed to national central banks pursuing the interests of their respective countries. The second difference is that 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 structural changes in the economies. For example, to the extent that the common currency fosters cross border market integration and therefore international interdependence, increased demand in one country has a stronger effect on exports from neighboring countries. Moreover, with the introduction of the common currency, borrowing in Euro bonds by one country now directly influences the interest rate of other national Euro debtors in the union if the demand for Euro bonds is not fully elastic.³

Optimal policy choices by a fiscal policy maker 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, 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, policy makers in EMU optimize in a *different economic environment*. Secondly, a single monetary authority—the ECB—replaces separate monetary authorities. In particular, the ECB maximizes a different objective function than national central banks, and fiscal policy makers anticipate *induced policy changes by the ECB* rather than by domestic central banks, in particular their own one. We discuss the implications of these two differences in turn.

Structural changes in the economy due to the move from EU to EMU tend to increase international linkages and thereby the spillover effects across decision makers and countries. For example, as pointed out before, with a common currency cross-country demand and supply elasticities are higher, and the issuance of Euro denominated bonds by one country has stronger effects on the interest cost in other countries. We argued previously (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 due to direct 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 become stronger 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 which fiscal variables the ECB responds to, 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. For instance, relative to the EU case, fiscal policy makers may issue too much Euro denominated debt, or even too much debt in any denomination, if they 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).⁴ In both cases, deadweight losses arise because individual governments do not

³To the extent that differential exchange rate risk is removed, national governments with different risk premia before EMU also experience a convergence of their risk premia. In fact, this convergence process might “overshoot”: investors might differentiate their judgments with respect to non-exchange rate related risk of government debt less between member countries in the EMU zone than between member countries in EU. (Such behavior may not be consistent with unbounded rationality.)

⁴See Chari and Kehoe (2004) and Beetsma and Bovenberg (1999), respectively, for such arguments.

take the negative consequences of higher equilibrium inflation in other countries into account. In equilibrium, the strategic interaction between fiscal authorities results in a situation akin to the prisoners' dilemma. Since not only policy makers, but also investors correctly anticipate the ECB's response, the latter has no "real" effects but simply results in an inflationary bias similar to the one analyzed by Barro and 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. In 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 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.⁵ In that case, the ECB's response has real effects since, effectively, part of the burden of the crisis country's public debt is born by all other member states. In consequence, a common-pool problem arises: Anticipating the course of actions, fiscal authorities again issue too much public debt and equilibrium inflation expectations, fuelled by the anticipation of a monetary bail out, rise.

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 in order to mitigate the effects of the monetary contraction. Deadweight losses arise because fiscal policy makers do not take the negative consequences of the ECB's response to their expansive policy stance—even higher interest rates—on the objectives of other fiscal policy makers into account. In equilibrium, fiscal policy in each country is expansive, but output remains depressed due to the ECB's contractionary policy stance.⁶

In the discussion up to this point, we have implicitly assumed that the incentives of national fiscal authorities are aligned with their constituency's long-term interests. As suggested by a large literature, this may not be the case in reality where fiscal policy choices often appear to be characterized by domestic fiscal policy failure.⁷ To the extent that the move from EU to EMU reduces the sensitivity of monetary conditions in any member country to the (fiscal) developments in that country, it may accentuate domestic fiscal policy failure in countries with low debt quotas while reducing it in countries with high debt quotas.⁸ To see this, note that the abolition of national central banks eliminates a potentially useful domestic "watchdog" with powers to counteract the effects of fiscal policy measures (or domestic wage bargaining) on the national economy. On that count, the move from EU to EMU is likely to result in looser fiscal policy (and perhaps less restraints on domestic wage formation). On the other hand, however, the abolishment of national central banks also eliminates a domestic lender of last resort with powers to inflate away nominal government debt in times of crisis. If national policy makers perceive such a crisis as sufficiently likely, the move from EU to EMU strengthens their incentives for prudent fiscal policy choices. Similarly, the abolition of national monetary policies under EMU eliminates the option to devalue as a final escape route. This might also

⁵See Uhlig (2002). Uhlig also discusses how the incentives for prudent bank regulation are affected when the ECB becomes the lender of last resort. Buitier, Corsetti and Roubini (1993) argue that the ECB can act as lender of last resort without an explicit bail out, and without raising inflation.

⁶See 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.

⁷See, for example, the surveys in Alesina, Roubini and Cohen (1997) on political business cycles or Alesina and Perotti (1995) and Persson and Tabellini (2000) on dynamic common-pool problems.

