Fiscal–Monetary Interaction and the Stability and Growth Pact in the European Monetary Union

Bodo Herzog

Department of Economics and Social Science

University of Bamberg

A thesis submitted for the degree of

Doctor rerum politicarum
(Dr.rer.pol.)

Yet to be decided: April 30, 2005.

I would like to dedicate this thesis to my loving parents, Martin, Marion and Julian.

Acknowledgements

I would like to acknowledge, first and foremost, Prof. Dr. Johannes Schwarze, my first supervisor, for his many suggestions and constant support during this research. I am also grateful to Prof. Dr. Thomas Gehring, my second supervisor, for his guidance through the political economic part of my dissertation.

Moreover I thank especially Prof. Dr. Richard Münch the Director of the Doctoral graduate programme 'Markets and Social Systems in Europe' as well as all other participating Professors at the university of Bamberg. The interest they expressed in my work and the very good comments on my preliminary work, gave me a better perspective of my own results.

I also gratefully acknowledge the financial support for my whole Ph.D. project and for all my travels to international conferences — where I presented my new research results — from the German Research Foundation (DFG).

Of course, I am grateful to my parents for their patience and *love*. Without them this work would never have come into existence (literally).

Additionally I thank Kurt Hafner and Christoph Wunder for sharing with me your knowledge of economics and provided me with many useful references and friendly encouragement. Finally, I wish to thank the following persons:

Roland (for his friendship); Franz (for everytime criticism to EU); Julian (for changing my life to a better one); Kaori (for insides in an other culture); Sabine, Dany, Christine, Stefanie, Sandra, Anja,

Janina, Olaf, Reinhard, Christoph, Bernd, Emil, Jens, Sebastian, Simon... (for all the good and bad times we had together); J. Haydn (for giving me power and ambition in very bad times in my live) *and* my younger brother Martin (because he asked me to).

Bamberg, Lichtenhaidestraße 11   Bodo Herzog
April 2, 2005

Abstract

*...it is clear that there is a need to reform
the Stability and Growth Pact.*

De Grauwe (2003, p. 219)

The European Economic and Monetary Union (EMU) is unique because it is a currency area of sovereign countries each retaining a large degree of fiscal autonomy, with a single monetary authority — the European Central Bank (ECB) — managing monetary policy for the whole zone.

The European Central Bank is mandated by the Maastricht Treaty of 1992 to maintain primary price stability. Thus the ECB is viewed as the strongest central bank in the world. But on the other hand the EMU is built also on strong fiscal discipline. The budgetary autonomy of the EMU's members is subject to the numerical constraints of the Maastricht Treaty and the Stability and Growth Pact (SGP), since Amsterdam in June 1997. While the numerical parameters of the Maastricht Treaty (budget deficits and debts should not exceed 3 per cent and 60 per cent of GDP, unless exceptional circumstances occur) were seen as a typical screening device to select the members of the euro area in the preliminary phase; the goal of the SGP was to make fiscal discipline and sustainability a permanent feature of the EMU. The European Council resolution which accompanied the Stability Pact (EC 1466/97 and 1467/97) underline the importance of safeguarding sound government finances as a means to strengthening the conditions for price stability and strong sustainable growth.

The European Monetary Union generates several new interactions between the monetary and fiscal policy level. For this reason we need

'new' instruments and methods to analyze the interactions and coordination between monetary und fiscal policies. In order to maintain price stability the fiscal framework was needed to ensure budgetary discipline. Central banks are often accused of being obsessed with inflation. This is totally untrue. If they are obsessed with anything, it is with *'fiscal policy'* (King, 1998).[1]

An early attempt to model the Stability and Growth Pact is provided by Beetsma and Uhlig (1999). A second step towards a better understanding of fiscal–monetary interaction within a Monetary Union were carried out by Dixit and Lambertini (2001, 2003) and Dixit (2001) within a game–theoretic framework. However, the empirical failures which occurred within the Stability and Growth Pact, are not sufficient explained in the recent literature. Therefore it emerges a new and huge reform debate about the European Stability and Growth Pact in 2002 until today.[2] These debates show again, that no economic theory exists on the Stability and Growth Pact or even on the mechanisms of the Pact. Analyzing the Stability and Growth Pact theoretically within a full fiscal–monetary interaction framework is one of the primary objectives of my thesis. The statement from the president of the EU-Commission Romani Prodi in the newspaper Le Mondé edition 2003: 'The Pact is stupid as all rules which are rigid', have again induced a discussion about the fiscal framework in Europe. Our theoretical analysis will fertilize the academic and political reform discussion of the European Stability and Growth Pact. Finally I will draw up a new reform proposal which incorporates the main critics and solves the main enforcement and implementation problems in the current 'Stability and Growth Pact'.

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[1] The empirical evidence that the structure of political institutions plays an important role is shown by Keffer and Stasavage (2002).

[2] The latest EU council meetings focusing on the reform debate of the Stability and Growth Pact are: February 5-6, 2004 and November 15-16, 2004. The ECOFIN–Council decided the current reform of the "new" Stability and Growth Pact at a special session on March 20, 2005.

The following thesis is divided into nine main parts. I will start first with a brief introduction. The second chapter deals with the Stability and Growth Pact and the institutional issues in the European fiscal framework. These new institutional settings have far reaching implications for the European economies of today. Thus it is necessary to understand this progress by looking into the history of monetary unions which will be done in chapter 3. From these general explanations in chapters 2 and 3, I will now focus on the Stability and Growth Pact theoretically in chapters 4 and 5. In these chapters, I will analyze the Stability Pact in extended and new model frameworks and several very important questions on the 'political' agenda today will be answered including:

1. What is an optimal rule in a heterogenous monetary union?

2. What are internal constraints in fiscal–monetary interaction in a monetary union?

3. Why do larger countries have more problems with the Stability and Growth Pact?

4. What are the ingredients for an efficient Stability and Growth Pact?

To find some initial answers to these questions, I will extend the existing model frameworks and analyze their consequences. In the last part of my thesis (chapter 6 and 7), I will speak more onto the huge reform discussion of the Stability and Growth Pact and so to the political economic part of the Stability Pact. I elaborate a reform proposal which recognizes nearly all other critics in the current reform discussion on the Stability Pact. On the basis of the previous chapters I will establish a 'New Stability and Growth Pact' which not only is a more realistic alternative in comparison to some other prominent reform suggestions but also solves some current problems as well as pinpointing some unknown disadvantages of the current Stability Pact. All in all it seems to me an excellent alternative for the near future and

a "real–reform" of the Stability and Growth Pact. The last, chapter 8 provides concluding remarks and an out look. Last but no least a German summary is provided in chapter 9.

The target of my work to provide a comprehensive overview of the fiscal architecture of the EMU is only possible by a great split between pure theoretical economics and pure political science. This clear interdisciplinary approach enables me to overcome the overt pre–embryonic discussion in that research field. Thus I can examine the development and the rationale implementation of the SGP, and cover both its institutional aspects and its economic implications. Assessing the critical and problematic issues and clarifying, evaluating and remedy the main drawbacks is also a very promising and challenging task for future research in that field.

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Nomenclature

Roman Symbols

b Deficit

d Debt

n Maximal number of countries

x Government spending

y Output

z Shortcut for a term of elasticities

L Loss function

H Hamiltonian function

Greek Symbols

α Weight factor

β Discont rate

π Inflation rate

τ Tax rate

μ Stochastic shock

λ Marginal cost of debt accumulation

ϕ Indexfunction

Superscripts

e Expectation operator

Subscripts

t Time

i Number of countries

Acronyms

SGP Stability and Growth Pact

$ECOFIN$ Council of Economic and Finance Ministers

GDP Growth Domestic Product

EMU European Monetary Union

EDP Excessive Deficit Procedure

TEU Treaty of European Union

EC European Community

EFC The Economic and Financial Committee

$BEPG$ Broad Economic Policy Guidelines

ECB European Central Bank

FED Federal Reserve Bank

Chapter 1

Introduction

> *(...) 'The definition of the fiscal architecture of EMU is still in progress. Many aspects will be clarified only as time goes by. The economic implications of the new rules are also far from being fully understood. Identifying key issues and relevant trade-offs is essential for designing appropriate policy responses at the EMU and at the national level.'*
>
> Brunila, A. and Buti, M. and Franco,D. (2001, p. 20)

The unknown answer after the failure of the early warning against Germany and France in February 2002 and the failure to strengthen the excessive deficit procedure in the Council of Economic and Finance Minister ($ECOFIN$–council) meeting against Germany in November 2003 is as follows:

> *What is wrong with the current Stability Pact and what will be the consequences for a reform of the Stability and Growth Pact in the European Monetary Union?*

The actual problems with the Stability Pact — which mostly the bigger countries have — were also enforced by the political announcement from EU–Commissions President R. Prodi: *'The Pact is stupid as all rules which are rigid'* (Le Mondé). Furthermore, there seems to be no clear evidence for an expected answer what should be the best reform proposal for the current Stability and Growth Pact.

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The huge reform discussion about the Stability and Growth Pact which has been emerging since these events is reason enough to analyze the current Stability Pact in more detail. To find out the relevant trade–offs in the European fiscal-monetary interaction framework has been a new research field for a short term. In a recent published book about 'Monetary and Fiscal Policies in EMU' Buti (2003) wrote:

> *Understanding the functioning of EMU and the interplay between monetary and fiscal authorities is and will remain a challenge for both academic research and policy–making for years to come. From their different perspectives, the contributions in this book provide the analytical instruments for undertaking a fascinating intellectual journey into the greatest monetary reform since Bretton Woods.*

It is therefore not surprising that there are relatively few models and theoretical arguments for the Stability and Growth Pact which was established in the subspaces of fiscal–monetary interaction, since monetary union in 1999. The most major findings from qualitative analysis of fiscal rules in pre–90ies are that free-riding, moral hazard and asymmetric information are the main challenges in the monetary union because of the new interactions. However, it is not known what is a *good* and *efficient* rule to manage fiscal–monetary interaction and there is no economic theory which explains the current 3% to GDP deficit threshold and the 60% debt threshold (De Grauwe, 2003). Rather it seems non–trivial to analyze the European fiscal framework and especially the Stability and Growth Pact because it links on the one hand economic monetary and fiscal theory as well as incentive theory with institutional economic analysis. Both theory blocks are barely linked because the agenda of the last one has to overcome the major drawbacks of the pure economic theory.

This work focuses on the existing pre–embryonic model frameworks and attempts to extend it to a more appropriate form for policy conclusions. Therefore you will see immediately in the following thesis a clear interdisciplinary approach between economics and political science.

When dealing with monetary–fiscal interaction in the monetary union it is a common practice by Dixit and Lambertini (2003), Beetsma and Jensen (2003) and Beetsma and Bovenberg (1999) to study models which are based on Barro and Gordon (1983a,b), Kydland and Prescott (1977)[1] and thus on simple game theory. We follow this approach to establish and extend some of the models with a Stability and Growth Pact. The construction of these models is based on the idea to model the Stability and Growth Pact as a fixed fine 'ψ' for each additional unit of debt that is issued (Beetsma and Uhlig, 1999). The reason to use this modelling approach is simply because at the moment there is no other real option to make the Stability Pact traceable in analytical models.

In the second part of my thesis I will discuss some policy conclusions for the current reform debate of the Stability and Growth Pact. Moreover, I will explain the law and economics perspective of the European fiscal framework in Europe.

My thesis is comprised of a collection of essays and papers and there is therefore not a complete and coherent structure as in a monograph. I have tried to structure it logically and most fitting but sometimes it has been really difficult to include all the research papers. The next page represents an illustrative **"Plan of my Thesis":**

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[1]Winning the Nobel price in economics in 2004.
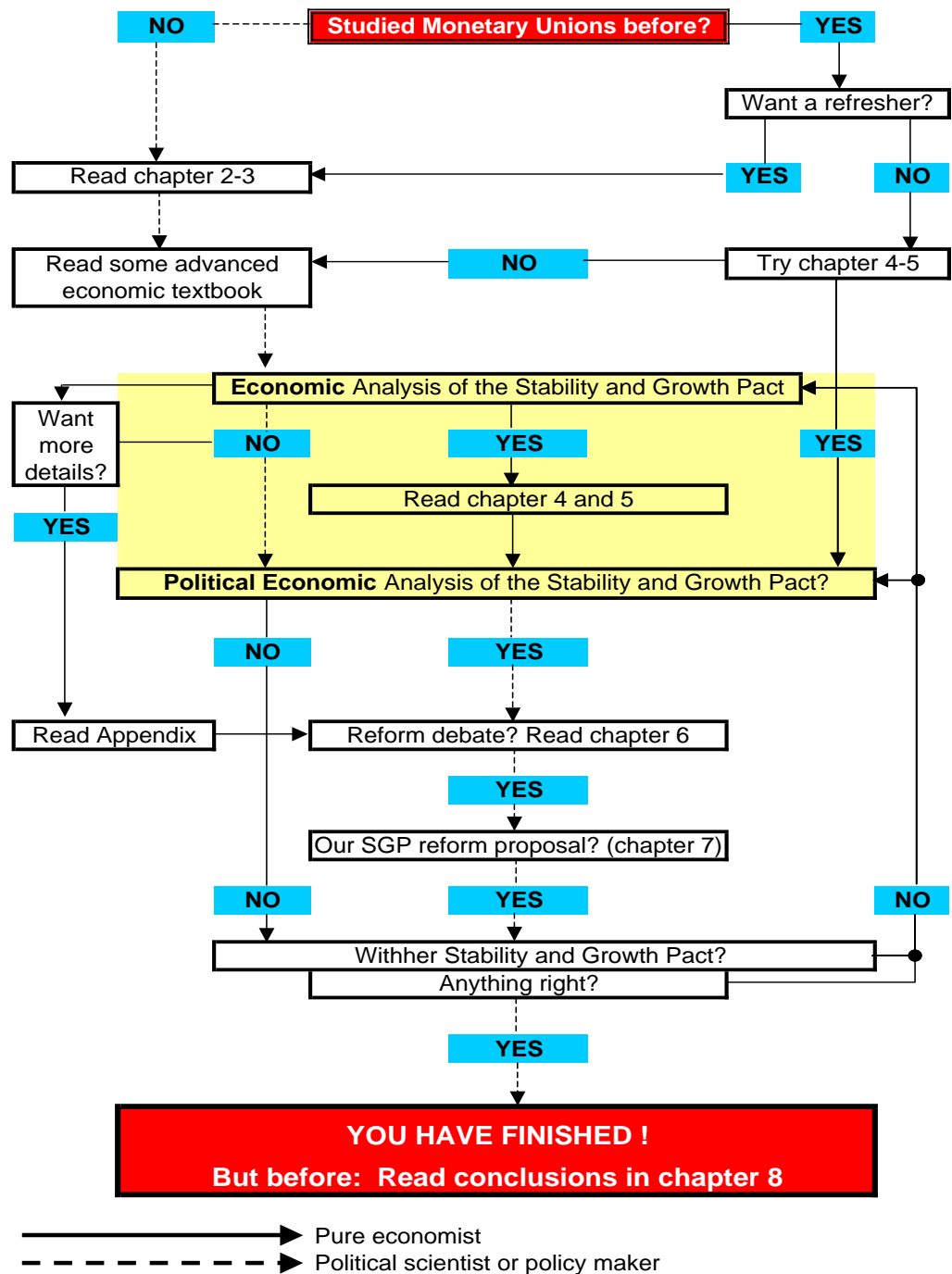
Figure 1.1: Getting the most out of this Thesis

Chapter 2

Fiscal Framework in the European Monetary Union

> *"Institutionen sind wie Festungen. Sie müssen klug an-*
> *gelegt und richtig bemannt sein."*

> K.R. Popper (1957,p.33-87)

The first chapter looks at the institutional issues of the European Fiscal Framework especially at the Stability and Growth Pact (*SGP*). It sets out the rationale for the SGP and considers the principles that should guide its future developments. The departure point is recognizing that effective macroeconomic policy frameworks can contribute to supporting high and stable levels of growth and employment. Section 2.1, discusses the basics for effective policy frameworks, which are characterized by credibility, flexibility and legitimacy. It notes that experience has pointed countries towards 'constrained discretion' as a means for achieving these objectives. Three key principles are important: clear long–term goals; a pre–commitment to sound institutional arrangements; and maximum transparency. Section 2.2 sets out the rational for the Stability and Growth Pact. It considers why the SGP is necessary, and highlights a number of institutional issues. The current SGP represents a first step forward in recognizing long-term budgetary discipline. However there are also many failures, trade–off's and problems within the current framework which are lead out in section 2.3. After

describing the institutional framework, we give evidence for some motivation and recent performance of the SGP. Section 2.4, discusses briefly the current economic literature in that field. The evolution of the Stability and Growth Pact and its future developments are then discussed after the economic analysis in chapter 6 and 7.

2.1 Policy Frameworks in a Monetary Union

This section outlines the basics for an effective policy framework, focusing in particular on fiscal frameworks. The key objectives that a robust framework should strive to achieve and the principles through which such a framework can be operationalized is now discussed (HM Treasury, 2004).

2.1.1 Effective Policy Frameworks

A strong macroeconomic framework is essential for maintaining high and stable levels of growth and employment and supporting the primary objective in monetary policy: price stability.[1] Therefore, it can help to maintain long–term economic stability. Stability allows all actors — business, individuals and the government — to plan more effectively for the long–run and help to raise productivity.

Effective macroeconomic frameworks are those which are characterized by Buti et al. (2003) through:

- credibility, so that policymakers have public trust

- flexibility, allowing a prompt and timely response to economic developments

- legitimacy, meaning there is widespread support for the framework.

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[1]Vice versa, there is no causality. There is a clear interaction between both policy frameworks (Smithin, 2003).

A robust policy framework must be both comprehensive and coherent, encompassing monetary policy and fiscal policy as well as achieving its goals. In establishing new macroeconomic frameworks, policymakers in Europe have recognized the need to avoid purely discretionary reliance, for a credible framework that solved the problem of "time–inconsistency" (Kydland and Prescott, 1977). Moreover they recognized the need to learn from the failures of rigid rule–based frameworks such as the Stability and Growth Pact, when the relationship that these rules were based on broke down (Keffer and Stasavage, 2002).

A *credible* framework will be enhanced where policy objectives are clear and where the way in which those objectives are to be pursued is transparent, for example through well–defined policy rules. Objectives by themselves are, however, insufficient to ensure credibility. Governments must also demonstrate their commitment to achieving their objectives. This commitment can be more credible and also be established more quickly through institutional arrangements, and a fitting disciplining framework with sanctions.

An effective policy framework will also provide appropriate short–term *flexibility* to allow a response to idiosyncratic and asymmetric shocks in the monetary union. Despite the clear trade–off between flexibility and credibility, the first one must not be on the cost of the second. Flexibility can also help enhance credibility. A strict rigid framework[1] may lose credibility if it does not respond effectively or adequately to country–specific or changing circumstances.

Macroeconomic frameworks must also demonstrate *legitimacy*[2], which means that they must have widespread support (Kohler-Koch and Eising, 1999; Wallace, 2000). This can be achieved through building a consensus with regards to the necessary goals and institutional arrangements. To ensure legitimacy a large degree of both transparency and accountability are key ingredients (Amtenbrink et al., 1997).

Indeed, these three objectives are closely related. For designing effective fiscal frameworks the $OECD$ has also developed some guidelines. The OECD recognizes that fiscal rules, are crucial in order to maintain and deliver fiscal sustain-

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[1]That is not completely true for the current SGP, because of many exceptional circumstances, wider interpretations of the targets and so much free-room to interpret the words.

[2]cf. Kant (1971) says to legitimize a rule you need only good reasons.

ability. Alongside highlighting the importance that the rules be credible, the OECD (Economic Outlook, 2003) also stipulates that rules should not be overly rigid. Acknowledging the need for flexibility, means that fiscal policy can deal with unforseen events and fulfil its stabilization role.

2.1.2 The Importance of Co-ordination

Co–ordination between fiscal–fiscal authorities and fiscal–monetary authorities are of great importance, particularly where responsibility for monetary and fiscal policies rests with different organizations. The monetary and fiscal authorities need to understand each other's policy objective and reaction function. This highlights the need for transparency, clear objectives and responsibilities, and appropriate mechanisms to ensure effective policy co–ordination takes place.

2.1.3 The Principle of Constrained Discretion

The past experience of policy rules in an environment of complete discretion, and with overly rigid rules that do not allow the flexibility to respond to shocks, leads countries towards the principle of constrained discretion (Bernanke and Mishkin, 1997). This approach combines the discretion necessary for effective economic policy with a credible institutional framework and constraints on policy makers to deliver clearly defined long–term policy objectives. It rejects the idea of frameworks based solely on complete discretion or fixed rules. Policymakers have found it hard to commit to resisting short–term pressures under conditions which afford complete discretion. This is partly an effect of the 'time–inconsistency' problem i.e. long–term goals may be sacrificed if short–term pressure suggest a different course of action. On the other hand frameworks that are based on fixed mechanistic rules — and therefore do not permit any discretion — also have limitations. Rigid rules do not allow any flexibility to respond to economic shocks and can lead to substantial adjustment costs.

The principle of constrained discretion (Bernanke and Mishkin, 1997) focuses on long–term and sustainable goals, but rejects the idea of frameworks based

solely on complete discretion or fixed rules. Constraint discretion mean that there is some flexibility in order to respond to economic shocks. In terms of fiscal policy, that rule is only reasonable if the policy is credibly constrained to deliver long–term stability. This principle of 'constrained discretion' has been operationalized by putting the following three key determinants in place (Treasury, 2005):

- clear and well–defined long term policy objectives

- pre–commitment to sound institutional arrangements which allow credible and flexible policy responses in the face of shocks

- maximum transparency.

Shifting the policy focus towards sustainable long–term goals requires realistic and clearly defined objectives. To ensure credibility, transparency and accountability through an institutional arrangement in the EMU, a fiscal system with regular controlling and reporting is needed.

2.1.4 Delegation or Contract Approach

A growing body of empirical and theoretical literature analyzes the important determinants of the fiscal budget performance with two different approaches: Delegation versus Contract (Hallerberg and von Hagen, 1998). Both can be found among the budget process in Europe (von Hagen, 1992). The two basic institutions (approaches) imitate centralization or internalization of budget externalities. The delegation approach emphasizes hierarchical relationships, the contract approach horizontal relationships among the relevant policy–makers.

The delegation approach based on the following key characteristics (von Hagen et al., 2002):

- A finance minister vested with strong agenda–setting power relative to the remaining members of the executive; this typically involves the right to make binding proposals for the broad budgetary categories.

- A finance minister vested with strong monitoring capacity with regard to the implementation of the budget and the power to correct deviations from the budget plan.

- A strong position of the executive relative to the legislature in the parliamentary phase of the budget process; this involves strict limitations on the scope of parliamentary amendments to the executive's budget proposal and a limited role where necessary the upper house of parliament in the process where applicable.

Under the contract approach, the participants start the budget process by negotiating and agreeing on a set of key budgetary parameters. The following points of the process characterize the contract approach:

- A strong emphasis on budgetary targets negotiated among all members of the executive at the beginning of the annual budget cycle. Theses targets are regarded as binding for all ruling parties.

- A finance minister vested with strong monitoring capacities in the implementation of the budget; agenda–setting power.

- A weak (limited) position of the executive relative to the parliament exemplified by weak or no limits on parliamentary amendments to the budget proposal.

Several authors have evaluated the performance of both approaches empirically (von Hagen, 1992; von Hagen and Harden, 1994). The main evidence is summarized in the following table:

Table 2.1: Empirical Evidence of Budgetary Institutions

Authors	Result
von Hagen and Harden (1994)	Countries with the contract approach are more successful in fiscal consolidation
von Hagen and Hallerberg (1998)	Centralization of the budget process reduces the deficit bias of fiscal policy
von Hagen et al. (2002)	[A] Countries with low degree of centralization have larger deficits than countries with a high degree of centralization [B] Contract approach is not adequate for countries with single-party governments or coalition governments
von Hagen and Hallerberg et al. (2004)	Fiscal developments were more determined by the electoral and the business cycle

Source: Herzog, B.

Von Hagen et al. (2002) show that the improvement in fiscal discipline was much greater among those states for which the contract approach is the adequate one. Therefore the authors suggest that the Stability Pact will work more effectively under the contract approach in states where the domestic budget process is characterized by a significant degree of centralization. Moreover the SGP will be less effective in assuring fiscal discipline in delegation states or states with rather fragmented budget processes. Furthermore a survey around journalist confirms that the SGP is less effective among larger countries and in delegation states (Germany, France) because in those countries the European fiscal frameworks were rejected (von Hagen et al., 2002).

The 'Excessive Deficit Procedure' and the 'Stability and Growth Pact' represent an important institutional framework. However, to follow a clear 'contract approach' requires centralizing the national budget process. This is not an adequate mechanism for countries such as Germany, France, UK or Greece because of the different federal fiscal structures (von Hagen et al., 2002). A recent empirical evaluation (von Hagen et al., 2004) confirms that finding. Furthermore, and most importantly the enforcement power of the SGP will become weaker in the future, as the threat of missing the EMU membership disappears and the

sanction credibility is low. One can therefore conclude that there are different efficient institutional approaches for the different countries in EMU. Before starting with the theoretical analysis, the institutional framework will be described in more detail below.

2.2 The Fiscal Framework of EMU

The need for a genuine institutional framework to deal with the exceptional degree of fiscal decentralization in a monetary area which exists in the EMU was already recognized in the blueprint for monetary union in Europe (Delors, 1989). Building on its predecessor, the Werner-Report (1970)[1], the Delors Report called for institutional provisions safeguarding fiscal discipline in the EMU, arguing that a lack of fiscal discipline might undermine the stability of the new currency.

The EMU had developed an elaborate fiscal framework for this purpose. According to article 4(3) of the Treaty on European Union (TEU), 'sound public finances' are one of the guiding principles of economic policy in the EU. EU procedures with relevance to conduct and coordination of fiscal policy are the 'Mutual Surveillance Procedure' (article 99 ECT), the 'no–bailout clause' (article 103 ECT), the 'Excessive Deficit Procedure' (EDP, article 104 ECT), and the SGP (Council Regulations 1466/97, 1476/97 and Council Resolution 97/C236/01–02). Article 99 holds that the member states of the EU regard their economic policies as a matter of common concern and coordinate them through the ECOFIN Council on the basis of 'Broad Economic Guidelines'. The no–bailout clause protects the Community and the member states from becoming responsible for financial liabilities of other member states against their will. The EDP set up a detailed process of monitoring the public finances of the member states with a view to ensuring that they remain sustainable. It includes the mandate (article 3 of the Protocol) that the member states of the EMU should implement appropriate

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[1]The Werner Report, published in 1970, was the first document outlining the creation of a monetary union among member states of the European Communities.

institutions at national level which enable them to fulfil their obligation of maintaining sustainable public finances. There is, however, no explanation of what this obligation means in practice. The SGP refines and lays out more concretely the procedures of the EDP.

Therefore the Stability and Growth Pact is the key element in the European Fiscal Framework. It is designed to ensure sustainable public finance in the European Monetary Union, in all participating member states — as a prerequisite to achieving stable long–term growth. Fiscal sustainability is essential for macroeconomic stability and growth. Moreover in order to maintain the primary objective of monetary policy i.e. 'price stability' a strong support system with a fiscal–framework is essential. Von Hagen (2004) says:

> "...the stability of the common currency requires the stability of public finance. The fear that high and rising public debts would undermine the central bank's ability to deliver price stability has left its mark in all important documents and political decisions on the way to EMU."

The Stability and Growth Pact represents a significant step forward in recognizing the importance of long–term budgetary discipline. The next subsections discuss the rationale for the Stability and Growth Pact (SGP). It explains the reasons why collective fiscal discipline and co–ordination are vital for a successful monetary union. Moreover explaining the role of the SGP in ensuring long–term sustainability, promoting fiscal co–ordination, and providing the flexibility to respond to shocks.

2.2.1 The Excessive Deficit Procedure (EDP)

In the Economic and Monetary Union (EMU), policy co–ordination and economic governance is based more generally on the principle of an intergovernmental approach; that is member states act together to make decisions. The EU fiscal framework, which applies to euro area countries as well as other EU members including the UK, Denmark, Sweden and all new members since 1 May 2004, has two arms:

(A) The Excessive Deficit Procedure and

(B) Multinational surveillance.

Theses arms are set out in articles 99 (ex article 103) and 104 (ex article 104c) respectively the *EC*–Treaty as amended at Maastricht in February, 1992 (entered into force in 1993).

Figure A.I: The Stability and Growth Pact: prevention and deterrence

	PREVENTION (Multilateral Surveillance)	DETERRENCE (Excessive Deficit Procedure)
Maastricht Treaty	Multilateral surveillance under Broad Guidelines of the Economic Policies of member states. Article 99 (ex103), February 1992.	Excessive Deficit Procedure. Article 104 (ex104c), February 1992.
STABILITY AND GROWTH PACT	Strengthening surveillance of budgetary positions close-to-balance or in surplus, surveillance through, Stability/Convergence Programmes. Regulation 1466/97, June 1997.	Speeding up and clarifying the implementation of the Excessive Deficit Procedure. Regulation 1467/97, June 1997.
Code of Conduct	Code of Conduct on the content and format of Stability and Convergence Programmes, covering implementation of the Stability and Growth Pact. EFC Opinion endorsed by ECOFIN, revised June 2001.	

Source: HM Treasury, (2004).

Figure 2.1: Excessive Deficit Procedure

The provisions of the Maastricht Treaty for joining the EMU were of course especially relevant in 1997–1998 when the monetary union was in the process of

being established (Rotte, 2004). The main rule was article 104 TEC, which states that not only all member countries of EMU but all EU countries have committed themselves to fiscal stability according to the Maastricht criteria. In order to secure compliance with this self–commitment and also political acceptance of EMU in the German public, a collective budget surveillance system was established in 1996–97, which became effective in 1999. The so–called 'Stability and Growth Pact' was implemented with the main economic aim of avoiding collective burdens — too high inflation and too low growth — via raising interest rates caused by national deficit spending.

The EDP is one cornerstone of the fiscal framework of EMU. It combines the unconditional obligation on the part of the member states to avoid 'excessive deficits' with a procedure aiming at providing a regular assessment of fiscal policies in the EMU, identifying excessive deficits and, if necessary, penalties for profligate behavior (article 104 TEU). The EDP charges the European Commission with the task of monitoring budgetary developments and the stock of public sector debt of the member states, checking in particular their compliance with two reference values, the ratio of the deficit to GDP and the ratio of public debt to GDP. The two reference values are set at 3% and 60%, respectively. If a member state does not comply with these reference values, and unless the deficit and the debt are approaching their reference values in a satisfactory way, and unless the excess of the deficit over the limits is exceptional and temporary the Commission prepares a report to the European Council. This report takes into account whether the deficit exceeds public investment spending and 'all other relevant factors, including the medium term economic and budgetary position' (article 104(3)) of the country concerned. The Economic and Financial Committee (EFC), which advises the Council in these matters (article 114), then states its opinion of this report. Note that, according to article 104(3), the Commission may also prepare a report to that effect, even if a member state complies with the criteria, but the Commission foresees the risk of an excessive deficit nonetheless. If the Commission considers that an excessive deficit exists, it expresses this opinion to ECOFIN and makes a recommendation for the Council to decide that an excessive deficit indeed exists. ECOFIN vote on this recommendation by qualified majority after taking into account any observation the country concerned

may make and after a broad assessment of the situation. Thus, ECOFIN decides whether or not an excessive deficit indeed exists.

If ECOFIN decides that this is the case, it makes confidential recommendations to the country concerned on how to correct the situation within a given period of time. If the country does not take appropriate action and does not respond to these recommendations in a satisfactory way, the Council may make its views and recommendations public,[1] ask the government concerned to take specific corrective actions and, ultimately, fine the country. In that case, the country would first be required to make a non–interest bearing deposit to the Community. If the excessive deficit still persists, this deposit would be turned into a fine paid to the Community (Fatas et al., 2003). ECOFIN can abrogate its decision under the EDP upon a recommendation from the Commission. All ECOFIN decisions in this context are made by qualified majority; once a country has been found to have an excessive deficit, its votes are not counted in these decisions.

In the context of the EDP, then, the numerical reference values for deficits and debts serve as triggers or screening devices for an assessment by the EU–Commission and by ECOFIN. In the view of the need to balance long–term objectives with short–run constraints on actual policy, such a trigger role is appropriate for the numerical criteria.

Up to now the European community has never regarded the EDP as a credible tool to protect the euro against deviating fiscal behavior. It lacks credibility because it is the finance ministers in ECOFIN who passes the ultimate judgement on whether or not excessive deficits exist and adjudicates penalties. By assigning these rights to ECOFIN, the EDP effectively makes a group of 'sinners' judge the performance of fellow 'sinners'. With regard to the fiscal performance of other member states, ECOFIN members have every reason to accept excuses for weak discipline and tend to base future fiscal outlooks on overly optimistic economic assumptions.[2] Being lenient and avoiding actions that are politically costly for

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[1]So there is a immediately a kind of peer–pressure in the current mechanism. De Grauwe (2003b) focuses only on that disciplining mechanism.

[2]This has confirmed in the last two years for the breaching states France and Germany as well as some of the critical candidates such as Greece and Italy.

fellow members is a rational strategy for ECOFIN members who might be in a position of fiscal distress in the future. This makes serious judgement and a strict application of sanctions unlikely.

2.2.2 The Stability and Growth Pact (SGP) Framework

During the mid–1990s, public fears arose in Germany throughout that the EDP would not suffice to discipline fiscal policies effectively after the start of the EMU. Germany's former finance minister, Theo Waigel, responded to these fears by proposing in 1995 a Stability Pact for the EMU. It was later adapted in Amsterdam as the 'Stability and Growth Pact' by the European Council (Brunila et al., 2001). The SGP modifies the EDP in several ways. Firstly, it commits the member states to the "new" medium–term objective of achieving budgets 'close to balance or in surplus'. This is a more specific goal than avoiding excessive deficits and a more ambitious one than the reference value for deficits under the EDP.

Secondly, it created an early warning system strengthening the surveillance of the public finances of member states. Under the SGP, EMU economies submit annual so–called 'Stability Programmes' to the European Commission. Eurogroup participants explaining their intended fiscal policies and, in particular, what they plan to do to reach and maintain the medium–term objective. Stability Programmes include annual fiscal targets as well as an explanation of the main economic assumptions underlying them.

Thirdly, the SGP gives more emphasis to the notions of exceptional and temporary breaches of the 3% deficit limit. In doing so, it implicitly defines an excessive deficit based on the 3% deficit limit. Furthermore, the SGP clarifies the rules for financial penalties and speeds up this process by setting specific deadlines for the individual steps.

Fourthly, the SGP provides political guidance to the parties involved in the EDP, calling them to implement the rules of the EDP effectively and in good time. It commits the Commission, in particular, to using its right of initiative under the EDP 'in a manner that facilitates the strict, timely, and effective functioning of

the SGP'. This puts severe limits on the Commission's right to exercise judgement on each individual case and situation, shifting instead that right to the Council.

The rules of the SGP have been steadily improved. In October 1998, ECOFIN endorsed a Monetary Committee opinion, the 'code of conduct' which specifies criteria to be observed in the assessment of a country's medium–term budgetary position, data standards and requirements for the programmes. In October 1999, ECOFIN recommended stricter compliance with, and more timely updating of, the programmes. In July 2001, ECOFIN endorsed an appended code of conduct proposed by the EFC refining the format and the use of data in the SGP.

Formally, the SGP consists of the relevant decisions of the European Council of Amsterdam from 1997 and two additional Council Regulations from 1997: "On the strengthening of the surveillance of budgetary positions and the surveillance and co–ordination of economic policies; and on speeding up and clarifying the implementation of the excessive deficit procedure" (Stability and Growth Pact, 1997). The collective surveillance mechanism of the SGP is based on three elements: the medium–term early warning system, the short–term observation of national budget programmes, and the excessive budget procedure.

The early warning system basically consists of annual stability programmes by the submitted EMU member countries and of convergence programmes by the other EU countries. The official programmes are addressed to the Council of EU finance ministers (ECOFIN), the EU Economic and Financial Committee (EFC) with two representatives from each member state, the European Commission and the ECB (article 114 TEC). The main contents of the stability programmes are:

- medium–term budget plans, which must aim for a balanced budget or even for budget surpluses (Artis and Buti, 2000).

- include the basic assumptions of budgetary planning as well as the relevant measures of fiscal and economic policy.

- moreover the sensitivity of the plan vis–à–vis changes in the assumptions have to be explained.

The period to be covered by the reports is five years, commencing with the year previous to the submission. Supported by the ECB, the Commission and

the EFC compile a comment on the programmes and present it to ECOFIN. The Council then decides within two months whether the medium–term budget aims contain an adequate margin of security to prevent an excessive deficit of 3% of GDP, whether the plan's assumptions are realistic and whether the planned measures provide for a stable budgetary development. If this is not the case, the country has to revise its planning and report once more.

Short–term surveillance is provided in the form of semi–annual reports of current national budget data on 1 March and on 1 September each year. The EU–Commission and the EFC examine separately from one another whether there is an excessive budget deficit. This is normally the case if at least one of two criteria from the SGP is not met: the budget deficit is higher than 3% of GDP, or the debt threshold is higher than 60% of GDP or is not approaching this point of reference with adequate speed. If an excessive deficit has been identified or if it is expected, the procedure for an excessive deficit according to article 104 TEC and the SGP is initiated.

Within this procedure, the Commission and the EFC first present their considerations to ECOFIN which decides with a qualified majority of votes whether there is in fact an excessive deficit or not. Crucial for this decision is whether there are any exceptional circumstances justifying a higher deficit. Such exceptions are natural disasters, a solely temporary character of the deficit, or a recession. A recession is operationalized by a reduction of GDP within a year. A reduction of less then 0.75% is defined as not exceptional, a reduction of 2% is generally accepted as such. Percentages within these two reference values are decided on by the Council, taking into consideration the position of the afflicted country as well as the suddenness and the cumulative effect of the shocks (which are also part of the Commission's report).

If the Council concludes that there is in fact an excessive deficit, the instruments of article 104(7–11) TEC come into force. Firstly, the Council gives some confidential advice to the country, which may be made public after a set imposing detailed measures in order to reduce the deficit. If the country still does not comply with these directions, the Council may inflict sanctions to enforce the implementation of the consolidation measures. These include the requirement need to give additional information when emitting government bonds, revisions in the

lending policies of the European Investment Bank, the obligation to give a no interest–bearing deposit bearing no interest to the Union, and the imposition of fines. The period between the submission of the budgetary data and the decision to impose potential sanctions is only ten months.

1. Step
Member states transfer the Stabilityprogrammes to EU-

Deficit ratio above 3% GDP

Deficit-ratio below 3% GDP or Exceptional circumstances

No sanction!

2. Step
EU-Commission suggests a report to the Ecofin-council

3. Step
Ecofin decides with majority

Deficit is not too high

Deficit too high. Sanction procedure starts!

4. Step
Recommendation to sinner states:
(a) reduce deficit within 4 months or
(b) reduce deficit within 1 year.

Ecofin and EU-Commission verify the necessary steps in deficit reduction

Too high deficit?

No! Procedure Stops.

Yes!
5. Step
Ecofin takes the member states in delay!

Country make the guidelines

Country ignore the guidelines

Sanctions!