⁸In those countries whose central banks in 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 may reduce the sensitivity of monetary conditions to (fiscal) developments to a lesser extent.

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.

Clearly, some of the differential incentives for fiscal policy makers discussed above counteract each other. For example, while non-internalized spillover effects may be stronger in EMU than in EU and may tend to induce too high deficits and debt, the lack of a domestic lender of last resort may strengthen the incentives for prudent fiscal policy and therefore tend to induce lower deficits. Which of these effects dominates, and hence whether a shift from EU to EMU results in looser or tighter fiscal policies in member states, presumably partly depends on institutional features in the individual countries, and how these features change as a result of a move to EMU. Conclusive empirical evidence on these questions is not available. However, Fatás and Mihov (2003) report signs of a “fatigue” in fiscal consolidation efforts since the introduction of the common monetary policy in 1999. Whether this fatigue, reflected in more lax fiscal policies, is related to changed strategic incentives remains unclear, though.

3 Institutional Constraints

Decentralized policy making in the context of highly integrated national economies gives rise to efficiency problems due to non-internalized demand externalities as well as strategic interaction. It may also give rise to undesired distributive implications. The move from EU to EMU is likely to accentuate these problems while simultaneously affecting—in which direction is not clear—the importance of domestic policy failure.

From a theoretical point of view, policy coordination could deal with the problems caused by international spillover effects. However, it could not solve the problems caused by domestic policy failures. Moreover, such international policy coordination hardly is politically feasible since it requires a degree of centralization that is impossible to reconcile with the demand for democratic accountability. Against this background, institutional constraints on national fiscal policy makers, for example the SGP, may be regarded as alternative attempts to deal with these problems. Our objective in this section is to elaborate on the question of optimal (or rather “reasonable”) design of such constraints.

In a world where constitutional designers had full information about all aspects of the economic environment, it would always be possible to design institutional constraints that affect policy makers’ incentives in the desired way. Indeed, we could think of many alternative institutional designs that would bring about the same desired incentives. One obvious approach to this end would be an appropriately designed system of Pigouvian taxes and subsidies. In the real world, however, the knowledge of constitutional designers about the economic environment is of course far from perfect. This suggests that institutional constraints should be specified in a *robust* manner: They should accommodate the inherent and unavoidable lack of information and at the same time elicit as much information as possible, for example by exploiting information conveyed by market conditions.

Moreover, constitutional designers have to acknowledge the fact that certain types of constraints may not be *implementable* because they conflict with political considerations—a particularly obvious point if institutional constraints are meant to address domestic policy failure in the first place. If this complication is not acknowledged, the constraints easily run into problems of time inconsistency and will therefore in fact be violated *ex post*. One factor to potentially render institutional constraints time inconsistent is that such constraints cannot be specified

for every conceivable contingency, and therefore, that they have unintended side effects. For instance, in the case of the SGP, automatic stabilizers might not be allowed to work in the most desirable fashion; public investment might be crowded out; tax smoothing or stabilizing discretionary demand management policies might be prevented; or, indeed, a fiscal contraction might be induced in the midst of a recession by the requirement to reduce deficits and debt quotas.⁹ One important way to reduce the risk of time inconsistency therefore is to choose constraints that do not restrict policy makers more than necessary.

We believe that robustness and political implementability (time consistency) should be overriding considerations when designing institutional constraints. In the following, we apply these considerations to a discussion of alternatives to the SGP. We structure our discussion along three natural dimensions, namely (i) the type of variables to which the constraints apply; (ii) the level of aggregation of the constraints and mechanisms to break them down to the national level; and (iii) their flexibility, i.e., the degree to which the constraints are adjusted to varying circumstances.¹⁰

3.1 Type of Variables to be Constrained

The most direct approach is to constrain *target variables*, i.e., those variables that are at the center of the coordination problem or at the source of the policy failure. From the demand externality point of view, the most important target variable presumably is a country's output gap (or unemployment rate), since it has immediate spillover effects via trade and other countries' output gaps. From the point of view of strategic interaction with the ECB, one important target variable is the stock of public debt, since a high debt quota in member states increases the incentive for the ECB to loosen its monetary policy stance, as discussed earlier. Another variable could be the output gap, to the extent that negative output gaps may trigger contractionary monetary policy responses by the ECB that are felt in all countries. From the domestic policy failure point of view, the most important target variable appears to be the stock of domestic debt, and potentially its change, the deficit. Finally, from a cross-country redistribution point of view, output gaps and domestic public debt (the latter affecting the cost of the debt service across countries and generations) could be relevant target variables.

A more indirect approach is to constrain *intermediate target variables* that are closely linked to target variables. From the strategic interaction point of view, for example, such an intermediate target variable could be the budget deficit since it directly affects the stock of debt, but by itself may not play a central role in the strategic interaction between fiscal authorities and the ECB. A disadvantage of constraining intermediate rather than ultimate target variables is that this approach requires additional information. In particular, the links between intermediate targets and ultimate targets have to be reasonably well understood. To the extent that this is not the case, or that these links are not stable over time, constraining intermediate rather than ultimate target variables violates the robustness principle. If in some circumstances the connection between intermediate and ultimate target variables changes then constraints on the former may quickly become counterproductive by causing undesired side effects. Indeed, such instability is a central problem today of the SGP; in the presence of high and persistent output gaps in several countries, constraints on deficits alone are unlikely to address the central problems. Moreover, even the link between the deficit and the debt quota is less stable than might appear: inflation,

⁹See, for example, Blanchard and Giavazzi (2003), Buiters et al. (1993), or European Economic Advisory Group (2003) for discussions.

¹⁰See Buiters (2003) for an alternative classification of institutional constraints.

economic growth, accounting “tricks” and other factors all play important roles in that respect.

Criticism along the line that the SGP aims at targets that are irrelevant or at least not robustly linked to the central problems that need to be addressed, is commonplace in the literature. Buiter et al. (1993) point out, for example, that nominal deficit constraints neglect inflation and do not differentiate between countries according to their real growth rate. Blanchard and Giavazzi (2003) and Fatás and Mihov (2003) stress the conflict between the long-run objective of sustainable public finances and a simplistic current-budget-deficit rule. European Economic Advisory Group (2003) emphasize the arbitrariness of the SGP constraints and the implied net debt targets and point to the asymmetries embodied in the SGP (i.e., the insufficient incentives to behave “well” as opposed to not to behave “badly”). All of these authors question the usefulness of gross, rather than net government debt in the SGP constraints.

The most indirect approach is to constrain *instrument variables* such as government spending or tax rates. There are at least two specific problems with that approach relative to the problems arising with constraints on intermediate target variables. First, both the informational requirements and the instability of the links between instrument and target variables may be even bigger than with intermediate targets to the extent that the effects of the instruments on the ultimate targets are transmitted via the intermediate targets. This gives rise to an even more severe violation of the robustness principle. Second, when imposed by international bodies or as the result of international bargaining, constraints on instrument variables are very difficult to implement politically since they directly impinge on a country’s capacity to choose the size of its public sector, the extent of redistribution, etc.

We conclude that institutional constraints on the ultimate target variables are, in principle, the most useful approach.

Some of the proposals in the debate about reforming the SGP move in that direction. In particular, several proposals for reforms of the SGP succeed in bringing the central constrained variable under the pact (the deficit) closer to a statistic that more accurately reflects the problem of domestic policy failure. These proposals argue in favor of constraining the accumulation of public debt in the medium term as opposed to annually, for example by constraining average budget deficits over the business cycle; constraining cyclically adjusted deficits as opposed to unadjusted deficits; or linking the admissible budget deficit to a country’s debt quota (see for example European Economic Advisory Group (2003)). While the second and third proposal intuitively make sense, the usefulness of the first proposal is more doubtful in a world where the time horizon of governments is rather short. If governments do indeed procrastinate, it is not clear why the option to delay fiscal adjustment over the business cycle (and possibly until a new government is in place) should help. Thus, while in a world with rare changes of government and an electorate with long memory a balanced budget requirement over the cycle might be a better target variable than the unadjusted deficit, this may not be the case in the real world.

A somewhat different proposal for reform that also addresses problems of domestic policy failure is due to Blanchard and Giavazzi (2003) who argue in favor of constraining deficits net of net public investment. This proposal has several advantages: First, government investment often gives rise to future financial returns, for example in the case of investment into energy production. In that case, the government’s wealth position is not undermined by increased debt but rather improved, and the deficit does not necessarily reflect any policy failure. Second, if the central aspect of domestic policy failure is a bias of government spending in favor of current as opposed to capital spending, then 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. Third, the proposed adjustment would not require any changes in the

Treaty underlying the SGP.

Generally speaking, many of these proposals aim in the right direction as far as problems of domestic policy failure are concerned. However, they do not come close enough to featuring the proper target variables with respect to problems other than domestic policy failure, in particular the various spillover effects. If these spillover effects are considered important, the set of target variables should be extended.

We conclude with the caveat that not all types of target variables are equally operational. For instance, it might be more difficult for politicians to announce policy targets for unemployment or capacity utilization than for the budget deficit since voters may care more strongly about the former than the latter variables. This might make it necessary to compromise between the relevance of target variables and their political feasibility.