Source: Herzog, B. (2004)

Figure 2.2: The Steps in Excessive Deficit Procedure

The first deposit is equivalent to fine of 0.2% of GDP and a variable part of a tenth of the difference between the actual deficit quota of the pervious year and 3%. However the maximal fine may not exceed 0.5% of GDP. In the case of Germany the hypothetical deposits would have been about 10 billion euro. This shows that potential sanctions are not negligible but in relation to the states expenditures they are almost 'peanuts'.

Maximal expected sanction fees (0,5% to GDP) within the Stability and Growth Pact; in Mio. Euro

EU 15-Member countries; Daten: Eurostat
Source: Herzog, B. (2003)
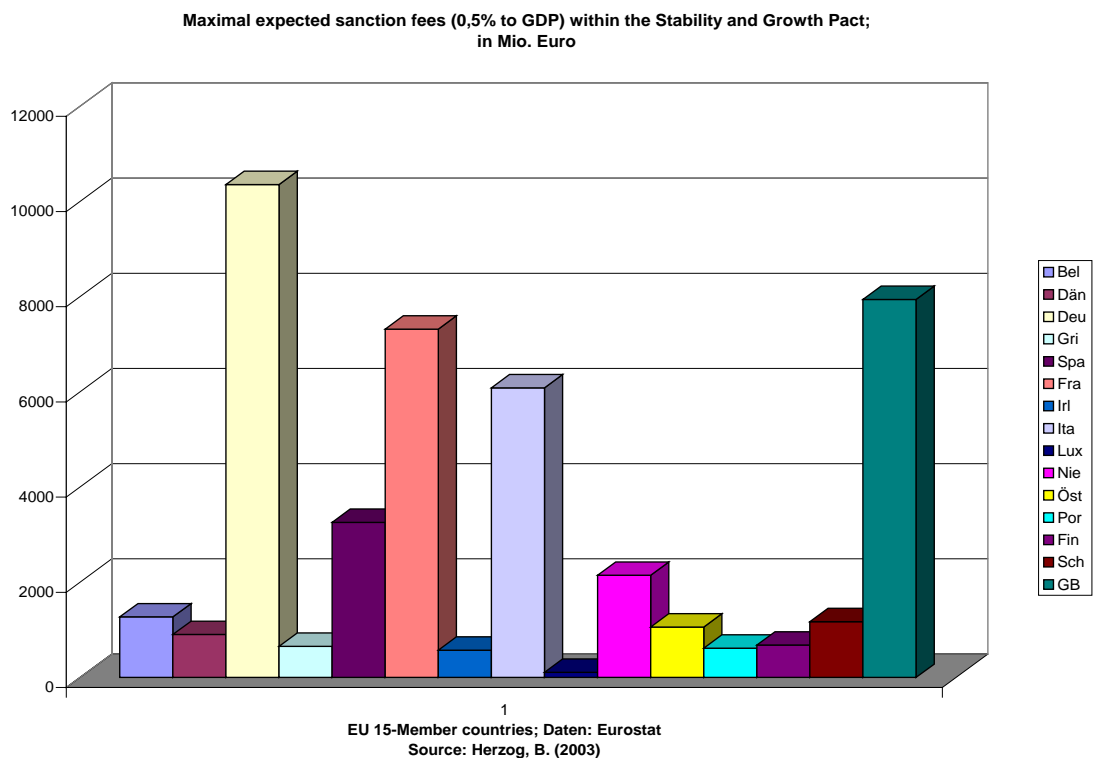
Figure 2.3: Maximal Sanction Fees of the SGP

The Code of Conduct, as agreed by EFC and endorsed by ECOFIN in October 1998, and subsequently revised in June 2001, clarified the content and format of the Stability and Convergence Programms as part of the surveillance process. The main targets were, strengthening and clarifying the implementation of the SGP. These included that:

- the medium term should be interpreted over the length of the economic cycle;

- the medium term objectives of close–to–balance or balance surplus should, while respecting the government deficit reference values, ensure a rapid decline in high debt ratios;

- SGP's should take into account the costs associated with ageing populations;

- measures aimed at improving the quality of public finances should be considered and

- the objectives of SGP should be consistent with the budgetary recommendations of the Broad Economic Policy Guidelines ($BEPGs$).

Despite of the huge European Fiscal Framework and the whole process together with EU–Commission, ECOFIN and national stability programmes of all EU member states, the national fiscal authority of each member state have the autonomy over fiscal policy. They set specific objectives of policy and make policy decisions about the overall stance of fiscal- , tax- and spending policies.

Compared with the original EDP, the SGP has achieved two advances: Firstly, it has shifted the nature of the fiscal framework significantly towards a rule–based concept constraining annual deficits and away from a framework based on informed judgement. Secondly, it has weakened the position of the European Commission in the process, to the benefit of ECOFIN (Calmfors, 2005; Ruerup et al., 2005/06).[1] While the Maastricht Treaty gave the Commission considerable discretion in initiating the EDP and advancing it, the SGP, by making the process 'more automatic', has reduced the Commission's role and raised the importance of ECOFIN judgements. The main task of the EU–Commission — the institutional guardian of the Treaty — was systematically undermined by all representative EU member states. As a result, the process and the decisions taken under it have become more politicized.

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[1]By the way again in the reformed Stability Pact on March 20, 2005.

The conjuncture of the EDP and SGP has completely changed the role of the numerical reference values for the annual deficits/debts from a trigger of assessment process — in the pre–Maastricht period as screening device — into a 'binding constraint'. Therefore any breaching of the SGP requires swift corrective actions by the Member State concerned, and a timely activation of the Excessive Deficit Procedure (Solbes, 2002). Two factors have advanced this development. The first is the lack of credibility in the process. This was already a problem in the EDP. However has become more subservient due to the increase in the ministers power against the EU–Commission and hence will tend to more fiscal laxity. The European public and the media have paid increasing attention to and criticisms on the interpretation of the EMU fiscal framework, particularly the 'Stability and Growth Pact'. From the EU–Commission's perspective, such an interpretation assures that the fiscal framework is applied equally to all member countries, and it conforms to the Commission's general role as the institution watching over the proper implementation of EU law. As a result, however, the nature of the fiscal framework has been transformed from a procedural ruled by oversight and informed judgement, as foreseen by the Maastricht Treaty, into a rigid numerical rule for the annual budget deficit.

2.2.3   National Stability Pacts

An important question arising in this context is, to what extent national governments can effectively commit their countries to compliance with the obligation of the SGP.[1] Several countries have tried to implement a so–called 'Internal Stability Pact', between the central and sub–national governments to solve this problem.

A corresponding stability pact (SGP) at a supranational level were implemented in Austria, Belgium and Spain, notwithstanding that in all remaining countries the fiscal rules are different. Germany has a kind of 'national stability pact' but it is not based on a rule approach due to its federal structure (Hausner, 2004).

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[1]cf. discussion in the German–Federal–Commission on a 'National Stability Pact' on December 16–17, 2004.

The argument for fiscal rules has strengthened over recent decades, as economic agents have become increasingly forward–looking and aware of the consequences of public debt developments on their welfare. The first objective of fiscal rules is to enhance the transparency and the credibility of fiscal policy. European governments have several fiscal policy objectives, including fiscal consolidation, lower tax burdens, pension reform and macroeconomic stabilization. In this context, there is a need to clarify how these options are included into a well–articulated fiscal strategy. A formal rule such as the SGP, provides a clear benchmark against which the performance of fiscal policy can be judged: any deviation from the rule has to be explained in public. The second objective of fiscal rules is to enlarge political support in favor of the fiscal strategy. The fiscal strategy needs political and institutional support from social partners and local authorities, which are partly responsible for general government outcomes. A rule could therefore be the vehicle of an 'internal stability pact' to enhance accountability vis–à–vis National and European criteria for all public authorities.

In Europe, two specific arguments can be advanced for adopting broad–based rules at national level:

- Even if the SGP requires corrective measures to be taken when a 'significant divergence' from budget targets is identified (EU–Commission, 2000), the SGP does not foresee formal sanctions in the event of deviations from the 'close to balance or in surplus' target and does not implement sanctions against breaching states on the 60% debt threshold.

- Fiscal coordination within the Euro–Zone needs to be strengthened. The SGP has been designed to limit the negative externalities stemming from excessive national deficits. Nevertheless, a more active coordination is necessary in Europe. The adoption of the rules by EMU member states could enhance both the predictability and the consistency of the national policy reaction functions to shocks and business cycle fluctuations (Pisani-Ferry, 2002).

The debate on fiscal rules has focused traditionally on a critical trade–off between commitment and the need to retain policy flexibility (cf. section 2.3).

Rules which lack transparency and are not supported by an institutional framework cannot effectively secure fiscal discipline. Drawing from the lessons of past failures in the SGP, four main desired characteristics would secure fiscal discipline (Mills and Quinet, 2002):

1. they should be intended for application on a permanent basis;

2. the rule should be state–contingent, so as to give the authorities sufficient flexibility to react to unforeseen shocks. However only *"limited"* 'state–contingent' is efficient (Beetsma and Jensen, 2003);

3. the rule should be both simple and well defined, in order to be transparent and credible;

4. the rule should be accompanied by some enforcement mechanisms on the supranational as well as on the national level, including availability of escape clauses and consequences of non–compliance.

The role of an internal stability pact can play in this context is much harder to assess, than the European Stability and Growth Pact, because it depends very much on the constitutional principles, which are specific in each country. Such internal pacts may be of small relevance, as the central government is the main player in public finance, anyway (von Hagen, et al. 2002). Where sub–national governments are more independent, as in Germany, so that the governments can be forced to bear the financial consequences of obligations from an 'internal agreement', it may be more inefficient, leaving the central government with the obligation to take all actions necessary to meet the SGP criteria.

2.2.4 Rationale for the Stability and Growth Pact

The SGP is important for ensuring sound public finance and to prevent high–debt countries from continuing to run high deficits and debts that could adversely affect all members in the monetary union (Beetsma, 2001; Herzog, 2004b). The new phenomenon in the EMU are adverse fiscal spill–overs that concern other

countries (Thygesen, 1999). A country in a monetary union that became unable to finance its expenditure would face three options:

- it could default on its debts

- it could receive direct transfers from other members of the monetary union or another international organization[1] or

- it could put pressure on the central bank to relax monetary policy.[2]

All three alternatives would be very harmful, for both the country involved and for other member countries in the monetary union. One big problem in the euro area, is the Treaty explicitly rules out 'bail outs' of one member state by another or by the European Central Bank (ECB). Instead of a fiscal rule as the SGP it is sometimes argued that financial markets will discipline fiscally profligate countries by increasing their borrowing costs. However, markets may not provide sufficient incentives for restraint and respond in that area with a to large delay. Moreover, the market response to unsustainable public finance can be non–linear and inappropriate because interest rates could therefore be affected adversely by the actions of one member country.

In principle, *policy co–ordination* can bring substantial gains. But in the euro area framework, characterized by a single monetary authority (ECB) with a number of decentralized fiscal authorities (currently 12), policy co–ordination is more difficult and complex because of the need for information sharing among various fiscal authorities (fiscal–fiscal co–ordination) as well as effective co–ordination between the fiscal and monetary authority (fiscal–monetary co–ordination). The last prerequisite is categorial rejected by the ECB. So ECB is against each 'pre–coordination' (ECB 2000, p. 78):

> *"The role of the Eurosystem is determined by the stipulations of the Treaty governing its status and activities, notably its independence and the primary objective of maintaining price stability. As a consequence, the Eurosystem cannot engage in any form of agreement aimed*

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[1]This opportunity is eliminate through the so–called 'NO-BAIL-OUT-CLAUSE' art. 103 ECT.

[2]This is unlikely because of the strong independence of ECB monetary policy.

> *at bringing about a predetermined "policy mix", since this could commit the Eurosystem to pursue a monetary policy which might conflict with the primary objective of price stability. The clear separation of policy responsibilities between monetary authorities and governments is rooted in the belief — confirmed by decades of practical experience and a substantial body of economic research — that committing monetary policy–makers to the primary objective of maintaining price stability helps significantly to achieve price stability in a credible and lasting manner. In this way, monetary policy will make the best possible contribution to the broader economic objectives of the European Union and its citizens. Since economic policy co–ordination relates predominantly to co–operation among the Member States themselves, the ECB's contribution to the overall co–ordination process lies in a dialogue with competent European bodies, notably the Council of Ministers and the Euro–11 Group, whereby views and information are exchanged. In this dialogue, the prerogatives and independence of policy actors are respected."*

The position of the ECB is clear, but in the current Convention proposal is there a clear attempt from the political side to take more influence in that direction. This development was criticized by the ECB (ECB–Report, 2003).

As a result the ECB stresses that the Stability and Growth Pact is the key mechanism for fiscal policy co–ordination in the euro area. The SGP set up information sharing through the stability programmes, and thereby aid policy co–ordination laid down in the BEPG's. The fiscal–monetary co–ordination is the one opportunity for the EU Commission and the chair of Eurogroup to attend the ECB Governing Council meetings to enhance understanding of the ECB reaction function to each fiscal or economic development. There is some suggestion that this mechanism for information sharing is not used to its full potential, and there is scope for further work on monetary–fiscal co–ordination issues (Smaghi and Casini, 2000).

A couple of other arguments for constrains on national fiscal policies have received serious attention and we will be discussed briefly. The first argument is that unconstrained national fiscal policies can put pressure on the monetary union's central bank to inflate. The idea goes as follows:

Suppose that there is an outstanding stock of nominal government debt. If the interest rates on this debt are not indexed, then market participants take into account their expectation of inflation when the interest rates are determined. Once the interest rates are set, the central bank can collect an inflation tax by

inflating more than the market participants expected. The resulting inflation is costly, but if direct taxes are distortionary or costly to administer or comply with, then the cost of the inflation may be worth the benefit of lower real debt payments and, hence, lower direct taxes.

That situation is made worse when national governments choose their fiscal policies independently as in the European Monetary Union. When an individual government decides how much debt to issue, it knows the motives of the central bank and the resulting expectations of the public; it knows that an increase in its debt will lead to union–wide inflation. It takes into account the cost to its own residents of this inflation, but not the cost to the residents of the rest of the monetary union. The result of this free-rider problem is a sub–optimally large amount of debt and even higher rate of inflation than if fiscal policies were coordinated (Beetsma and Bovenberg, 1999).

Despite the primary objective 'price–stability' of the ECB, this commitment is not perfectly credible. The central bank also have an incentive to lower interest rates and reduce the outstanding stock of real debt, especially if policy is influenced by governments acting in their national interests. De jure the Maastricht Treaty forbids national governments from pressuring the central bank, however, this may be difficult to observe and more difficult to verify.

Moreover constraints on fiscal policy would reduce a central bank's incentive to lower real interest rates, but would not reduce its incentives to lower real wages. Indeed, if restrictions on fiscal policy exacerbate unemployment, they may increase the central bank's incentives to lower the real wage.

A further argument for a fiscal framework are interest rate and government spending spill–overs. Increased government spending by one country or a group of countries may crowd out other forms of spending in the world economy and it may also stimulate world demand and increase world output. If uncoordinated fiscal policy is sub–optimal because of a negative or positive externality, there are three standard solutions:

1. The EU can impose a quota on the externality. This would be a rational for the Pact's debt ceiling.

2. The EU can impose a Pigovian tax on the increased debt or give a sub-
   sidy. Unfortunately, these two options require knowing the EU–wide social
   optimum and therefore a huge information exchange.

3. The Coase–Theorem solution. If an externality exists, then the government
   can issue tradable property rights (Cassela, 2001).

In the following we shed some light on the politic–economic perspective of why
governments are following socially undesirable fiscal policies? Systematically too
high government spending is sometimes put forward by well–organized interest
groups. A second argument is that governments may run up debt to constrain
their successors. Finally, the political business cycle literature shows several sub–
optimal incentives in consolidation also under a rule–based system like the SGP.
A short related argument in line with that literature illustrates that governments
may not be able to commit themselves to an optimal fiscal policy. Therefore,
delegation to a third party or an institution enforce better and may raise their
welfare. Even if this were the case, however, it is unlikely that such uniform rules
for all EU member states are an appropriate solution.

Nearly all the arguments so far have in common that they use either free–rider
or moral hazard problems for their justification. A different consistent theoretical
argument is shown by Sims (2004). He builds a model of an E type (for ECB) and
an F type (for Fed) central bank and works out the differences and similarities.
Sims (2004) summarizes the model implications as follows: A type F central
bank depends on fiscal cooperation and backup under certain conditions if it is to
guarantee a stable price level. If it can rely on such backup, it will need to invoke
it only very rarely, so its effective degree of independence may be large. A type
E bank can do without fiscal backup under certain conditions in which a type F
bank would need it. However a type E bank will find that the need to maintain
or attain a positive net worth is a constraint on its ability to tightly control the
price level. That can result because the ECB has no 'lender of the last resort'
function. Therefore, negative net wealth implies liabilities for the treasury and
so higher deficits or taxes in the future. That is a potential source of an increase
in inflation and can lead to a more restrictive monetary policy. Hence, monetary
policy attracts again more capital. Now the exchange-rate appreciates in Europe

and that implies again losses in net wealth for the ECB. Now a — vicious cycle — starts! The only opportunity to escape such a worse scenario is to constrain fiscal policy so that negative net wealth can be compensated without any problem and no inflationary pressure. The only way to achieve that is to target fiscal policy to a balanced budget in the medium–run as it is done by the SGP. Summing up: There are plethora of arguments of the necessity of a the 'Stability and Growth Pact' from an economical and political perspective.

2.3   Conflicting Objectives

In principal there are four important trade–off's in the European Fiscal Framework:

1. Discipline versus Flexibility,

2. Rule versus Discretion,

3. Fiscal–Fiscal versus Central Coordination and

4. Stabilization versus Consolidation.

In the following subsections we evaluate the four trade–off's and relate all of them to the discussion on the Stability and Growth Pact.

2.3.1   Discipline versus Flexibility

Fiscal discipline is seen in the literature as the precondition for a balanced fiscal budget and policy mix, because high levels of debt are likely to induce a restrictive stance in monetary policy (Buti et al., 1998). In other words, the SGP allows the ECB to be less restrictive in monetary policy (Beetsma and Uhlig, 1999). In contrast to the rule–based scheme, it is sometimes argued that financial markets provide a sufficient guarantee for fiscal discipline on their own. However, far being from perfect, financial markets react with a lag, have a tendency to overshoot the

equilibrium and can cause negative contagion effects as well as spill–overs to other member countries (Arits and Buti, 2000; Artis and Winkler, 1999).

A politic–economic argument is that partisan control over fiscal policy usually suffers from a deficit bias due to incentives to overspend (Alesina and Tabellini, 1987; Nordhaus, 1975). The reason for this is that political agents do not internalize the whole social cost of providing benefits within their region. Normally, overspending is partially counteracted by the risk of incurring higher interest rates, not least because of increased inflationary pressure from depreciation in the exchange rate. The establishment of the monetary union has spread that risk to all members and thereby increases the relative weight of the incentives to overspend. The unintended negative externalities of expansive fiscal policy are then externalized onto the community. Moreover free–riding on the expansive fiscal policy in other euro member countries increases the problem in a monetary union. The EMU therefore aggravates perverse incentives for fiscal looseness and exacerbates a politically induced deficit bias (Beetsma and Bovenberg, 1999). The inflationary result of increased deficits can, inside a monetary union, no longer be cushioned by exchange rate depreciation (or devaluation) and will therefore lead to reduced exports. Another justification for a disciplining mechanism like the SGP is provided by the concern over fiscal spillovers in the sense of negative externalities of fiscal profligacy on other, 'innocent', member states within the Eurozone. This danger is the main argument of the proponents for increased policy coordination and has been claimed to grow in line with economic integration (Masso, 1996).

The essence of the arguments supporting the SGP is the need for fiscal discipline in itself. This need is increased by the specific requirements of monetary union. The pact is perceived as helpful because price stability itself is argued to be poorly safeguarded by the institutional independence of monetary policy (Grilli et al., 1991). A politically induced deficit bias, exacerbated by entry to the EMU, has to be institutionally contained in order to enable a growth–enhancing policy mix.