3.2 Level of Aggregation

Institutional constraints can apply either at the national level in each country or at the aggregate EMU level. In the latter case, it is of course necessary to implement additional mechanisms to break the aggregate constraints down to the country level where fiscal policy is actually pursued. Which approach is more appropriate depends on the particular type of problem at hand.

Consider first the case where demand externalities, strategic interaction, or undesired distributive effects are to be corrected. Constraints at the country level have the advantage that they allow for differentiation across countries, for example to address asymmetries in political preferences, the transmission mechanism or the intensity of strategic interaction across countries. But to a large extent, this advantage appears to be theoretical at best. For political factors render it very difficult to differentiate institutional constraints across countries—each country can always find reasons why itself should be treated less harshly. In effect, then, country level constraints are likely to result in identical constraints for each country, as is currently the case with the SGP.

Constraints at the EMU level, on the other hand, have the advantage that they free individual countries from the straight-jacket of fixed, identical constraints. In fact, aggregate targets are the natural starting point when imposing such constraints if demand externalities and problems of strategic interaction arise in proportion to the EMU *average* of relevant target variables (a reasonable assumption for demand externalities, for example arising from output gaps, and a very realistic assumption for the effects working through policy responses of the ECB). Moreover, imposing constraints at the EMU level is also likely to constitute the more robust approach since it requires fewer constraints. However, as pointed out before, aggregate constraints eventually have to be broken down to the national level where fiscal policy is actually conducted. The conflicts that are potentially associated with such a recurring process might appear to constitute a strong disadvantage of this option. On closer sight, however, this need not really be the case: decentralized mechanisms that smoothly allocate the aggregate constraints across countries may in fact be feasible.

One interesting proposal for such a mechanism is due to Casella (1999), who suggests that markets be created among governments on which deficit permits can be traded. Such an arrangement has several advantages. In contrast to the rigid rules of the SGP, it allows an allocation of deficits to countries where their social value is highest (or social cost is lowest); it provides a reward for virtue (since countries with low deficits can sell deficit permits); and it weakens the loss of sovereignty that a country suffers either when having to restrict domestic aggregate demand in the midst of a prolonged recession, or when breaching the SGP criteria. As a byproduct of

all these effects, the credibility of the agreed upon rules would be strengthened.¹¹

To see how such a system could be arranged, it is useful to start from the definition of an aggregate target variable for the EMU area, namely

$$z \equiv \sum_l \frac{Y_l}{Y} z_l,$$

where z and z_l denote the EMU average and country l 's value of the target variable, respectively; and Y_l and Y denote country l 's and the EMU area's GDP, respectively. Suppose that one permit, for instance with respect to the unemployment rate or the debt quota, assigns the right to one percentage point of that rate per unit of GDP. Conditional on an EMU wide GDP of Y , the total number of permits consistent with a desired level of the target variable for the EMU area, z , therefore equals zY . Countries would receive an initial free endowment of permits in proportion to their GDP, zY_l , and would then be free to trade the permits with each other. This would imply that a country had to buy the more permits the bigger it is, and the "worse" it performs relative to the EMU average. However, as a share of domestic GDP, the cost (revenue) of (from) changing a country's target variable z_l by a certain amount would be identical for each country. It would also imply that the desired value for the EMU average of the target variable would be reached as long as expected and actual EMU wide GDP coincide, because

$$zY = z \sum_l Y_l = \sum_l z_l Y_l.$$

The left-hand side of this equation represents the aggregate supply of permits, determined on the EMU level, while the right-hand side represents aggregate demand for permits based on all countries' net demands.

Underlying the assumption of market clearing is the supposition that some kind of market for permits emerges and that the demand for permits, and thus countries' target variables, are sensitive to the price on this market. In practice, problems might arise along both of these dimensions. First, large countries like Germany may act oligopolistically in the market for permits. Secondly, governments may not be able to influence the target variables in the short term and as a consequence the market for permits might not clear. To avoid this problem, it will be necessary to adjust aggregate supply, that is, the aggregate target variable instead. This underlines the importance of setting the aggregate target variable on a reasonable and feasible level. We return to this issue. Third, countries might conscientiously violate the requirement to hold the required number of permits. To deal with this issue may require fees for the violators. For modest violations, it may be reasonable to use the market price of permits as punishment fee. For larger violations, higher fees should be imposed according to a progressive scale, as suggested in Casella's proposal with regards to markets for deficit permits. Many more questions, such as whether to allow for "precautionary" permit holdings, would have to be dealt with. Some of these potential problems could be avoided (although others may thereby be created) by instead relying on alternative mechanisms to flexibly break down the aggregate constraints to country levels. One such alternative mechanism could be a combination of appropriately set Pigouvian tax and subsidy rates on the target variables to be constrained: If tax and subsidy rates are set equal to the price that would clear the market for tradeable permits, and if taxes (subsidies) are charged (paid) for levels of the target variable higher (lower) than the EMU wide target level of that variable, then the two approaches would implement the same allocation. Future research