The main criticisms of the rule–based approach to fiscal discipline is that the SGP in its present form is excessively tight and inflexible and thereby hampers

automatic stabilizers (Buti et al., 2003). The Stability Pact as such does not encourage discipline and consolidate when it could be achieved at a much lower cost, i.e. in upswings, but is confined to requiring pro–cyclical measures in times of weak or falling growth. Furthermore, it completely fails to promote an improvement in the quality of consolidation and in sustainable public finance. It remains paradoxical that the SGP exhibits an unjustified overemphasis on deficits rather than the more substantial debt problem (Rostagno and Hiebert, 2001). The only explanation is to be found in a political economy argument: It is easier to control the deficit by rules than by the debt level. Logically it is more difficult to define sustainable public debts (Pasinetti, 2000).[1]

A last argument for disciplining schemes in a monetary union is based on a game–theoretic reason and the problem of fiscal–monetary interaction (Dixit and Lambertini, 2001). Dixit and Lambertini (2001) show that 'fiscal discretion destroys monetary commitments' on the part of the ECB, which justifies the imposition of budgetary rules when there are conflicting targets between monetary and fiscal authorities. However, if both sides agree on the ultimate policy targets in what the authors call a situation of 'monetary–fiscal symbiosis', then the preferred outcomes can be achieved.

All mentioned criticisms to the pact do not deny the need for fiscal discipline and its increased importance under the conditions of monetary union. Nevertheless, concerns about the ability of fiscal policy to fulfill its equally enhanced responsibility for anti–cyclical stabilization of the demand side give grounds for considerable doubt as to whether the particular institutional solution that has been adopted represents a good choice.[2]

2.3.2   Rule versus Discretion

Departing from the issue of discipline, the question remains how the fiscal branch of economic policy should be procedurally organized? The alternatives are located

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[1] cf our approach to evaluate sustainable public finance in the European Monetary Union.

[2] The same is true for the reformed Stability and Growth Pact, since March 20, 2005.

on a continuum between complete political discretion at one end and a fully de–politicized scheme of rules and technocratic agencies at the other.

Economic policy suffers inevitably from 'time inconsistency' (Kydland and Prescott, 1977). Without a credible commitment to an ex ante optimal plan, policymakers will always find it rational to deviate ex post from their announced course. Moreover the 'Lucas critique' which denies the applicability of traditional economic models to policymaking is a clear argument for game–theoretic models in that research field.[1] To limit the effects due to deficit spending, government action should be constrained by rules or even delegated to an independent agency. This demand has been implemented for monetary policy in the form of a 'conservative central banker' (Rogoff, 1985), which is independent of time–inconsistent governments and can follow a predictable rule.

Fully rational expectations would imply that fiscal action has no impact on 'Ricardian Equivalence' (Barro, 1974). The 'Fiscal Theory of Price Level' (Leeper, 1991; Leith and Wren-Lewis, 2002; Woodford, 2003) states that in reality there is more likely a 'Non–Ricardian–Equivalence'. That constellation implies a close connection between fiscal and monetary policy. Whereas Barro's contribution described fiscal policy as 'irrelevant' in the sense of public debt and taxation being equivalent in their effects on the economy, Woodford et al. (2003) confirm the relevance of fiscal policy in a so–called 'non–Ricardian' regime. However, price stability implies not only commitment to monetary policy rules but also a clear commitment to an appropriate fiscal framework.

The emerging theoretical "near–consensus" between rules and discretion seems to point towards 'rules with discretion' or 'The Principle of Constrained Discretion'. A higher budget deficit or an expansionary monetary policy is thus able to decrease unemployment. However, in the long–run, structural parameters determine a 'natural level' of growth and employment. Therefore, in theory, an adequate system of fiscal policy should generally aim for long–term budgetary consolidation, whilst leaving room for automatic or ad hoc discretionary stabilization in the face of short–term fluctuations.

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[1]Our economic analysis in chapter 4 and 5 is therefore based on game–theoretic models.

2.3.3 Fiscal–Fiscal versus Central Coordination

Begg et al. (2003) describe it as a means of addressing two simultaneous dilemmas. First, providing a purposeful framework for twelve interdependent fiscal policies vis–à–vis a single monetary policy, implies a problem of collective action. This is generally shown by Arrow's Impossibility Theorem (Arrow, 1951). The second problem arises due to the fact that consolidation under the EMU is characterized as a 'prisoners dilemma' (Allsopp, 2002). Therefore, one country benefits from another country's consolidation in the form of positive externalities, primary through the interest rate channel, and moreover has an incentive towards free–rider behavior and provides too little consolidation itself. The SGP can therefore be seen as a device to impose the cooperative solution (Axelrod, 1995) into a consolidation game as well as a guarantee of central banks independence vis–à–vis potentially irresponsible spending behaviors.

2.3.4 Stabilization versus Consolidation

In normal situations, business cycle fluctuations in the economy are smoothed by the so–called 'automatic stabilizers' operating in the public sector in the form of progressive or higher government expenditure and lower taxes at times of economic downturns (Frenkel and Razin, 1987). Recent empirical research suggests that European economies have experienced extensive stabilization effects through fiscal policy in the 80ies and 90ies (Bayoumi and Eichengreen, 1995; Bayoumi and Masson, 1996). The importance of stabilization has even increased with the EMU because of the common objectives, the Stability and Growth Pact and, by definition the 'one size fit all' monetary policy. However, the theoretical findings in chapter 4 and the empirical evidence (von Hagen et al., 2002) suggest that discipline and stabilization are mutually supporting in the longer run.

Summing up: All the discussed trade–off's underly also the following relation between *Efficiency versus Discipline and Stabilization.* A potential trade–off has also been identified between budgetary discipline (stabilization) and efficiency. For instance, the constraint of a balanced budget might present governments

from lowering the tax burden and hence reducing the distortions induced by a high level of taxes. However, fiscal discipline is the precondition for guaranteeing permanent reductions in the tax burden (Myles, 1998). Moreover it is clear that public debt has a negative impact on growth in the long–run. Maintaining discipline will enhance public growth and thus efficiency in the long–run whilst short–term reactions to business cycles bring the typical trade–off back on the agenda.

These trade–off's depend not only on two dimensions and the behavior of fiscal authorities, but also on the interplay between monetary authorities and the other fiscal policies. Empirical analyzes reveal that fiscal and monetary policies have tended to be substitutes. However, the interaction between multiple fiscal authorities and a single monetary authority makes the policy 'game' in EMU much more complex and unpredictable. These interactions imply higher risks of policy conflicts and corresponding higher gains from successful coordination (Engwerda et al., 2002).

2.4 Literature Review

Economists have tried to model this interaction mechanism and the consequences implied by the SGP. An early attempt to model the SGP is provided by Beetsma and Uhlig (1999). They present in a two–period model of the monetary union that governments have incentives to issue more debt than a social planner would choose. They conclude therefore that the incentives to restrain debt accumulation are diminished in a monetary union and, hence, the excessiveness of debt will be exacerbated. Thus, the spill over effect arises through increasing public debt in a country, which leads to a looser common monetary policy and hence, affects all the union participants. Similarly to Beetsma and Uhlig (1999) is the work by Chari and Kehoe (1998) and Chari and Kehoe (2003) who explore the need for debt restrictions in a two–country model of monetary union. They conclude, that restrictions on public debt are needed, because union members do not fully internalize the welfare effects of an increase in nominal debt on the common

union–wide inflation rate.[1] Dixit and Lambertini (2003) and Beetsma and Jensen (2003) modeling a monetary union with fiscal–monetary interaction.[2] The results of these models are: prices (or inflation) are higher if the central bank cannot fully commit to the aim of price stability and a shock–contingent budgetary target leads increasing free–riding behavior.

All the papers mentioned so far have in common that the union's central bank is not only concerned with low inflation, but also with other objectives. Debrun (2000), in contrast provides a rational for short–run (deficit–based) fiscal constraints, despite the assumption that the ECB is totally committed to its objective (Beetsma and Bovenberg, 2002). The important point here is that fiscal policies affect aggregated demand and supply and, hence the price level in the monetary union. Through a lack of commitment in monetary and fiscal policy the public deficit biased up: Firstly, governments try to stimulate aggregate demand by expansive fiscal policy and secondly, they use deficits to move the common inflation rate to the direction they individually prefer.[3] This model prediction is perhaps an empirical rational for the reason why France and Germany with very low 'national' inflation rates and growth rates breache the SGP. In the following thesis, we found that the current SGP works not really to secure price stability. We can show, if more than one country breaches the Pact, a deficit–spiral (or debt–spiral) to more excessive government spending will be induced, despite the SGP. Additionally we found that the optimal inflation rate by the ECB could be higher under the current Stability and Growth Pact. Moreover complex monetary–fiscal interaction reduces the disciplining power of monetary policy.

The theoretical analysis explains on the one hand the need of fiscal restrictions and on the other hand the implementation problems of the current SGP. Beetsma concludes however, that the theoretical literature cannot pass any clear verdict on the SGP: *'Therefore, the pros and cons of the SGP need to be assessed using qualitative arguments.'*

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[1]Cf. Giovannetti et al extend the paper of Chari and Kehoe into various directions.

[2]Cf. However without implementing fiscal restrictions such as the Stability Pact.

[3]Cf. If the real inflation rate target is too tight, it boosts aggregate demand further, which increases inflation.

In a nutshell, the need of a strong fiscal framework like the SGP in the European Monetary Union is consensus. The implementation of an efficient coordination mechanism is very difficult, because it has to link 'National and European' interests. Therefore there is no 'perfect' rule. However in the following chapters we will assess what some key ingredients would be to manage this interaction efficient.

Chapter 3

Lessons from historical and current Monetary Unions

'Over most of history, monetary unification has fol-lowed political integration.'

Robert A. Mundell (1999)

European Monetary Union differs in many matters from the historical exam-ples. On the one hand EMU has proceeded thus far without any political inte-gration until today. On the other hand, because the euro is based on paper and book–keeping currency, it differs from silver and gold standards. But Monetary integration in such a framework is more difficult than with metallic currencies (Mundell, 2000). So the open question will be: 'What makes a successful inter-national currency? Analyzing the history of monetary union is a valuable source of knowledge about the prospects for the European Monetary Union, even if the lessons of history are not always straightforward. In this section we focus on the importance of the fiscal policy frameworks in historical monetary unions .[1]

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[1]For a detailed overview of the development of the world finance system see Eichengreen (1996). A very good summary of the history of monetary unions is presented by Theurl (1992).

3.1 Introduction

A Monetary Union or a unified currency area is an extreme version of a fixed exchange rate monetary régime (Bordo, 2001). The body of a monetary union is that all member states or entities adopt the same currency as unit of account, medium of exchange and store of value.[1] The monetary union therefore has one exchange rate towards the rest of the world (Jarchow and Rhmann, 1991).

In the following section, we distinguish between national monetary unions and multinational monetary unions and their corresponding fiscal frameworks. By a national monetary union we mean that political and monetary sovereignty go hand in hand (Theurl, 1992). Roughly speaking, the borders of the nation–state are the borders of the monetary area. For example, within the British monetary union comprising England, Scotland, Wales and Northern Ireland or the United States or the German monetary union of the western and eastern parts in July 1, 1990 (Lehmann, 1995). A national monetary union has as a rule merely one monetary authority, commonly a central bank.

By a multinational monetary union we mean international monetary cooperation between a number of independent countries based on permanently fixed exchange rates between member countries. Typical historical examples on the European continent are:

- Latin monetary union (1865–1927) which consisted of: France, Switzerland, Belgium, Italy and Greece.

- Scandinavian monetary union (1872–1931) which had one common currency, the Scandinavian *krona*, and three members: Sweden, Norway and Denmark.

- Austro-Hungarian Monetary Union (1867–1919) which was based on Austria and Hungary.

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[1] These properties define money in standard textbooks, but not at all exclusively. New monetary economics define money slightly differently. See Smithin (2003) and Greenwald and Stiglitz (2003).

Adoption of a common currency by member states can be consistent with alternative sets of institutional arrangements. While we deal in this chapter primarily with monetary experience of the late 18th and the 19th centuries the lessons for the European Monetary Union could be not more appropriate. On the one hand it shows very impressively the danger of an inconsistent fiscal framework and on the other hand it explains very illustratively the symptoms of a break–up. Apart from that a number of monetary unions have been established in the 20th century, for example:[1]

- CFA Franc Zone, formed in 1959 by former French colonies in west and central Africa.[2]

- East Caribbean Currency Area is a multinational monetary union consisting of seven small island nations.[3]

- Very small unions, as for example Andorra-France, Vatican City-Italy and Liechtenstein-Switzerland.

Table 3.1: Summary of Historical Monetary Unions

Monetary areas	Time of creation
National monetary unions	
United States	1789-92
Italy	1861
Germany	1875 and 1991
Multinational monetary unions	
Latin monetary union	1865
Scandinavian monetary union	1873-75
Austro-Hungarian monetary union	1867
Current monetary unions	
CFA Franc Zone	1959
EMU	1999
Source: Herzog (2004)	

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[1] A more complete summary is found in Cohen (1993) and Bordo (2001).

[2] The members are Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon, Ivory Coast, Mali, Niger, Senegal and Togo.

[3] The members are Anguilla, Antigua and Barbuda, Dominica, Grenada, St Kitts-Nevis, St Lucia and St Vincent and the Grenadines.

All these monetary unions cooperate also in other matters, for example within a common market. Moreover all these current unions are still in operation.

In the following sections we describe the establishment of three national unions, those of US, Italy and Germany, and the three multinational unions: Latin monetary union, Scandinavian monetary union and Austro–Hungary monetary union. Finally, we try to analyze monetary union and fiscal policy experience for a better understanding in the EMU (Bordo and Jonung, 2003): We asked the question: What are the key determinants for the creation and also the dissolution of past and current monetary unions?

3.2 Different Monetary Unions

3.2.1 National Monetary Unions

The United States Monetary Union

The US monetary union was created with the signing of the Constitution in 1789. The constitution gave the Congress the sole power to 'coin money' and ' regulate the value thereof'. Moreover the, Coinage Act of 1792 defined the US dollar in terms of fixed weights of gold and silver coins, placing the country on a bimetallic standard (Bordo and Jonung, 2003). Although banking instability characterized the nineteenth century, the monetary union remained intact with the exception of the Civil War period 1861–65. Monetary unification of the US was thus not completed until long after its political unification. The US did not establish a central bank with a lender of the last resort function until this century.

The Italian Monetary Union

The main reason for the establishment of a currency union on the Apennine peninsula in the 1860s was political unification of the area now known as Italy. In 1859, more than 90 different metallic currencies were legal tender. The existence

of a huge number of different currencies was commonly regarded as a barrier to trade, as also seen in Germany through the 'Deutscher Bund' or 'Zollverein'. During a brief transition period, only four currencies were acceptable and the others were exchanged for these four. But the monetary unification of Italy was not accompanied by immediate action to establish a single monetary authority. Several regional banks were issuing notes as well as performing central bank functions. Also the Italian monetary union was stable in the past periods.

The German Monetary Union

The German monetary — as well as political — unification process proceeded stepwise. The Reichsbank was created in 1875 after the unification of coinage in 1857. Both steps were important processes in the creation of the German monetary union. In 1834, all intended customs barriers were removed. This agreement, known as the 'Zollverein' was integrated in a system with a common standard. Political unification, by the creation of the German Reich, was followed by establishing a central bank that could function as a lender of last resort. Moreover, political unification was also a prerequisite for a common fiscal policy– as it emerged during the First World War. Again — as seen in the other cases — monetary unification followed political unification (Bordo and Jonung, 2003). The analogous case was seen in the German monetary unification in 1990.

3.2.2   Multinational Monetary Unions

The Latin Monetary Union

In the end of 1865, Belgium proposed a joint monetary conference that created the Latin Monetary Union between Belgium, France, Switzerland and later also Italy and Greece. Initially, the union achieved its aims and solved the main problems from the preliminary period.[1] However, two problems soon emerged. The first problem was endogenous: inconsistencies about sovereignty rights in the

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[1]A full description of the Latin Monetary Union was presented by Willis (1901 and 1968).

area of national fiscal policy. That enabled Italy to finance part of her chronic government deficit with seignorage, the costs of which were shared between all four counties (Bordo and Jonung, 2000). The second problem and main cause of the break–up of the Latin Monetary Union are exogenous factors such as World War One.

The Scandinavian Monetary Union

Prior to the formation of the Scandinavian monetary union in 1873, the three Scandinavian countries had a long history of similar currencies and exchange of notes and coins between them (Jonung, 1984).[1] Sweden, Denmark and Norway created a common monetary union in 1873.[2] After some problems the Scandinavian monetary union altered the system slightly in 1885, to ensure that no country sought to gain seignorage benefits at the expense of the others, and in 1894 to cancel all existing restrictions.[3] Like in the case of Latin monetary union, the Scandinavian monetary union's collapse was induced through such endogenous factors as political struggles and exogenous factors as World War One. Consequently to both of them, in that period monetary policy was more expansive in Denmark and Norway than in Sweden (Bergman et al., 1993).

The Austro–Hungarian Monetary Union

Since 1866, and the end of the Habsburg Monarchy's rule over Central Europe, Austrians had to find a way to grant Hungary increased economic freedom while at the same time retaining the economic unity of the stumbling Empire (Flandreau, 2003). The result was the so–called 'Compromise of 1867' a comprehensive

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[1]A complete summary of the history of the Scandinavian Monetary Union is shown in Bergman et al. (1993)).

[2]Norway first officially joined the monetary union in 1875, after two years. The reason for that is historically not entirely clear, but in practice her monetary standard was the same since 1873 (Bordo, 2000).

[3]The monetary union was not combined with a Scandinavian free trade area (Lonung, 1993).

agreement which carefully delineated political and economic rights and obligations. The 'Compromise' was signed for ten years. It was renewed every ten years until 1919 through negotiation rounds. The Austro–Hungarian Monetary Union was based on two distinct political entities (monarchies), and defined the domains where the two countries were fully sovereign, and those where sovereignty was shared. Among the latter we find the common market and trade policy, the common currency, a common army, a common diplomacy and foreign representatives. Among the first were the right for each part to have its own parliament, government, electoral system, laws and budgets. Thus the dual monarchy can be called a de facto monetary union like the EMU today (Flandreau, 2001).

3.2.3   Current Monetary Unions

The main focus on newly formed Monetary Unions like the EMU has been some attention on their economic impacts — given EMU's short life in terms of historical monetary unions — and thus the large matters for speculation. However European monetary unions are by no means a new phenomenon, as the current example of the CFA France Zone shows.

The CFA Monetary Union

As the various colonies achieved political independence in the late 1950s and early 1960s, most of these monetary unions were dissolved, the new nation states preferring complete economic independence, with their own currencies and independent central bank. In western and central Africa, most of the states newly independent from France chose to retain close economic links with the colonial power. They retained the shared currency of French colonial Africa, and continued to work with the existing central banks.

The African Zone — the Communauté (or Cooperation) Financière Africaine (CFA) — currently consists of fifteen countries, all but one of which are situated in West and Central Africa. The main goals and institutions of the CFA monetary union are:

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- Complete financial integration between member states.

- Guaranteed convertibility.

- Fixed exchange rates.

- Free transfers between the member states and France (no restrictions).

- administrative structure to which member states bind themselves, and which prevent African states from free riding on French guarantees, and on each other.

The institutional mechanism entails considerable loss of economic sovereignty on the part of the African states (Fielding, 2002) and is probably comparable to the Stability and Growth Pact in the European Fiscal Framework. Fielding (2002) argues in a very detail analysis as follows:

> "The administrative structures of the CFA are designed to 'harmonize' the monetary policy of member states, so that the French guarantees are feasible, i.e. institutional restrictions prevent countries free riding on the system. Without any controls, free riding would be easy. For example, without any institutional constraints, government could create large current account deficits each year by increasing borrowing from private banks to finance government consumption of imports."

Similar features are possible in the EMU. Moreover the monetary framework has some similarity with the EMU (Fielding, 2002). The conclusions and suggestions for future policy are relegated to the next section.

European Monetary Union

On 1 January 1999[1] the exchange rates of eleven members[2] of the European Union were locked to each other at irrevocably fixed rates. This was a major

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[1]Indeed, the changeover weekend is both easily identified and correct *de jure*. However, the euro area was *de facto* created in the weekend of 2-3 May 1998, when the decision was made as to which countries were to participate in the Third Stage of EMU.

[2]now 12 members plus Greece.

step towards the establishment of the European Monetary Union (EMU) and the European Central Bank (ECB). The domestic currencies have been replaced by one single currency, the EURO. Since then, the creation of the Euro marks an important event in the history of European integration and in the history of global monetary systems.

The creation of EMU and the ECB was accompanied by a discussion of the future of EMU. Independent observers have pointed out a number of shortcomings, 'flaws' and 'hazard areas' in the construction and workings of EMU (Bordo and Jonung, 2003). These include:

- the absence of a central lender of last resort function for EMU,

- the lack of a central authority supervising the financial systems of EMU,

- weak democratic control (accountability) of the ECB,

- unclear and inconsistent policy directives for the ECB,

- the absence of central co–ordination of fiscal policy within EMU combined with unduly strict criteria for domestic debt and deficits as set out in the Maastricht rules and the Stability and Growth Pact in the face of asymmetric shocks, and

- Euroland is assumed not to be an 'optimal' currency area.

Do these shortcomings represent major threats to the future of EMU? Later, we focus mainly on the 'fifth' item, especially on the Stability and Growth Pact and its current drawbacks. But before the pure economic analysis starts — with various economic models — we answer some questions by examining the historical record of the illustrated unions above, those that have turned out to be lasting as well as some unions that have been dissolved. The main advantages of this analysis as compared to pure economic theory are: First, it recognizes the 'Lucas critique' (Lucas, 1976); Second, it is not static and finally of most importance it is not ahistorical. This approach is an evolutionary one, since we examine a long stretch of time and the character of the processes causing the appearance and

dissolution of monetary co–operation and unification. The aim is to extract the key conditions for the establishment and survival of monetary unions.[1]

3.3 Lessons from Historical Monetary Unions

There are several reasons why unions are created (Bordo, 2001). First, the most important reason is the existence of political unity. Second are economic reasons, including gains from trade, access to wider markets, reduction in transaction costs in exchanging money and harmonization of policies. All have played an important role in the creation of monetary unions. Finally, there are also other non–economic factors encouraging unions such as a common history, a common language, culture and religion (Alt and Lowry, 1994).

3.3.1 Can we learn from history?

Why are monetary unions dissolved or destroyed? The answer is: "Far–reaching political events are the crucial factor." The crucial point emerge when far–reaching political events causes. The break–up of existing monetary unions is accompanied by periods of transformations and such strong exogenous shocks as wars. Bordo (2001) concludes:

> 'To sum up, the causes of the fall of monetary unions are mainly to be found in political developments.'

The paper by Bordo (2001) concludes with some bearing on EMU and distils out several lessons from the historical record.[2] In the following list we summarize the main historical observations:

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[1]A more detailed description of the relevant institutional monetary and fiscal framework was done in chapter 1 and is extended in chapter 5.

[2]Several conclusions are independently found from Theurl (1992) in his research about twelve lessons from history.

1. The creation of national monetary unions was closely associated with sovereign and independent nation–states. Moreover all national monetary unions (United States, Italy and Germany) were followed by political unifications. This feature is a historical constant and a very long–running and far–reaching relationship.

2. Economic reasons for monetary unions are reductions in transaction costs, gains from trade and a wider harmonization.

3. The existence of permanent institutions supporting political unity is a good indication for a stable and strong monetary union.

4. Monetary unions collapse when political disintegration is caused by extremely strong and unexpected shocks.

5. Monetary unification is an evolutionary process and it is impossible to set–up a detailed plan for the process in advance covering all future circumstances.

Feldstein (1997) and Cohen (1993) argue from six case studies of monetary co–operations 'that political conditions are most instrumental in determining the sustainability of monetary cooperation among sovereign governments.' The term "political conditions" covers the presence of a strong local hegemon or a dense network of institutional interactions. Cohen (1993) concludes that economic and organizational factors matter, but interstate politics appears to matter most of all.

The main causes of the break–up of the three discussed multinational monetary unions was apart from the First World War the decentralized fiscal policy of member countries. Therefore the dissolution of these monetary unions was determined by both exogenous shocks and such endogenous factors as different preferences in the national fiscal policies. But multinational monetary unions have been easy to divide when each member state maintained a central bank of its own during the monetary union. Thus the central banks of the nation states could rapidly re–establish the domestic 'national' monetary union. The following table illustrates the dissolution of some monetary unions in the twentieth century:

Table 3.2: Dissolution of Historical Monetary Unions

Monetary Unions	Dissolution	Causes of dissolution
National monetary unions		
Austria	1919-27	Defeat at war
Russia	1918-20	Creation of several new states
Soviet Union	1992-94	Political unrest; New states
Yugoslavia	1991-94	Civil war; rise of new states
Czechoslovakia	1993	Political divergences; New states
Multinational monetary unions		Sock of war and especially
Latin monetary union	1914-27	Divergent monetary & fiscal policies
Scandinavian monetary union	1914-24	Divergent monetary & fiscal policies
Austro–Hungarian union	1919-	Divergent monetary & fiscal policies

Source: Herzog (2003), Bordo and Jonung (1997).

One can see that the exogenous factor 'War' alone was not sufficient to explain the dissolution of monetary unions. Such endogenous factors as high fiscal deficits, high inflation and other political determinants were also important causes of the break–up.

When considering the future of EMU, we first should ask whether EMU will emerge as a national or multinational monetary union. The answer is not obvious. The EMU could be both. The EMU project is unique in the history of monetary unions and thus there is no adequate example in monetary experience. Bordo and Jonung (2003) propose to see the EMU as a 'National Monetary Union' because of the major institutional framework of monetary policy (the ECB) and the other institutions in the EMU (i.e. SGP, BEPG). But this perspective was criticized by several other authors because there is no existing political union and none to be seen in the future. But despite the debate over the correct framework some determinants and shortcomings are clear and more will emerge over time. Indeed, current criticism by economists concerning the short–comings of the Eurosystem lays the groundwork for future improvements.

We pick up some of the biggest problems —"The Maastricht criteria and the Stability and Growth Pact"— that are of most importance in the later chapters and sections. The Maastricht criteria are tough on paper, but in reality they have already been stretched incredibly in various ways, for example by allowing

Belgium, Italy, Greece and others into the EMU in spite of their debt to GDP and deficit to GDP ratios being 'too' high.[1] Wide cross–country diversity in inflation trends and budgetary positions would also manifest itself with no doubt costly, acrimonious debates within the future of European Union. In extrem circumstances, this could even raise the specter of possible break–up; more generally, it would generate additional uncertainty about future policy, with probably adverse knock–on effects, such as those on the risk–premium parameter. Political desiderata have already overruled the rules of the Eurosystem. The political economy of the EMU will primarily be determined by the major powers among the members of the monetary union. If there were to be tensions between for example Germany and France, the risk for the EMU to become unstable would increase (Bordo and Jonung, 2003). The EMU requires one dominant player or a strong coalition to function well. To sum up, the political process as the major determinant of the future of the EMU is consistent with the views put forth by many other researches (see for example Cohen (1993,1998), Corden (1972), Goorhart (1998) and Obstfeld and Rogoff (1996)).

The lessons from the current CFA monetary union provide a good example of the biggest challenges also in the European context. The regulations that are designed to constrain the borrowing of individual governments are ineffective because they do not represent binding constraints (Fielding, 2002). This phenomenon is also observable in the EMU (Hughes-Hallett, 2004). Moreover some empirical studies confirm that larger countries accumulate higher deficits than smaller countries (von Hagen, 2004). These failings entail on the one hand economic costs and on the other hand they create financial instability and thus have the potential to destabilize the monetary union. Fielding (2002) concludes that for the future institutions — in CFA monetary union — to perform efficiently, they should be based on the characteristics of its member states.

A major lesson from history is that monetary unification is an evolutionary process (Bayoumi and Masson, 1996). This process, should properly be regarded as a policy learning process where policy makers learn to cope with the shortcomings that emerge. This process will continue as long as the political will to

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[1]Notice that with the exception of Luxemburg no country in the pre-EMU has achieved all four Maastricht convergence criteria (Wagner, 1998).

maintain the union is present. Once it disappears, the EMU will break apart. However, learning from history this might occur only under a complex combination of extreme circumstances.

3.3.2 Could the Eurozone Break Up?

'No times. The Monetary Union is irreversible.'

Wim Duisenberg (FAZ, 12. November 2004)

Recent political squabbles and the effective abandonment of the Stability and Growth Pact (SGP) has led some to question whether the whole "Euro experiment" could collapse. We look at what could cause the Eurozone to break up, namely, political infighting, the failure of the SGP and the deep recession in big countries like Germany and France.[1]

As seen in all historical monetary unions it is more likely that politics rather than economics would cause the Eurozone to break up. However, an escalation of political infighting could lead to a loss of credibility in the Eurozone and cause the Eurozone to break up either gradually or with a big bang.

If the SGP rules can be broken then simple game theory tells us that if one person (state) cheats (and gets away with it) everyone will "cheat" and the SGP will totally unravel. This could lead to a vicious cycle i.e. more political infighting and a loss of confidence from the outside world. The consequences are even more fiscal loosening and higher interest rates, and eventually the collapse of the Euro. Is that a realistic perspective?

From a historical point of view certainly: Yes. But as we have explained above the EMU is a 'new' monetary union with no real example in history. The major factors suggesting that this will not happen in the near future are the following points:

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[1]The war with Iraq also highlights how political disagreements could lead to strong tensions within the Eurozone.

1. Each Eurozone member country gives up its sovereignty rights in monetary policy and delegate them to the European Central Bank. A quick reversal of that direction — i.e. reestablishing the old national currency — is, because of the costs and time of transition very unlikely.

2. The losers in the case of such a development would be those countries that have benefited the most from joining the Euro, i.e. the small and peripheral countries.

3. Moreover there is no 'secession' of excessive breaching states allowed in the Treaty and the 'no–bail–out–clause' is not credible.

4. This might be happen only under a complex combination of extreme circumstances.

All the facts mentioned so far are indicators for no break–up. But there is a slightly fuzzy danger about future developments within the discussion about the Stability and Growth Pact. The necessity of the fiscal framework is undeniable, but the gradually decreasing credibility because of breaching states is an unforseen source of danger. Therefore it is reason enough to focus more on the Stability and Growth Pact and to analyze its impacts.

3.3.3 Critics to the pure historical approach

> 'The only lesson of history is that men never learn anything from history.'

> Georg W.F. Hegel (1830)

The critics of the historical research reemphasize that the history of so–called monetary unions is only a limited guide to the prospects of EMU, because the regimes of today and their institutional frameworks differ in many respects (Samuel, 2001):[1]

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[1]But the mechanism today is the same. The historical monetary unions had gold convertibility as a common focal point a commitment mechanism. Today the analog mechanism is 'price-stability' (Bordo and Jonung, 2001).

- Gold standard versus paper and fiat money standard.

- Convertibility and seignorage versus price stability, economic growth and employment.

Indeed there are many differences in both the monetary systems and their respective targets. But each human being and also the economic literature know that we can learn from history: Compare for example the "Learning–by–doing–theory" in economics. The main objective is to avoid the same mistakes as we have made the past. To make correct comparisons is impossible, which is clear from philosophy (Kant, 1971). Hence, it is possible to criticize any historical approach.

> "History is therefore not a great deal of help in deciding whether a paper-based euro needs a common political authority (Samuel 2001)."

Moreover it is questionable whether the EMU is sustainable without a political union. From a historical perspective there are three kinds of external shocks to the individual members in a monetary union which can simply be countered with political agreement:

- asymmetric shocks,

- banking failures,

- military threats.

It seems a little surprising that the three forces working to break–up a monetary union are the same today as in the past, excepting the last. But the new 'Terro–threat' makes that point not also so unimportant.

The open question is also the reverse one: Must political union accompany monetary union? Schwartz (2001) argues that member countries have different preferences with respect to the level of the long–run inflation rate and the degree of financing budget deficits. Thus it is not obvious why a political union would resolve this dilemma because a political union does not level this diversity in economics, politics and culture. Additionally, Walters (2001) concludes that

the basic reason for putting monetary union first is that the architects of the EU believe that there was considerable electoral support for a monetary union, whereas there was little taste for a centralized political union among the peoples of Europe. Therefore, Jacques Delors (Delors, 1989) said that there would be substantial approval for a monetary union which would, he thought, soon led inevitably to a United States of Europe. Moreover Connolly (1998) has pointed out that Luxemburg and Belgium had a monetary union and no political union for a very long time. That fact confirms that a strong and automatic connection between monetary and political union like Bordo and Jonung (1997) have shown is not necessary rather than sufficient for an successful monetary union.

Moreover several authors argue that the supranational and national monetary unions in the nation building process are not adequate predictors for the current European Monetary Union. Some authors see the Austro-Hungarian example as the best precedent case and the most fitting 'theoretical equivalent' for the EMU. The reason for this is straightforward: unlike many other experiences of monetary unification which have relied either on a large decentralization of monetary and commercial authority or on process of political integration, both Euroland and Austria–Hungary occupy the uncomfortable middle ground of full monetary and commercial unification, with complete fiscal subsidiarity. Flandreau (2001) suggests in line with the French scholar Vilar (1974) that the history of money could be a way to improve our analytical understanding of monetary phenomena. However, it could only be achieved through the use of the conceptual tool which is called *'theoretical equivalents'*. This implies that the Austro–Hungary Monetary Union is the best fitting theoretical equivalent to EMU. Indeed the institutional structure is more similar to the modern EMU but there are also an number of differences between the two unions:

- The AHMU was a simple two player game where monitoring was easy and negotiation direct.

- Free rider problems were limited in the AHMU because of the geographic and economic links.

- There was a market mechanism[1] to discipline fiscal policy; "not a rule" approach.

But the simplest answer to all arguments is always: We compare not like with like but we try to *learn* something about the differences in structure and their induced implications. The EMU emerges as a hybrid between a so–called "multinational monetary union", i.e. each member states retain a large degree of sovereignty and a "national monetary union", i.e. there is only one single central bank — the ECB — which runs the currency.

3.4   Conclusion

These lessons from historical monetary unions are very important for the design of the current EMU and their institutions. A successful EMU needs an adequate fiscal and economic framework as was seen in the historical experience of monetary unions. This was one of the key findings in all past historical monetary unions. Moreover the illustration of all above examples shows that the constitution of the political system was always the *'uncertain'* and *'critical'* factor in history. To learn from these historical records — like learning by doing — is a very important and necessary step before one can economically analyze and evaluate the European fiscal framework in more detail.

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[1]The market in the past is really also not comparable with capital markets today.

Chapter 4

Analyzing the European Stability and Growth Pact

> *"Every fiscal norm or rule will have some arbitrariness by definition but it is considered to be necessary to enforce fiscal discipline in EU Member States."*

Buti et al. (2003)

The most illustrative example in the history of 'European Integration' is certainly the supranational 'Monetary union', since 1999 (Theurl, 1992).[1] The economic and political costs and benefits of European Economic and Monetary Union (EMU) have been the subject of lively academic and public debates (Dixit, 2002). A wonderful by–product for the economic profession has been the emergence of a new research topic. The EMU involves many interactions between the common monetary policy and the domestic fiscal policies of the member governments. The conflicts caused by these interactions, especially the current problems with the 'Stability and Growth Pact' (SGP), as well as the institutional consequences ('Modes of economic governance') will be analyzed in economic terms in our papers. Freedom of national fiscal policies undermines the ECB's monetary commitment (article 104 ECT). This may justify fiscal constraints like the 'Stability and Growth Pact' but in a modified version compared to the current SGP.

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[1]cf. historical monetary unions existed in Europe also in the 18th century. For example 'Latin coin union', German-Austria-Union and Scandinavian-Union.

The fiscal framework of EMU has developed gradually. In 1992, the Treaty of Maastricht set the fiscal criteria for joining Monetary Union. After seting up the fiscal framework a lively debate emerged in Europe. Why fiscal rules in EMU?[1] There were many reasons presented, like moral hazard, free–riding, interest rate spill–overs, no credible bail–out provision and so on (Brunila et al., 2001). The conclusion of the debate was that fiscal policy in a monetary union can foil the primary target 'price–stability', set by the European Central Bank (ECB). Additionally German politicians and society have had some fears about a weak 'EURO'. Therefore the former German Finance Minister Theo Waigel put forward a proposal in November 1995 to complement the provisions of the Treaty (Buti et al., 2000)[2]. So a further step in the fiscal framework of EMU was the 'Stability and Growth Pact' (1466/97 and 1467/97, Stability and Growth Pact (1997))[3], adapted by the European Council in Amsterdam, in June 1997 (Brunila et al., 2001).

After the implementation of the SGP in 1997 and contemporaneous with the introduction of the Monetary Union in 1999, several criticisms (Buti et al., 1997) of the fiscal rules emerged (Brunila, 2001).[4] In the EU's system of fiscal surveillance, finance ministers are both the miscreants and the judges.[5]

Hence, the need for reforming the SGP became more and more obvious in the course of 2002. In February 2002, the erosion of the Stability Pact started, because ECOFIN was unable to vote for a simple early warning so–called 'blue–letter' for Germany. Currently the largest countries — Germany[6], France, and Italy — are in breach of the Stability Pact. They exceeded the 3% budget deficit threshold of GDP in 2002, 2003, 2004 and 2005. Moreover, they are likely to do so again in 2006. Hence, we can conclude for Europe that everybody knows something went wrong with the current SGP because ECOFIN is unlikely and

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[1]cf. Junius, et al. (2002): Handbuch der EZB.

[2]cf. He announced a 'Stability Pact for Europe'.

[3]Since July 28, 2005, the old Stability and Growth Pact was supplemented by the reformed Pact in 2005 (EC–Regulation 1055/05 and 1056/05).

[4]cf. Why 3% to GDP deficit and not more?, Beetsma and Uhlig (1999).

[5]cf. Although countries that are in breach of the pact do not vote on their own sanctions, they can hope for a certain amount of sympathy from theirs peers.

[6]cf. German deficit is 3.9% to GDP and French is 4.1%, in year 2003; Eurostat (2004).

unable to vote in favor of imposing sanctions (Barysch, 2003). Furthermore, the president of the EU–Commission Romano Prodi has said in the newspaper *Le Monde* (2002): *"I know very well that the Stability Pact is stupid, like all rules that are rigid"*.

So far the current fiscal institutional framework is based on four elements in Europe:

1. two criteria inherited from the Maastricht Treaty: the 3% of GDP deficit threshold and

2. respectively the 60% of GDP government debt threshold

3. an institutional framework to implement fiscal surveillance: the Stability and Growth Pact

4. a co–ordination process: the Broad Economic Policy Guidelines.

The theoretical literature about European Monetary Union (EMU) is based on the work by Rogoff (1985), who has shown that an optimally designed central bank involves a trade–off between flexibility and credibility. Extending this type of analysis to monetary union, Laskar (1989) investigates how the optimal degree of conservatism of the central bank depends on the relative importance of common and idiosyncratic shocks.