¹¹For a discussion of Casella's proposal, see Buiter (2003, section IX).

should investigate other, simple and robust mechanisms to allocate aggregate constraints to the national level.

Consider next the case where the constraint is designed to correct a purely domestic problem, in particular domestic fiscal policy failure. Subsidiarity considerations, democratic accountability, and the robustness principle all suggest that problems of domestic policy failure without direct international repercussions should be dealt with where they arise, at the national level, for example by means of expenditure ceilings, stricter budgetary processes, or a strengthened position of the Treasury. A more radical approach has been proposed by Wyplosz (2002) who argues in favor of some delegation of fiscal stabilization policy from national governments to national fiscal policy committees. Wyplosz points out, in our view rather convincingly, that such committees are in a better position to evaluate the trade-off between short-run stabilization and long-run sustainability than governments—even if governments are constrained by institutional features. After all, (good) committees combine sound judgment with flexibility, and they are credible to the extent that their task is made largely unrelated to the highly political, short-term issues of redistribution.¹² Of course, to be consistent with democratic principles, such committees have to be accountable to political authorities on the basis of the tasks that politicians have delegated to them—as in the case of operationally independent central banks.

However, the case for country level constraints implemented by national legislative bodies is weakened if domestic policy failure extends to the constitutional level in the sense that politicians are unable to implement constraints at the national level even though they would prefer to do so. One of the motivations behind the SGP may therefore have been a willingness of policy makers to tie their own hands by *internationally* agreed institutional constraints. In the words of Buiter et al. (1993), EMU wide institutions may serve as substitutes for national institutions, giving rise to a “fiscal backbone” for countries with weak institutions. European Economic Advisory Group (2003) similarly suggest that domestic policy failure can be usefully dealt with at the European level, and that the SGP can be viewed as an external commitment mechanism—similar to GATT or WTO agreements. According to that view, the reason for initiating the SGP in connection with the launch of EMU is that this event offered a “window of opportunity” to impose such fiscal constraints.¹³ It seems indeed quite natural that the political process would exploit such a rare opportunity. Thus, whether institutional constraints to address domestic fiscal policy failure should be implemented at the national or international level really depends on whether politicians are *able* to implement adequate constraints at the former level or not.

This might vary from country to country. Eichengreen (2004) accordingly argues that the SGP constraints should apply selectively: Only countries without sustainable fiscal policies should be bound by them. Eichengreen (2004) proposes an independent expert committee whose task it would be to periodically judge which countries satisfy the sustainability criterion, as operationalized by “appropriate fiscal institutions”, “limited future pension liabilities”, and flexible labor markets. Clearly, it is debatable whether all these aspects are the most relevant ones to judge the solidity of public finances and whether it may be possible in practice to impose constraints only on a subset of countries. Nevertheless, the proposal seems interesting to us because it stresses the role of institutional constraints on the international level as substitutes for domestic institutions *in those countries* that need such substitutes.

¹²See also the discussion in European Economic Advisory Group (2003).

¹³Beetsma 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 fiscal rules of the sort implemented in the SGP time consistent. According to Beetsma and Uhlig (1999), countries have no incentive to enforce the deficit constraints *ex post* unless they share a common currency.

We conclude that—for informational and political reasons—institutional constraints to address demand externalities and problems of strategic interaction may usefully be applied to target variables on the aggregate level whenever this is administratively feasible. These aggregate constraints must, however, be accompanied by decentralized mechanisms, for instance markets for permits or Pigouvian tax/subsidy programs, as discussed above. Such a partly decentralized approach eliminates a large part of the informational requirements under country level constraints, but it does not do away with all of them (as Casella recognizes in her proposal for markets for deficit permits). In particular, the question of the numerical values for the aggregate target variables remains to be resolved. We return to this issue below. On the other hand, if the institutional constraints are intended to correct domestic policy failure then such constraints should be specified to apply directly at the country level. They should also be designed and implemented nationally, unless domestic policy failure extends to the constitutional level such that national politicians need a backbone in the form of international agreements.

Aggregate constraints that are decentralized by means of tradeable permits or Pigouvian taxes have the additional advantage that the punishment and reward scheme they sustain is smooth rather than abrupt as in the case of threshold values at the country level such as the 3% or 60% criteria in the SGP. Such smoothness is likely to foster political implementability because it eliminates unnecessary political “hype” when a country’s targeted variable reaches or exceeds the threshold. In that respect, smoothness promises to significantly de-politicize the debate. To similarly achieve smoothness for constraints at the country level (in particular, those constraints addressing domestic policy failure), threshold values should be replaced by constraints that render a country’s punishment a smooth function of the value of that country’s targeted variable.¹⁴

When applying these conclusions to existing proposals for reform of the SGP, the implications depend on the view that one holds with respect to the fundamental purpose of the SGP. If the purpose of the constraints is to address inefficient international coordination, then it appears insufficient to move to modified (deficit) targets at the national level since this approach does not allow for an efficient allocation of the aggregate constraint across countries. If, on the other hand, the purpose of supranationally imposed constraints is to correct domestic policy failure, it would be counter productive to allow governments to reallocate their assigned quotas. Nevertheless, political implementability may require that the constraints at the country level feature smooth punishments and rewards.

3.3 Flexibility of the Constraints

Finally, consider the degree of flexibility of the constraints. One polar case is simple rigid constraints, such as the ones currently embodied in the SGP. They render the rules easy to understand. This does not necessarily imply, however, that the rules are easy to enforce, in particular if they are not perceived to be “reasonable”. Moreover, simplicity and rigidity have the obvious disadvantage that they preclude flexible adaptation and responses to new circumstances.

Highly flexible institutional constraints are at the other end of the spectrum. They have the obvious advantage of allowing for more balanced responses to varying circumstances. If

¹⁴A smooth punishment function has the additional benefit of widening the range over which the incentive structure operates. Threshold values, on the other hand, tend to give strong incentives once the targeted variable enters the vicinity of the threshold, but weak incentives otherwise. This discrepancy is less stark, however, if policy makers face significant uncertainty. Pressure in favor of, e.g., deficit reduction then starts to build up well before the deficit quota reaches the threshold value.

implemented in the form of rules, flexible constraints have the disadvantage that the rules are hard to specify if they are to be credible. For without precise specification, the interpretation of the rules will be considerably influenced by the particular interests pursued at the time of the interpretation. Alternatively, flexible institutional constraints can be implemented in the form of “implicit constraints”, i.e., procedural rules disciplining the budgetary process. Such implicit constraints have proven useful, according to Fatás and Mihov (2003), who argue that “the current process of discussion, approval, and surveillance of national budget plans by the European Commission” can be viewed as a form of implicit constraints. This particular example then suggests, however, that such implicit constraints might suffer from a severe lack of credibility as well.

How can the pervasive trade-off between flexibility and credibility be overcome? Delegation—in particular of the power to decide about the numerical values for the aggregate constraints, and of the monitoring of their implementation at the national level—offers a standard solution. On the one hand, delegation of these tasks to an international body of administrators, experts, lawyers, and perhaps retired politicians allows for hopefully sound judgment and thus flexibility. The agents in charge of quantifying the constraints can account for all available information, both in terms of institutional knowledge about transmission mechanisms and strategic interaction and in terms of information about the concrete economic circumstances. Of course, they are forced to make “common-sense” judgments, but that is necessary in a world full of complexities and uncertainties, which makes it impossible to stick to strict interpretations of rigid rules. On the other hand, this gain in flexibility relative to rules, however sophisticated they may be, is achieved without a need to sacrifice credibility with regards to the fundamental objectives pursued by the constraints. Credibility rather is preserved as long as the agents in charge can be relied upon to face appropriate incentives—just as a Rogoff (1985)-type conservative central banker. Finally, delegation of such sort may not weaken national sovereignty more than the rigid rules and discrete punishment functions embodied in the SGP, and it might remove some of the “political drama” which today surrounds conflicts about the interpretation and implementation of the SGP.

In spite of the broadly successful delegation of monetary policy, proposals for partial delegation of fiscal policy on the national level have usually received unfavorable reception. This is probably due to the fact that fiscal policy is perceived to belong to a core of activities in the center of the political sphere. However, this view is most likely “history dependent.” As the case of monetary policy delegation has shown, perceptions about which issues should be dealt with in the political sphere can change once a convincing case is being made. Since the proposals by Wyplosz (2002) or European Economic Advisory Group (2003) for the partial delegation of fiscal policy at the national level do make a reasonable case, these proposals may gain more acceptance. In the process, this should also foster awareness that the potential benefits of delegation are not limited to the national level.