In contrast to monetary policy, fiscal policy remains a national responsibility within the EMU. The analytical literature on European monetary union has paid relatively little attention to the importance of fiscal policies and their interactions with the common monetary policy (Lane, 2003).[1] Several works have considered only the incomplete interaction cancels of monetary and fiscal policies in a monetary union. For example Sibert (1992), Levine and Brociner (1994), Dixit and Lambertini (2001), Dixit and Lambertini (2003) and Beetsma and Bovenberg

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[1]cf. In a closed economy setting with national monetary policymaking, the interaction between monetary and fiscal policy has been analyzed by Alesina and Tabellini (1987), Debelle (1993) and Debelle and Fisher (1994).

(2002), which consider monetary–fiscal interaction in a monetary union where the purpose of fiscal policy is the supply of public goods. All these papers have in common that the take not into account the 'Stability- and Growth Pact'. They suggest that a monetary union with decentralized fiscal decisions and discretionary monetary policy produces an inflationary bias and excessive spending on public goods resulting in excessive debt accumulation. Fiscal coordination or fiscal leadership may discipline fiscal and monetary policy. In particular, the Barro and Gordon (1983a,b) model of nominal wage contracting employed by Rogoff (1985) investigates the trade–off between credibility and flexibility is extended to a monetary union with both constellations: decentralized fiscal policymaking and coordinated fiscal policymaking. Within such a framework with endogenous fiscal policy, adverse output shocks are not stabilized merely through the traditional channel of inflation surprise (as in Barro and Gordon, 1983) but also through lower taxes financed by additional seignorage revenues and lower public spending. In this way, stabilization policy involves not only monetary policy but also fiscal policy; compare Dixit and Lambertini (2003) and Beetsma and Jensen (2003). The reduced role of monetary policy stabilization implies that it attaches a higher priority to price stability. Whereas monetary unification thus reduces both expected inflation rates and the variance of inflation, it harms overall welfare by reducing average output and public spending and increasing the variability of these variables. In fact, countries would like to enter a monetary union if this union involves an international transfer stabilizing asymmetric and idiosyncratic shocks (Beetsma and Bovenberg, 1999). In the tradition of Dixit (2001a,b), Dixit and Lambertini (2001, 2002), Beetsma and Uhlig (1999) and Beetsma and Bovenberg (1999), we explore the role of monetary–fiscal policy interaction from a public finance perspective. Our papers draw on that literature to investigate: What are the national incentives of fiscal policy in the current 'Stability and Growth Pact'?

The remainder of the chapter is based on four published papers and is organized as follows. In section (4.1), we present a model extended with a SGP to analyze fiscal policy incentives in the EMU. Section (4.2), builds a new definition approach to sustainable fiscal policy in the EMU under the Stability and Growth Pact. Using that tool, we extend a model framework to analyze the effects of

relaxing the long–run targets in the SGP in section (4.3). Finally, in section (4.4), we present a new model framework to analyze the institutional interaction in the European Economic and Monetary Union. In chapter 5, we present again a new model that focuses on a detailed analysis of consolidation incentives and the behavior of the participating EMU countries.

4.1 Fiscal–Monetary–Interaction Model with a SGP

The monetary union is formed by n countries.[1] The European Central Bank (ECB) is responsible for the whole monetary policy. The fiscal policy is de–centralized. In the monetary union exists i ($i = 1, ..., n$) governments. For simplification, we assume that all i economies are identical. Each country produces a single perfect substitutable good. The inflation rate π is uniform across the monetary union. Labor is assumed to be internationally immobile. Trade union objective is to set the log real wage rate $r_t^* > 0$. Nominal–wage contracts are signed before policies are selected.[2] So the trade unions are Stackelberg–leaders'. Expectations are rational $p^e = E[p]$.

The normalized output equation for 'y' is (Derivation in appendix A.1):

$$\hat{y}_{i,t} = z * [\pi_t - \pi_t^e - r_t^* - \tau_{i,t} + ln(\eta)] + \mu_t, \qquad (4.1)$$

where 'π' represents inflation, 'π^e' expected inflation, 'μ' is a stochastic shock and 'z' is an abbreviation for elasticities. Two distortions reduce output below its first best level. First, the output tax $\tau_{i,t}$ which drives a wedge between social and private output. Second, the power of the trade union allows them to drive the real wage 'r' above its social optimum. We transform the outcome through

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[1]**The section is based on the following published papers:** 7th **INFER Workshop on Economic Policy, Conference-Proceeding and** 9th **Spring Meeting for Young Economists (SMYE);** http://www.smye2004.org/session.php?session=47.

[2]This sequence is necessary to guarantee the so–called shock channels.

subtraction of the following term $z(-r_t^* + ln[\eta])$ (which is constant) from the above equation.

$$y_{i,t} := \hat{y}_{i,t} - [-r_t^* + ln(\eta)]z = z * [\pi_t - \pi_t^e - \tau_{i,t}] + \mu_t \qquad (4.2)$$

The first best output level is attained in absence of tax distortions ($\tau_{i,t} = 0$) and if expectations are fulfilled ($\pi = \pi^e$). Thus it results:

$$\hat{y}_{i,t}^* = \frac{\eta}{1-\eta}ln(\eta); \qquad y_{i,t}^* = zr_t^*. \qquad (4.3)$$

This implies that the real wage target must be greater than zero $r_t^* > 0$ and acts as an implicit tax on output (Beetsma and Bovenberg, 1999).

4.1.1 Model assumptions

To calculate the optimal monetary and fiscal policy, we minimize different loss functions. The loss function of country i's society is in general (Dixit, 2001a; Engwerda et al., 2002)[1]:

$$L_i\hat{s} = \frac{1}{2}\sum_{t=1}^{2}\beta_s^{t-1}\left[\alpha_{\pi,s}(\pi_t - \pi_t^*)^2 + (y_{i,t} - \bar{y}_{i,t})^2 + \alpha_{x,s}(x_{i,t} - \bar{x}_t)^2\right], \qquad (4.4)$$

with $0 < \beta_S \leq 1$ as the discount–factor and $\alpha_{\pi,s}, \alpha_{x,s} > 0$ as weights. The welfare loss increases in: (1) deviation of inflation, (2) deviation of output and (3) deviation of government spending, from the target levels. To simplify the further calculations, we assume that $\pi^* = 0$. In Europe, this is nearly correct because the target inflation is near 2%[2]. Moreover the inflation measures are normally biased up.

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[1]cf. Woodford (2003). Microfoundations of this loss function are approximations of quadratic welfare functions (Benigno, 2003)

[2]cf. ECB Press Release (8 May 2003): The ECB's monetary strategy.

The loss function of a fiscal authority is in general:

$$L_i^F = \frac{1}{2} \sum_{t=1}^{2} \beta_F^{t-1} \left[\alpha_{\pi,s}(\pi_t - \pi_t^*)^2 + (y_{i,t} - \bar{y}_{i,t})^2 + \alpha_{x,s}(x_{i,t} - \bar{x}_t)^2 \right], \qquad (4.5)$$

with $0 < \beta_F \leq 1$. The difference between these two functions is only the discount–factor coefficient β.

The monetary policy is delegated to an independent central bank (European Central Bank), which exercises direct and perfect control over the inflation rate. One could also assume that the ECB could prefer stabilizing policy outcomes (article 2 ECT) if the inflation target is achieved. The ECB loss function is assigned by means of contractual agreement with the principal (e.g. legislature). That is:

$$L_{ECB} = \frac{1}{2} \sum_{t=1}^{2} \beta_s^{t-1} \left[\alpha_{\pi,M}(\pi_t - \pi_t^*)^2 + (y_{i,t} - \bar{y}_{i,t})^2 \right] \qquad (4.6)$$

where π_t* is the inflation target imposed in period t. Without loss of generality, we assume in the whole paper that the inflation target is zero. Moreover, the relative weight the ECB attaches to inflation is $\alpha_{\pi,M}$ and may deviate from society's corresponding weight, α_π ($=\alpha_{\pi,S}$). The intuition behind that function is that the "Common Central Bank" considers only its primary target price–stability but if this is satisfied it also looks at the output objectives (article 105 ECT).[1]

The fiscal authority (government) is confronted with the (intertemporal) budget constraint:[2]

$$x_{i,t} + (1 + \rho)d_{i,t-1} + \phi_{(0,1)}^L(b_{i,t} - \bar{D}) = \tau_{i,t} + d_t + \frac{\phi_{(0,1)}^R}{n-1} \sum_{j=1,j\neq i} (b_{j,t} - \bar{D}), \quad (4.7)$$

where $d_{i,t-1}$ denotes the stock of public debt carried over from the previous period, while $d_{i,t}$ represents the outstanding debt at the end of the current period

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[1]cf. Beetsma and Bovenberg, 2003.

[2]cf. Beetsma and Uhlig (1999).

t. The real rate of interest is ρ. This is assumed to be exogenous because the countries in the monetary union are relatively small to the rest of the world. The variable τ stand for distortional tax. $\bar{D}$ is the deficit threshold of the SGP and parameter ϕ is a characteristic or index function.[1] The variable $b_{i,t}$ represents the actual deficit amount. The deficit is defined as $b_{i,t} = d_{i,t} - d_{i,t-1}$. If a country j breaches the deficit criteria then $\phi^R = 1$ (also interpreted as the probability to breach the Stability Pact); in the other case no breach of the SGP: $\phi^R = 0$. Moreover, we assume that countries feature the same initial stock of public debt $d_{i,t=0} = d_0$ (i=1,...,n). Without loss of generality, it is set equal to zero ($d_0 = 0$). All debt is paid off at the end of the last period ($d_{i,t} = 0, i = 1, ..., n$). The assumption indicates "No–Ponzi–Game" and is similar to the well–known transversality condition in dynamical optimization.[2]

For some convenience we rewrite the budget constraint above as,

$$K_t + (1 + \rho)d_{i,t-1} - d_{i,t} + \phi^L_{[0,1]}([d_{i,t} - d_{i,t-1}] - \bar{D}) =$$
$$(\tau_{i,t} + \frac{\bar{y}_t}{Z}) + (\bar{x}_t - x_{i,t}) + \frac{\phi^R_{[0,1]}}{n-1} \sum_{j=1,j\neq i} ([d_{j,t-1} - d_{j,t-2}] - \bar{D}) \qquad (4.8)$$

with, $K := \left[\bar{x}_t + \frac{\bar{y}_t}{z}\right]$. Notice that the government budget constraint abstracts from seigniorage revenues. These revenues are very small in industrial economies in comparison to the total government revenues.[3] Substituting (2)[4] in (7) and eliminating τ_t, yields (9):

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[1]is equivalent to a delta function Strang (2003)

[2]cf. appendix B and Chiang (1992) and Dixit (1990).

[3]cf. Beetsma and Jensen, 2003.

[4]For simplicity we always use only the last digit of the 2 digit numeration of mathematical formulas.

$$K_t + (1 + \rho)d_{i,t-1} - d_{i,t} + \phi^L_{[0,1]}([d_{i,t} - d_{i,t-1}] - \bar{D}) + \frac{\mu_t}{z} =$$

$$(\bar{y}_t - y_t)\frac{1}{z} + (\bar{x}_t - x_{i,t}) + (\pi_t - \pi^e_t) + \frac{\phi^R_{[0,1]}}{n-1} \sum_{j=1,j\neq i} ([d_{j,t-1} - d_{j,t-2}] - \bar{D}) \quad (4.9)$$

The right hand side (RHS) of the budget constraint equation (7) represents the sources of finance: (1) implicit tax revenues, (2) shortfall of governmental spending and (3) revenues of sanction fees, if country j breaches the SGP. The left hand side (LHS) shows the sources of expenditures: (1) government expenditures for services, (2) debt payment and (3) sanction payment, if country i breaches the SGP.

We assume that the Common Central Bank (CCB) can not fully commit to a pre–announced inflation target. Hence, the CCB acts under discretion and takes the inflation expectations as given when it sets its policy instrument. This is probably the most realistic description of how monetary policy is conducted in practice (Beetsma and Bovenberg, 2003). The timing within each period is as following:

1. Shocks materialize

2. Wage setters sign nominal wage contracts

3. Shocks materialize again

4. After the announced rule monetary policy selects the inflation rate; the government simultaneously selects the tax rate and public debt

5. Hence, output is determined

6. Public spending x is residually determined from the budget constraint

7. Sanction fee does matter or not.

This implies that monetary and fiscal authorities are playing a Nash game together.

4.1.2 Economic Analysis

In this section, we discuss the model in more detail. It is a kind of Barro and Gordon–model but extended in a similar way to Dixit and Lambertini (2003) as well as Beetsma and Bovenberg (2003) to analyze monetary–fiscal interaction. First, we implement a two period time structure with a common stochastic shock. Second, we implement the SGP in this framework. Finally, we extend the two–period framework to infinite time. In the following subsections we analyze the implications of the existing SGP and the consequences for debt policy. The whole calculation of this model is in the Appendix A.1[1].

The first–period fiscal authority equates the marginal benefit from issuing more debt to the marginal cost. The result is:

$$\alpha_{x,s}(\bar{x}_1 - x_1) = \lambda_{FU}[(1+\rho)+\phi^L]\left(\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1}-\bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1}-\bar{D})\right) \tag{4.10}$$

Now we can solve this condition to first–period debt d_1:

$$\bar{K}_1 - (\phi^L - \phi^R) - \lambda^*[1+\rho+\phi^L]\left[\bar{K}_2 - \phi^L\bar{D} - \frac{\phi^R}{n-1}\sum(d_{j,1}-\bar{D})\right] = [1+\lambda^*(1+\rho+\phi^L)^2]*d_1 \tag{4.11}$$

with, $\lambda^* := \lambda_F\left(\frac{P}{S}\right)$.[2]

This result is similar to Beetsma and Bovenberg (1999) without a SGP. In our model we have $\partial d_1/\partial\lambda^* < 0$, that implies a decrease in first–period debt, by an increase of marginal cost of debt accumulation λ^*. Another interesting finding is, if the monetary union becomes larger (i.e. n grows), that implies λ^* decreases and so the first–period debt level increases (Beetsma and Bovenberg, 1999). Intuitively, from the perspective of each individual member of the EMU, the ECB generates different public goods. So in a larger union, each fiscal authority faces less incentives to contribute to this public good. Hence public debt and thus inflation are higher in a monetary union, in comparison to a unique nation state.

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[1]Moreover the following results and proofs are relegated also to the Appendix (A.1).

[2]$P := \frac{\alpha_{\pi,S}}{\alpha_{\pi,M}} + \frac{1}{z^2} + \frac{1}{\alpha_{x,s}}$ and $S := \frac{1}{\alpha_{\pi,M}} + \frac{1}{z^2}$.

Result (i). In absence of a Stability Pact $\phi^L = \phi^R = 0$, the following results:

(a)

$$\frac{\partial d_{i,1}}{\partial \lambda} < 0 \tag{4.12}$$

(b)

$$\frac{\partial d_{i,1}}{\partial \rho} < 0. \tag{4.13}$$

Proposition 4.1. *In absence of a Stability Pact $\phi^L = \phi^R = 0$ marginal cost of debt λ^* is a substitutional instrument for disciplining debt accumulation.*

Proof 4.1. *See result (i) part (a).*[1] $\square$

In fact, debt costs can be distributed around the participating countries in a monetary union. That might be one reason to implement a Stability and Growth Pact into the EMU. The main objective of the Stability Pact is to reduce that pervers incentives. In a more general framework (with a SGP) the proposition above is only correct with an additional assumption. One must assume that the deterministic component of expenditures $\bar{K}_2$ is bigger than the sanction fees in country i and sanction revenues from other breaching countries j. In the European fiscal framework that assumption is normally satisfied. One question for further research would be whether the European fiscal framework is more restrictive (stronger) for smaller than for bigger countries. Apart from these results, the next section focuses on a more detailed analysis of the Stability Pact.

4.1.3 Comparative static analysis of the SGP

The problem with the existing SGP is really more sophisticated. First, the sanction mechanism is not credible and the enforcement procedure in the ECOFIN

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[1]Cf. Appendix A.1

council is questionable. The current empirical problems with the breaching countries Germany, France, Italy, Greece and Portugal induce a reform discussion about the 'Stability and Growth Pact' in Europe. Reform proposals and criticisms of the Stability Pact are discussed later. Already the main criticisms of the Pact: missing long–term incentives, no economic theory for the thresholds, the fiscal aggravation of breaching countries and the key failure, the partisan decision mechanism in the Ecofin council, show us how urgent a detailed analysis of the current SGP is. Exactly both problems would be considered within our reform proposal in chapter 6 and 7. To analyze these incentives in more detail, we endogenize the SGP in the optimization process (Appendix A.1). The following proposition is achievable:

Proposition 4.2. *If both countries i and j breaches the SGP ($\phi^L = \phi^R > 0$) then country i's debt stock is affected as follows:*

(a) *A race to the top of debt accumulation is induced.*

(b) *The effect (a) is increasing if country j's breaching probability ϕ^R increases.*

(c) *Relaxing the deficit threshold $\bar{D}$ increases the debt in country i, if the breaching probability in country i is higher than that in country j ($\phi^L > \phi^R$), and vice versa decreases the debt if the breaching probability in the other country is higher ($\phi^R > \phi^L$).*

Proof 4.2. (a) *From (8), we can compute,*

$$\frac{\partial d_{i,1}}{\partial d_{j,1}} = \frac{\lambda^*[1 + \rho + \phi^L]\phi^R}{1 + \lambda^*[1 + \rho + \phi^L]^2} > 0. \tag{4.14}$$

(b) *Now computing this term to ϕ^R yields:*

$$\frac{\left(\frac{\partial d_{i,1}}{\partial d_{j,1}}\right)}{\partial \phi^R} = \frac{\lambda^*[1+\rho+\phi^L]}{1+\lambda^*[1+\rho+\phi^L]^2} > 0. \qquad (4.15)$$

(c) *Derivating the first–order condition to $\bar{D}$ results in:*

$$\frac{\partial d_{i,1}}{\partial \bar{D}} = -\frac{\lambda^*[1+\rho+\phi^L](\phi^R-\phi^L)}{1+\lambda^*[1+\rho+\phi^L]^2} \begin{pmatrix} > \\ \leq \end{pmatrix} 0, \qquad if \begin{pmatrix} \phi^L > \phi^R \\ \phi^R > \phi^L \end{pmatrix} \square$$
$$(4.16)$$

Case (a) demonstrates the typical free rider situation. The excessive debt policy in country j implies an increase in the debt level for the breaching country i because the cost of debt policy is distributed on all members. It is interesting that the debt target $\bar{D}$ vanishes. This explains the fact that the current SGP cannot solve the problem of internalizing external effects in the EMU.

Part (b) shows very clearly, that if both countries breach the Stability Pact there is a kind of 'competition' about the highest debt levels. Empirically that finding covers the current situation between the two breaching countries Germany and France very well.

Finally part (c) implies that relaxing the 3% deficit threshold of GDP in Maastricht and/or in the SGP, increases the debt stock in country i, $d_{i,1}$, if the 'excessive deficit procedure' or 'breaching–probability' in the other countries is relatively small. In this situation the debt/deficit target $\bar{D}$ is important. A higher debt/deficit target reduces the optimal debt/deficit policy in country i, if the breaching probability is smaller than that of country j. Why? The result is counterintuitive. An interesting finding is that the objectives of the SGP are out of reach because of unsatisfactory incentives, the short–run time horizon[1], as well as the non-credible enforcement mechanism. Finally, we assume that the debt level is identical in all countries ($d_i = d_j$). That simplifying assumption yields the next surprising proposition.

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[1]cf. Wyplosz, Charles (FT, 2003): Stabilitätspakt verschärft Konjunkturkrisen.

Proposition 4.3. *The incentives in the SGP are:*

(a) *An increase of the probability to breach the deficit ceiling (ϕ^L), decreases the debt stock $d_{i,1}$.*

(b) *An increase of country j's probability (ϕ^R), increases the debt stock $d_{i,1}$.*

(c) *Relaxing the deficit threshold $\bar{D}$, increases the debt in country i, if the breaching probability in country i is higher than in country j ($\phi^L > \phi^R$) and vice versa decreases the debt if the breaching probability in the other country is higher ($\phi^R > \phi^L$).*

Proof 4.3. *The whole proof is relegated to the Appendix.*

The intuition of part (a) and (b) describes the fact that the 'excessive deficit procedure' in the SGP disciplines only as long as no other country breaches the Pact. Additionally the same case occurs, if country j's probability to breach the Pact in future is higher than that of country i. The interpretation of the findings in part (c) is similar to proposition 2. A combination of Proposition 2 and Proposition 3 implies immediately the following Proposition.

Proposition 4.4. *If one country breaches the SGP there is an incentive for other endangered countries to breach also the Stability Pact.*

Proof 4.4. *Following directly from Proposition 2 and Proposition 3.*

That paradoxical finding eliminates the implied disciplining effect of the current Stability and Growth Pact. The main reason for that observation is the sanction–fee compensation mechanism in the SGP. A similar result was found by Ohr and Schmidt (2002) in an institutional economic analysis of the SGP. A summary of our results is shown in Figure 4.1. The next subsection extends and closes the technical analysis of the Stability and Growth Pact.

The remaining question is unaffected: Why do more larger countries have problems with the SGP in comparison to the smaller countries? The analysis above helps also to find a first approximation to that question (Herzog, 2004).
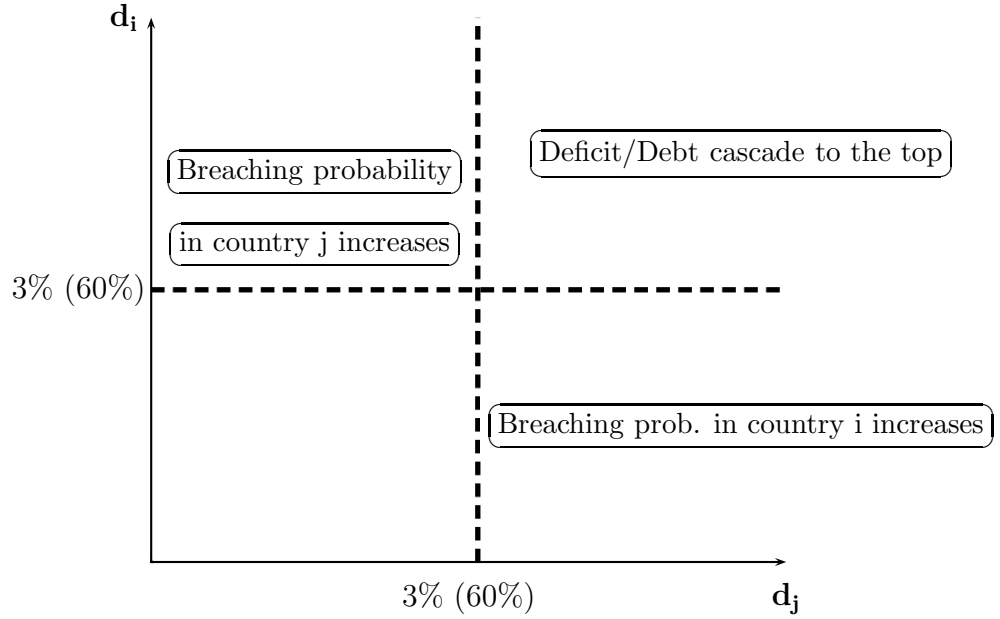
Figure 4.1: Summary of the model results

Proposition 4.5. *If the breaching probability of an other identical (in debt stock) country is higher than the country in breach, then that country may follow to breach the Stability Pact. But if the breaching probability for a group of countries is low, then there is no incentive to follow and breach the Stability Pact.*

Proof 4.5. *Because the Proposition is derived under the assumption of identical countries (meaning the same debt stock), an incentive to breach the Pact if the breaching probability ϕ^R in the other country is higher, or respectively not to breach the Pact, if respectively lower, exists immediately.*

So from that Proposition it is clear that in Europe the larger countries are more likely to breach the SGP, because there exists at least one country which was in breach (France, Germany or Italy). Furthermore, there exists stronger free–rider incentives in bigger countries as shown later in chapter 5. Thus the other big countries such as Italy, Great Britain and Netherlands follow to breach the Pact in 2004 as we will see empirically (Hughes Hallett and Lewis, 2005). For the smaller countries there is no country — for a long-term — in breach and furthermore the free–rider incentives are lower (Heise, 2002). Notice the 'excessive deficit procedure' (EDP) against Portugal was adjusted after only 1–year in breach, in spring 2004. That confirms empirically the Proposition and the

situation which is observed in reality around the larger countries like Germany and France in 2002, 2003, 2004 and probably 2005. Moreover it seems to be a really robust result from historical record and the situation observed in the African monetary union over the last 30 years.

4.1.4 Analyzing the outcomes

In the infinite–period model, we calculate the final outcomes with an exogenous Stability Pact. Thus, we can analyze the responses of the Stability Pact to the outcomes.

Proposition 4.6. *Assume country i breaches the SGP:*

(a) *Inflation increases, π_t.*

(b) *Output y_t and public spending x_t decreases.*

(c) *Debt d_t increases.*

Proof 4.6. *Part (a) follows immediately from derivation to 1^{SGP}: $\partial \pi_t / \partial 1^{SGP} > 0$. Notice that breaching the SGP implies $1^{SGP} > 0$. Similarly part (b): the derivation to 1^{SGP}. Hence: $\partial(\bar{y} - y_t)/\partial 1^{SGP} > 0$ and $\partial(\bar{y} - y_t)/\partial 1^{SGP} > 0$. Hence that implies smaller y_t and x_t for given (fixed) targets $\bar{y}_t$ and $\bar{x}_t$. Part (c): after the derivation, it results: $\partial d_t / \partial 1^{SGP} > 0$. $\square$*

This proposition emphasizes that the key target — to maintain price–stability in Europe — fails in that model framework even with a SGP. An interesting extension of that model might be to endogenize the breaching probability in the Stability and Growth Pact.

4.1.5 Model Conclusion

We would like to conclude with some implications of our results for the design of institutions and mechanisms in the EMU[1] and suggestions for further research.

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[1]cf also EEC.

Participation in the EMU depends on fiscal policy flexibility, structure of the national budget, the "Stability and Growth Pact" and the old (Maastricht) convergence criteria. The evaluation of all these factors leads to a positive or negative decision for catching–up countries. But the SGP leads to a situation in which the new countries refuse to participate in the EMU, because only countries with a sound household structure e.g. low deficit levels are able to fulfill the SGP. But empirical findings show that new EU–member countries possess lower debt amounts sooner but with very high deficit levels. This discrepancy would be even stronger in the process of catching–up to average European levels (Balassa–Samuelson–Effect).

The enlargement of the European monetary union is a very important topic today because nobody knows how a monetary union will work with more than 12 participating countries.[1] And how can the European economic and monetary union be controlled more efficiently in the future? To find some other institutions and mechanisms than the SGP in the 'European Economic and Monetary Union' is necessary for the further success of the EMU and the 'Euro'.[2] The new research agenda of 'fiscal–monetary interaction' seems very promising for future research (Lane, 2003 and Buti, 2003). Moreover the results and the developments of public debt in reality (France, Germany, Italy, Greece, Portugal...) show us, how urgent further research on this topic is. A further extension in that framework might be a full endogenous modelling of the breaching probability.

The definition of fiscal architecture of EMU is still in progress. Many aspects and problems will be clarified merely as time goes by. Identifying key issues and relevant trade–offs is essential for designing appropriate policy responses at the EMU and at the national level. Since February 2002, with the failure of early warnings against Germany and France and the failure to impose sanctions in November 2003, many people called the European fiscal framework, especially the SGP, dead. Therefore it is time to look for an appropriate fiscal framework which cures the main problems and drawbacks, particularly the current failures within the 'STABILITY AND GROWTH PACT'.

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[1]M. Friedman proposes that the European monetary union breaks-down in 10 or 15 years.

[2]The importance of good fiscal policy coordination in monetary unions is also obviously shown in historical monetary unions in Europe — Scandinavian and Latin coin unions — and current monetary unions in Africa.

4.2 Defining Fiscal Policy Sustainability within the SGP

The most illustrative example of interaction conflicts in the EUROPEAN COM-MUNITY is seen in the history of European monetary integration.[1] In the background of environmental research a new term becomes more and more important: 'SUSTAINABILITY' (Neher, 1990). Sustainable fiscal policy is also one of the mainstays in Europe. In nearly all policy areas that term is used, for instance in the common provisions "... to achieve balanced and sustainable development" (article 2 ECT) or in fiscal policy "... sustainable growth" and "...sustainable fiscal policy" (Stability and Growth Pact, 1997). Hence, sustainability has been the subject of lively public and academic debates in Europe (Bohn, 1995 and Pasinetti, 2000). A wonderful by–product for the economic profession has been the emergence of a new research topic (Dixit and Lambertini, 2001; Wacker, 1998).

In the tradition of resource economics (Kennedy, 1986; Stocky and Lucas, 1993) and recent papers in related fields from Wilcox (1989), Bohn (1995, 1998), et al. (2001) and Alfaro and Kanczuk (2003), we try to define what is meant by 'sustainable' fiscal policy (debt and deficit policy) in the European framework. The second part of our paper is in reference to the growing literature about fiscal–monetary interaction e.g. Dixit (2001a), Dixit and Lambertini (2001, 2002, 2003) and Beetsma and Bovenberg (1999, 2002), to exploring the role of sustainable monetary–fiscal policy interaction from a public finance perspective. Our paper draws on that literature to investigate the impact, of the sustainable fiscal policies in the EMU and the consequences, especially for the current reform discussion about the SGP (Beetsma and Jensen, 2003; Beetsma and Uhlig, 1999). The main objective is to find an answer to the following question: Which constellation

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[1]The section is based on the following published papers: EcoMod04 Conference-Proceeding (and online: http://www.ecomod.net/conferences/ecomod2004/ecomod2004_papers/91.pdf) and $16^{t}h$ CEIS-Conference at Villa Montragone (International Economic Association), Conference-Proceedings (and online: http://www.ceistorvergata.it/conferenzeconvegni/mondragone/XVI_papers/Paper-Herzog%20%20Bodo.pdf).

implies a strong sustainable policy framework in Europe, as in fiscal policy versus a weak framework as in employment- and social policy?

We think the supranational monetary policy on the one hand and the decentralized fiscal policy on the other hand and its connection link the Stability and Growth Pact is an interesting research topic in the future of 'European policy modelling'. To make the existing literature in this field more realistic it is necessary to take into account the objective of a sustainable fiscal policy framework. We try to explain more precisely what is meant by sustainable public finance and how sustainability relates to the optimality of fiscal policy in a broader perspective. The innovation in that paper is to answer the question: How can we solve the interaction conflicts between sustainable 'European'- and 'National' interests effective?

The remainder of our paper is structured as follows. The following subsections explain and motivate the expression 'sustainability' and its function in fiscal policy. In section 4.3, we present a model close to the paper by Beetsma and Uhlig (1999) and Beetsma and Jensen (2003) and analyze the implications of fiscal policy sustainability. We show several new insights and suggestions for the design of fiscal rules in the EMU. The knowledge that policy–makers need a simple screening device to evaluate sustainable policy in the European framework will be analyzed in a new stylized model approach. Finally, the last subsection concludes the main body of the paper. All technicalities and proofs are relegated to an Appendix.

4.2.1   Motivation of Sustainable Modelling

In the European Community Treaty provisions the expression 'sustainable' appears 6 times. One first finds 'sustainable' ideas in article 2 ECT, which announces the main targets of the European union:

'The Community shall have as its task, by establishing a common market and an economic and monetary union and by implementing common policies or activities referred to in articles 3 and 4, to promote throughout the Community a

harmonious, balanced and *sustainable* development of economic activities, a high level of employment and of social protection, equality between men and women, *sustainable* and non–inflationary growth, a high degree of competitiveness and convergence of economic performance, a high level of protection and improvement of the quality of the environment, the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member States.'

Furthermore article 4 ECT and article 6 ECT mention 'sustainability' as a key element in Europe. In article 4(3):

'These activities of the Member States and the Community shall entail compliance with the following guiding principles: stable prices, *sound public finances* and monetary conditions and a *sustainable* balance of payments'.

Moreover article 6 emphasize: 'Environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities referred to in article 3, in particular with a view to promoting *sustainable* development.' These references are a brief showcase of the importance of sustainability in Europe. However, in the European Treaty under Title VII 'Economic and Monetary policy' there are again several legal rules with a clear reference to sustainability. For instance article 121 ECT contains the well–known convergence criteria, which are sustained in the SGP: *'A high degree of sustainable convergence by reference to the fulfilment by each Member State of the following criteria'*:

- the *sustainability* of the government financial position; this will be apparent from the country having achieved a government budgetary position without a deficit that is excessive as determined in accordance with article 104(6) ECT.

These treaty provisions show us the primary focus of sustainability in fiscal policy in Europe. Additionally, we analyzed regulations, protocols and all related documents to fiscal and economic policy from the European Commission and found that the expression 'sustainable' or 'sustainability' appears more than 30

times. This is in our view an indicator that the term sustainability became a very important guideline in fiscal policy but also in other related policy fields.

Since the implementation of the Stability and Growth Pact in 1997, there have been many discussions about the fiscal framework in Europe. In spring 2002, the criticims of the Stability Pact were reinforced after the failure to send a 'blue letter' to Germany. In the aftermath, ECOFIN was unable to strengthen the 'excessive deficit procedure' against Germany or to impose sanctions against sinner states in November 2003. Although many people would like a stronger Stability Pact, with a more independent council (Wyplosz, 2002), since then there are others who prefer only some modest modification of the current Stability Pact. The main objective of the latter approach is to achieve more flexibility in fiscal policy (De Grauwe, 2003). To understand the current reform discussions about the SGP better it is necessary to consider the discussion about 'sustainable' fiscal policy in more detail. The reason for that is a crucial preference for sustainable policy in the treaty provisions as seen in the economic and fiscal framework and in the Stability and Growth Pact. 'Europe will achieve a sustainable growth path and the national debt should decrease sustainably.' All around Europe that expression is used. But the economic meaning in the different fields is often not declared and seems nearly vague.[1] In a recent book Fatas et al. (2003) conclude:'(...) EMU should implement appropriate institutions at the national level that enable them to fulfil their obligation for maintaining sustainable public finance. There is, however, no explanation of what this obligation means in practice' and also the EU-Commission said on 11 November 2002: 'All countries must agree that sustainability is a core objective.'(...) however (...) a clear definition of how sustainability should be measured is not included' in the European fiscal framework. This clearly pre–embryonic stage of discussion about European 'sustainability' in the fiscal framework is now ready to be focused on in more detail.

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[1]cf. the struggles in the EU-Commission and also in academic areas about the definition of sustainability.

4.2.2 Definition Approaches

The art of designing a fiscal framework for EMU is in finding an appropriate translation of the long–run concern for sustainability to the short–run behaviour of the government and an effective enforcement mechanism. A first attempt to define the concept of 'sustainability' in the European framework starts in 1998. Pasinetti (2000), defines sustainable policy as: a deficit/GDP ratio that entails a decreasing (or at worst a constant) debt/GDP ratio, which means a decreasing (or at most a constant) tax burden, on account of the debt, on tax-payers. Conversely, he defines as non–sustainable those deficit/GDP ratios that entail an increasing debt/GDP ratio, which means that — if corrected — they would require an additional tax burden on the citizen. This definition has been criticized by Harck (2000). Harck asked the question: 'Is the definition by Pasinetti acceptable in the sense of being a useful screening device?' The main conclusion from Harck's criticism was that a non–increasing debt ratio is neither a necessary nor a sufficient condition for sustainability in any reasonable sense of the word. It does not clearly make sense to define sustainability in isolation from the question of the existence and the level of a finite terminal debt ratio. Therefore, Pasinetti distinguishes two possible ways to define 'sustainability'. The definition differentiates according to whether the initial debt position of the country concerned is above or below the externally given optimum level. This implies:

(a) In those countries where $\frac{D}{Y} > 60\%$, the strong inequality holds

$$\frac{S}{Y} > -g\frac{D}{Y}$$

where D represents debt, S is deficit and Y is the abbreviation for GDP. This definition would indeed be a necessary and sufficient condition to put the country concerned on a persistent converging path towards a point below the externally fixed threshold of debt/GDP ratio to 60%.

(b) In those countries where $\frac{D}{Y} \leq 60\%$, the added triangular area (see 4.2, right) would allow some temporary increase in debt/GDP ratio, so that the following condition holds temporarily

$$\frac{S}{Y} \geq -g60\%.$$

S/Y

Sustainability area

D/Y

Sustainability area

$-\mathbf{g} * \frac{\mathbf{D}}{\mathbf{Y}}$

Unsustainability area

S/Y

Sustainability area

60%

D/Y

Sustainability area

3%

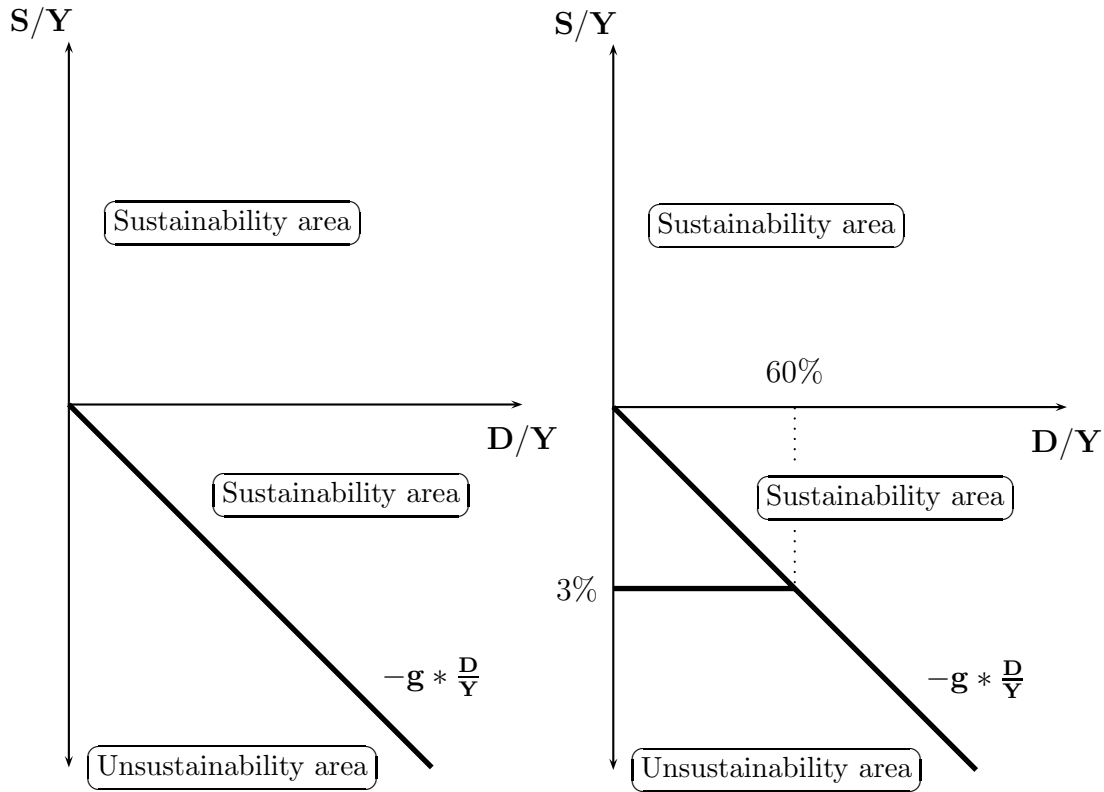$-\mathbf{g} * \frac{\mathbf{D}}{\mathbf{Y}}$

Unsustainability area

Figure 4.2: Two different definitions of sustainability

The purpose of the simple definition of sustainability was indeed to provide a quick and simple screening device for policy–makers. But this is not without danger, as we will show in our model and definition approach in the next subsection. The main problem with Pasintetti's definition approach is also mentioned by De Grauwe (2002). A sustainable fiscal policy like that defined here and in the SGP implies a zero debt position in the long–run. Pasinetti admits to this constellation as a fascinating scenario, by far more interesting than any arbitrary levels of debt and deficit ceilings. Basically, there is no economic theory for debt and deficit thresholds but there are really good arguments for a certain amount of debt (De Grauwe, 2003, p.217).