Delegation of the interpretation and implementation of constraints strengthens their credibility but does not completely resolve all time inconsistency problems. In particular, delegation does not resolve the potential lack of enforceability of the constraints. One view in that respect is that enforcement is not a big problem; after all, the experience of the delegation of monetary policy to the ECB shows that national policy makers are prepared to accept the policy choices of an agency once decision making powers have been properly delegated. According to an opposing view, enforcement of restrictions on fiscal policy makers nevertheless is a much harder problem due to the lack of a clear separation of power and responsibilities. In that view, enforceability might require a system of constraints that is compatible with the ex post incentives of all fiscal

policy makers.

4 Conclusions

Decentralized fiscal policy choices by national governments give rise to a multitude of potential problems. We have concentrated on four types of problems, namely efficiency losses due to demand externalities, strategic interaction among policy makers, and domestic policy failure, as well as undesired distributive effects due to pecuniary externalities. Since these problems are not exclusively linked to domestic budget deficits, the focus of the SGP is too narrow.

We have argued that robustness and political implementability should be guiding principles in the design of institutional constraints on fiscal policy makers, and we have discussed implications along three dimensions. Measured along these dimensions, the SGP certainly fails: It constrains an intermediate rather than an ultimate target variable; is unnecessarily inflexible concerning the allocation of EMU wide constraints across countries; and does not sufficiently exploit the benefits of delegation.

Many reforms of the SGP that have been proposed in the policy discussion imply some improvements over the status quo since they allow for more flexibility of national macroeconomic policies. However, most of these proposals remain silent about potential problems due to the lack of policy coordination. Output gaps and the stock of public debt should play at least as important roles as the deficit in that respect.

As an alternative to the SGP, we have proposed a framework with constraints applying to fundamental target variables (such as unemployment or capacity utilization and the debt quota). We have argued that, for many of the potential problems that arise at the EMU level, the constraints should also be formulated at that level, with accompanying mechanisms to break them down to the national level. We discussed two such mechanisms: Trade in permits tied to various target variables along the lines of Casella's (1999) proposal for trade in deficit permits; and a Pigouvian tax/subsidy scheme. In view of the usual trade-off between flexibility and credibility, and the pervasive lack of relevant quantitative information, we have argued that delegation of the interpretation and implementation of the constraints to an independent (but accountable) committee at the supranational level may be beneficial.

Our discussion also suggests a pragmatic approach to the increasingly pressing transition problem: how do we get from a failed SGP to a new set of institutions without losing too much credibility on the way? A first step that is simple to implement could be to stick to the current 3% and 60% targets for a while, but to interpret them as reference values in the center of broader intervals with smooth punishment and reward schemes defined over these intervals. In the medium run, new constraints at the EMU level (with some allocation mechanisms accompanying them) and, if necessary, at the national level could be designed, and power to adjust the numerical values associated with these constraints could be delegated to an independent agency with carefully designed incentives and accountability. At that stage, institutional designers should use the window of opportunity of reform to devise constraints that deal not only with the inefficiencies arising from the move from EU to EMU, but more generally with the inefficiencies arising due to uncoordinated monetary-fiscal policy interaction.

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 that enter 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 of its arguments.

A strategy of a player specifies the action of the player at each possible information set. Since the private sector and the policy makers only move once in our setup, 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:¹⁵

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

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 we omit 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 by¹⁶

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

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 authority. In the benchmark case, these spillover effects do not cause deadweight losses since all authorities agree on the overall social welfare measure $V(\cdot)$ that aggregates policy makers' preferences.

¹⁵In the following, a bar denotes variables or functions in the benchmark case.

¹⁶Throughout the analysis, we assume that equilibria are 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 again are 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 the allocation 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 feedback from the other central banks (the terms subsumed under A_{N+1}).

If we consider 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 where 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 internalized by policy makers in the benchmark, according to the agreed upon social welfare measure $V(\cdot)$, while they are not 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 the second difference, the presence of the A terms in the EU case, is conflicting interests among policy makers. Regardless of whether authorities move simultaneously or sequentially, as long as they share the same objective function $V(\cdot)$, they do not have to worry about the induced policy responses by other authorities because incentives are fully aligned. Absent conflicting interests, the A terms in (2) would therefore be irrelevant (since $dU(x)/dx \cdot A$ would be equal to zero). The equilibrium conditions of the benchmark are equivalent to the 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 $V(\cdot)$. This latter set of conditions, namely

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

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

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

closely resembles the equilibrium conditions in the EU case, with the only difference that marginal welfare effects and thus optimal strategies here are defined relative to the agreed upon social welfare function $V(\cdot)$. To see the equivalence between the equilibrium conditions of the benchmark and the equilibrium conditions displayed above, note that, at the optimal coordinated policy, the last condition above implies that $(dU(x)/dx)\bar{A}_{N+1} = 0$, and therefore $(dU(x)/dx)(dF(\cdot)/d\bar{\rho}) = 0$. Moreover, this in turn implies $(dU(x)/dx)\bar{A}_i = 0$, and therefore $(dU(x)/dx)(dF(\cdot)/d\bar{\tau}_i) = 0$. Turning to the efficiency implications, note that the terms

$$\frac{dU_i(x)}{dx}A_j, \quad i = 1, \dots, 2N; j = 1, \dots, N + 1,$$

reflect the effects of authority j 's actions on authority i 's objective function that are mediated via induced policy responses. Since A_j includes the policy feedbacks of all authorities moving later than j , times the effect of these policy feedbacks on the allocation, the product $\frac{dU_i(x)}{dx}A_j$ comprises several spillover effects. In the benchmark case, these policy mediated spillover effects are fully internalized (and equal to zero), whereas in the EU case they are not.

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

Of course, 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 by¹⁷

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

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 again are 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

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

¹⁷In the following, a hat denotes variables and functions in the EMU case.

where strategies and the mapping from policies and expectations into the allocation again are 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 we argue in the main text, these structural changes are likely to increase the interdependencies among and hence spillover effects across countries.

References

- Alesina, A. and Perotti, R. (1995), 'The political economy of budget deficits', *IMF Staff Papers* **42**(1), 1–31.
- Alesina, A., Roubini, N. and Cohen, G. D. (1997), *Political Cycles and the Macroeconomy*, MIT Press, Cambridge, Massachusetts.
- Barro, R. J. and Gordon, D. B. (1983), 'Rules, discretion, and reputation in a model of monetary policy', *Journal of Monetary Economics* **12**, 101–121.
- Beetsma, R. M. and Bovenberg, A. L. (1999), 'Does monetary unification lead to excessive debt accumulation?', *Journal of Public Economics* **74**(3), 299–325.
- Beetsma, R. and Uhlig, H. (1999), 'An analysis of the Stability and Growth Pact', *Economic Journal* **109**, 546–571.
- Blanchard, O. J. and Giavazzi, F. (2003), Improving the SGP through a proper accounting of public investment. Mimeo, MIT, Cambridge, Massachusetts.
- Buiter, W., Corsetti, G. and Roubini, N. (1993), 'Excessive deficits: Sense and nonsense in the treaty of Maastricht', *Economic Policy* **16**, 57–100.
- Buiter, W. H. (2003), 'Ten commandments for a fiscal rule in the E(M)U', *Oxford Review of Economic Policy* **19**(1), 84–99.
- Casella, A. (1999), 'Tradable deficit rights: Efficient implementation of the stability pact in the European Monetary Union', *Economic Policy* (29), 323–361.
- Chari, V. V. and Kehoe, P. J. (2004), On the desirability of fiscal constraints in a monetary union, Working Paper 10232, NBER, Cambridge, Massachusetts.
- Dixit, A. and Lambertini, L. (2001), 'Monetary-fiscal policy interactions and commitment versus discretion in a monetary union', *European Economic Review* **45**(4–6), 977–987.
- Eichengreen, B. (2004), 'Institutions for fiscal stability', *CESifo Economic Studies* **50**(1), 1–25.
- European Economic Advisory Group (2003), *Fiscal Policy and Macroeconomic Stabilisation in the Euro Area: Possible Reforms of the Stability and Growth Pact and National Decision-Making Processes*, Report on the European Economy 2003, CESifo, Munich, chapter 2, pp. 46–75.
- Fatás, A. and Mihov, I. (2003), 'On constraining fiscal policy discretion in EMU', *Oxford Review of Economic Policy* **19**(1), 112–131.
- Persson, T. and Tabellini, G. (2000), *Political Economics*, MIT Press, Cambridge, Massachusetts.
- Rogoff, K. (1985), 'The optimal degree of commitment to an intermediate monetary target', *Quarterly Journal of Economics* **100**, 1169–1190.
- Uhlig, H. (2002), One money, but many fiscal policies in Europe: What are the consequences?, Discussion Paper 2002-32, CentER, Tilburg.

Wyplosz, C. (2002), Fiscal discipline in EMU: Rules or institutions. Paper prepared for Group of Economic Analysis of the European Commission.