In a press release of the European Commission (EU-Commission, 2004), we found a wider view of the 'sustainability' definition: '...the Commission has proposed that the most heavily indebted countries should be monitored more closely,

coupled perhaps with more flexible application of the Stability and Growth Pact in the case of countries achieving substantial progress in the areas of deficit and public debt.' This view relaxes the sustainable idea, because more shock and case to case contingent reactions implies more free–riding and undermines crucially the credibility of the commitment to the Stability and Growth Pact (Beetsam and Jensen, 2003).

Buiter and Grafe (2003) define sustainability of a government fiscal programme as the absence of default risk. They mention also that 'one can weaken this to the requirement that default risk be below some threshold level' (Besancenot, 2004). The idea of the fiscal constraints like the SGP and the Maastricht Treaty is to have externally imposed constraints aimed at preventing each individual member country from following an unsustainable, explosive path of public debt and deficit. In this view Buiter and Grafe show that 'excessive' debt is a more broadly based concept than 'unsustainable' debt. The reason for this is: 'Debt and deficit can be excessive, that is, impose greater costs than benefits, without creating a serious risk of sovereign debt default (Butier and Grafe, 2003).' However, debt sustainability is a more long–run perspective and so it is a necessary condition for debt not to be excessive in that view. But the definition here is very vague and impossible to easily apply for policy–makers. How can default risk measured in states?

In the next subsection, we try to systematize the definition debate. Sustainable policy was born in resource economics and environmental economics. Hence, we borrow from the analysis in those fields and define 'sustainability' in the tradition of that literature. To understand this in more detail, we construct now a simple intertemporal 'Debt consolidation model'. In that model we will explain our view of the term 'Sustainable fiscal policy or debt policy'. Section 4.2 uses that new definition of sustainability and implements it in a more complex model framework. We show what the impacts of changes in the sustainability–target–set are based on, especially on the Stability and Growth Pact.

4.2.3   Sustainable model approach

Government deficits have become a focus of professional interest and political debate all around the world (Bohn, 1995; Wilcox, 1989). Particularly since the implementation of the SGP in the European monetary union and the significant rise of budget deficits in Germany, France and Portugal in 2003 and in UK and Italy in 2004 concerns, are increasing about the long–run sustainability of fiscal policy in Europe. A first attempt to analyze 'Sustainability of Government Budget Deficits' is made by Wilcox (1989). Against the approach by Diamond (1965), in which it was sustainable to borrow money, and pay the interest by borrowing more, Wilcox searched for an other way. In those economies which are labelled 'dynamically inefficient' in the literature, an increase in current debt has no implications for future surpluses. So governments in dynamically efficient economies face a present–value constraint, because the literature states that the current market value of the debt equals the discounted sum of expected future surpluses. The empirical results from Wilcox and related papers such as Hamilton and Flavin (1986) show on the basis of U.S. data an ambivalent result about the sustainability of fiscal policy. They found that the U.S. fiscal policy is not sustainable. However, Bohn (1995) criticized the older approaches and established an explicit 'stochastic general equilibrium model'. He studied first the theoretical foundations of sustainability and through that found new ways for an empirical test of sustainability. A quantitative analysis on the basis of the theoretical foundation confirms the finding that U.S. fiscal policy is sustainable (Bohn, 1998). The central result of Bohn (1991) was that the government has to satisfy an intertemporal budget constraint and an associated transversality condition regardless of the level of the safe interest rate. All policies that satisfy both conditions would be called sustainable. Close to this literature, we will first present a 'definition model', which examines the conjuncture of sustainable policy and consolidation effort to define 'Sustainability' more appropriately in the *European framework* under the SGP.

In the following, we assume that the debt level is similar to a (natural) stock variable[1] which is treated as sustainable (cf. logistic growth law). The intuition

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[1]Cf. in environmental economics for example fishes.

behind this assumption is clear: Excessive debt is dangerous because of the default risk but too low debt also implies disadvantages. A strong consolidation in the debt stock implies giving–up necessary infrastructure investments. That implies higher long–run costs in the future. Additionally a low debt stock is analogous with a too low fish stock. On the one hand the result is malnutrition, on the other chronic underfinancing. A similar analogy is found if the debt stock is too high.[1] This interpretation is certainly unfamiliar but it is also very tricky to find innovative insights and new results for the design of a sustainable policy framework. Furthermore, empirical findings by Bohn (1998) are in line with our model approach. The question is: How much does consolidation depend on sustainable resource management in fiscal policy? No existing model can answer this important question. In our model approach we try to approximate to that question a bit closer. In the following, we indicate the debt stock with the variable 'd(t)' and the 'harvest-rate' (= consolidation variable) 'u(t)'. The debt stock is interpreted (as explained above) as a utility variable from real debt 'b(t)'. The aim is to find the optimal consolidation path and so the equilibrium levels for debt and their corresponding consolidation effort.

Now we are ready to define the problem formally:

$$\max_u \int_0^\infty ln[u(t)]e^{-\delta t}dt \tag{4.17}$$

$$s.t. \qquad \dot{d} = r * d\left(1 - \frac{d}{k}\right) - u \qquad r > 0, k > 0 \tag{4.18}$$

$$d_{t=0} = d_0 \tag{4.19}$$

The parameter 'r' can be interpreted as debt growth, 'k' represents the whole financial budget revenues (on GDP) and 'δ' is a discount rate. Additionally, we assume that $r > \delta > 0$ which is normal in these problems. The functional form of the budget constraint (4.18 and 4.19) is typical in resource economics.[2] Moreover we transfer the 'Maximum Sustainable Yield' (MSY) concept here for

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[1]The utility of the debt stock decreases after a maximum because the costs of excessive debts are higher than their benefits.

[2]$F(d) = rd\left(1 - \frac{d}{k}\right)$.

debt $d^* < d_{MSY} = k/2$. To solve this problem we use a 'Hamilton function'. From optimal control theory — the first–order necessary condition — is known as the *maximum principle* or *pontryagin principle*. Denoted by H, the Hamiltonian is defined as

$$\tilde{H} = ln[u] + \lambda(t)\left[rd\left(1 - \frac{d}{k}\right) - u\right] \tag{4.20}$$

Form the problem (4.17–4.19) and the Hamiltonian defined[1] in (4.20), results the maximum principle conditions as:

$$\frac{\partial \tilde{H}}{\partial u} = \frac{1}{u} - \lambda = 0 \tag{4.21}$$

$$\dot{\lambda} - \delta\lambda = -\frac{\partial \tilde{H}}{\partial d} = -\lambda r\left[1 - \frac{2d}{k}\right] \tag{4.22}$$

$$\dot{d} = \frac{\partial \tilde{H}}{\partial \lambda} = rd\left(1 - \frac{d}{k}\right) - u. \tag{4.23}$$

After several transformations it results the following trivial ordinary differential equation system (ODES):

$$\dot{d} = rd\left(1 - \frac{d}{k}\right) - u \tag{4.24}$$

$$\dot{u} = -u\left(\delta - r\left[1 - \frac{2d}{k}\right]\right). \tag{4.25}$$

The solution of this differential equation system results in the optimal debt path d^* and the optimal consolidation path u^*. The results are:

$$d^* = \frac{k(r - \delta)}{2r} \tag{4.26}$$

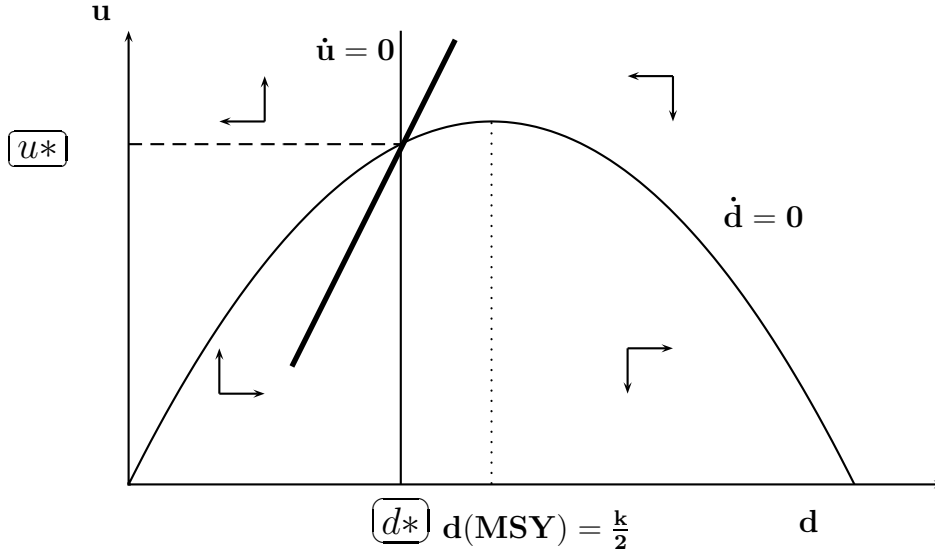$$u^* = \frac{k}{2}(r^2 - \delta^2). \tag{4.27}$$

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[1] $\tilde{H} = He^{rt}$.

Figure 4.3: Sustainable–Definition Diagram

Because of the transversality condition (TC) $\lim_{t\to\infty} \lambda(t) \to 0$, we can prove that the path is stable with a unique equilibrium.[1] The most important results and concluding definitions for sustainable fiscal policies are relegated to the next subsection.

4.2.4 Model results and their implications

A first not unexpected finding, is that the analysis above provides a warning about the popular fiscal 'indicators' like deficit to GDP or debt to GDP ratios in the Stability and Growth Pact. In fact they provide very little information about sustainability. This fact is also mentioned in the current reform discussion about the SGP by De Grauwe (2003).

The results from this simple model are

Results (i):

(a) *The optimal debt level is positive and smaller than the 'maximum sustainable yield' utility debt* $0 < d^* < d_{MSY}$.

(b) *The optimal consolidation rate is positive* $u^* > 0$.

(c) *There is one stable path to convergence in the equilibrium point* (d^*, u^*).

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[1] $\tilde{H} = He^{rt} \Rightarrow H = e^{-rt}ln(u) + \lambda[rd(1 - \frac{d}{k}) - u] \to 0$, because of the TC.

The implications from these results are: A sustainable debt policy or con-solidation policy corresponds even with a positive equilibrium debt ratio. In comparison to the existing targets in the SGP, that result shows us: a zero debt level is not an 'inner' equilibrium. Only a rim debt level $d = 0$ could be possible but only with an inefficient high consolidation level $u >> 0$, which is certainly not achievable.

So these results imply that a 'sustainable' fiscal policy (particularly debt pol-icy) is consistent with the following three propositions.

Proposition 4.7. *Sustainable fiscal policy or debt policy is a stable conjuncture among optimal consolidation and the corresponding debt level.*

Additionally a sustainable debt policy is smaller than the maximum sustain-able yield amount but greater than zero. This generates the following proposition,

Proposition 4.8. *Sustainable debt policy isn't excessive ($d^* < d_{MSY}$).*

The definition here seems different to Buiter and Grafe (2003) but the general idea is the same, because the sustainable equilibrium debt level in this approach is equivalent to 'the absence of default risk'. Moreover 4.3 shows that sustainable debt policy is also attainable with higher ('excessive') debt. This implies finally the last proposition,

Proposition 4.9. *A higher debt level ($d > d^*$) is sustainable if the consolidation level is also higher ($u > u^*$) and both variables converge onto the stable path into equilibrium (SBCP).*

All proofs are immediately clear from the model solution and assumptions. This result might be helpful for a clearer understanding of sustainable deficit levels. But the difficulty in both cases lies in a closer operationalization of the 'maximum sustainable yield' level. This approach does not provides optimal debt or deficit thresholds like that in the SGP. But it shows us the direction of convergence for long–run target values in fiscal policy. All debt or deficit levels that are on the 'Sustainable–Balance–Consolidation–Path' (SBCP) are labelled as sustainable fiscal policies under the European framework and the SGP. A brief

summary of this preliminary subsection is the following definition of fiscal policy sustainability in the European Monetary Union under the Stability and Growth Pact as:

Definition 4.2.1. Sustainable policy is each combination of the managed resource and their corresponding consolidation effort (control–variable), with a position on the 'Sustainable–Balance–Consolidation–Path (SBCP). The properties of fiscal policy sustainability are summarized in the comprised Propositions.

That new definition includes the definition of Bohn (1998), which defines sustainable as a point on the Balance–Growth–Path (BGP) and it is in line with the transversality condition. Moreover it is also very similar to the definition in the European framework by Pasinetti (2000) as well as Buiter and Grafe (2003). However, it is in our opinion a neat description and moreover better tractable for an analytical analysis in the following polit–economic model. The next section uses the new sustainability concept and integrates it in a game–theoretic interaction model which analyses in more detail the sustainability of the European framework especially within the well–known Stability and Growth Pact.

4.3 Analyzing Sustainability within the SGP

Closest in spirit of the following model is Beetsma and Jensen (2003) and Beetsma and Uhlig (1999), which analysis contingent deficit sanctions and moral hazard with a stability pact. Other related work are Chari and Kehoe (1998) and Giovannetti et al. (1998), who explore the need for debt restrictions in multi–country models of a monetary union. Moreover Besancenot et al. (2004) analyzes the default on sustainable public debt. They found in the model that the maximum debt level that investors are willing to hold may be much lower than the commonly used sustainable level.[1] Hence, what are the implications of that findings for the European fiscal framework?

4.3.1 Extended Model Framework

The model consists of two periods, 1 and 2, and n>1 countries that participate in a monetary union. Monetary policy is conducted at the supranational level, while fiscal policy remains dezentral in the national sovereignty responsibility. Countries are assumed to be identical both in their economic and political structure. Moreover each country has two political parties, F and G, of which one of them forms the government in period 1. At the beginning of period 2, the incumbent government is assumed to be re–elected with probability 0≤p<1. Without any loss of generality, we assume that party F is in power in period 1 in each country.[2] Close to Alesina and Tabellini (1987) we assume that the two parties differ in terms of their preferences for the composition of public spending. Both parties F and G attaches only to the provision of their own public good called f and

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[1]The section is based on the following published papers: EcoMod04 Conference-Proceeding (and online: http://www.ecomod.net/conferences/ecomod2004/ecomod2004_papers/91.pdf) and $16^{t}h$ CEIS-Conference at Villa Montragone (International Economic Association), Conference-Proceedings (and online: http://www.ceistorvergata.it/conferenzeconvegni/mondragone/XVI_papers/Paper-Herzog%20%20Bodo.pdf) and $9^{t}h$ SPIE Annual Meeting in Conference-Proceeding (and online: http://iscte.pt/SPIE/lista_completa_eng.htm).

[2]Cf. Beetsma and Jensen (2003) mention that the result would be unchanged if in some countries party F and in other countries party G is in power, as long as the re-election probability of the incumbent government remains the same across countries.

g. The incumbent party will not spend anything on the other party's preferred good. Now the expected utility of parties F and G in country i are given by, respectively,

$$U_{Fi} = E[u(f_{i1}) + pu(f_{2i}) - \frac{\pi^2}{2\phi}], \tag{4.28}$$

$$U_{Gi} = E[pu(g_{2i}) - \frac{\pi^2}{2\phi}], \tag{4.29}$$

where $f_{ti} \geq 0$ and $g_{ti} \geq 0$, respectively, are spending on public goods F and G in period t. Function u is twice continuously differentiable with $u' > 0$, $u'' < 0$ and $u(0) = 0$. $E[.]$ is the expectation operator conditional on the information available at the start of the game. Both parties are care about inflation π. The inflation rate is determined in the last second period. Parameter $\phi > 0$ is the inverse of the degree of inflation aversion. Similar to Beetsma and Jensen (2003), we abstract from discounting because this does not affect our results.

The budget constraints of the government in country i, $\forall i$, in periods 1 and 2 are,

$$f_{1i} + g_{1i} = 1 + \epsilon_i + b_{1i} - \psi(d_{1i} - \bar{d}_{1i}) + \frac{\psi}{n-1} \sum_{j=1, j \neq i}^{n} (d_{1j} - \bar{d}_{ij}), \tag{4.30}$$

$$f_{2i} + g_{2i} = 1 - (1 + \pi^e - \pi)b_{1i} - \psi(d_{2i} - \bar{d}_{2i}) + \frac{\psi}{n-1} \sum_{j=1, j}^{n} (d_{2j} - \bar{d}_{2j}). \tag{4.31}$$

The governments endowment is exogenous and equal '1' in each period. First–period variables are hit by ϵ_i, a shock with $E[\epsilon] = 0$ and bounded support $[\epsilon_L, \epsilon^U]$, $\epsilon_L < 0 < \epsilon^U$, and variance σ_ϵ^2 with ϵ_i iid. $\forall i$. Debt at the end of period t is denoted by b_{it}. We assume that countries start with zero initial debt and that all debt is paid off at the end of the second period (i.e. $b_{0i} = b_{2i} = 0, \forall i$). Beetsma and Jensen (1999) relaxed the zero–initial debt assumption in their model and show that the main results are unaffected. The debt in period one, is in nominal government debt and sold on the world capital market (cf. Calvo and Guidotti, 1993). Close to Beetsma and Jensen (2003), we assume that the ex–ante real interest rate is zero, which is exogenously determined on the world

capital market. But this does not affect our results. The variable π^e is the rational inflation expectation. Additionally the risk–neutral investors are willing to hold government bonds and the ex post real interest rate is $\pi^e - \pi$. The government deficit is defined as $d_{it} := b_{it} - b_{i,t-1}$. If the current deficit level d_{it} is higher than the allowed threshold of $\bar{d}_{it}$, imply a "Excessive Deficit Procedure" whenever $\psi > 0$. In that situation (period t) a breaching government i pay the fine $\psi(d_{ti} - \bar{d}_{ti})$, but in the revers constellation it becomes a reward. In line with Beetsma and Jensen (2003), we assume first of all in contrast of the actual SGP, that the period 1 deficit level depends on the resource of shock. But later we extend this assumption in a more realistic way,

$$\bar{d}_{1i} = \bar{d} - \delta\epsilon_i \qquad and \qquad \bar{d}_{2i} = \bar{d}, \qquad (4.32)$$

where δ is what the authors term the 'degree of state contingency'. If $\delta > 0$, and a bad shock occur imply a raise in the reference deficit level like the 'exceptional options' in the SGP if the shock is sufficiently large.[1] The last terms in the equations (4.30) and (4.31) are the rebates to country i of the fines paid by the union members; close to the mechanism in the current SGP. Apart from the current reform discussion about the SGP that model implicit assumes total credible sanctions.

The Common Central Bank (CCB) sets monetary policy for the whole monetary union with primary aim 'price stability'. Equivalent to the assumptions above and the formal Treaty provisions (article 105 ECT), we assume that the CCB is not completely independent. This assumption is controversial but many papers show that free–riding, moral hazard and bail–out problems are tougher in a monetary union and influence so the independence of the CCB. The CCB attaches a weight $0 \leq \lambda \leq 1$ to the inflation objective of maximizing $-\pi^2/(2\phi)$ and a weight $(1 - \lambda)$ to the objective of maximizing the average amount of resources

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[1]Hence, δ can be interpreted as the degree of flexibility in the SGP. The current reform debate pushes the δ to a higher level and generates therefore a huge buffer for all economic situations.

available to the governments in period 2. The function is

$$U_{CCB} = \lambda\left(-\frac{\pi^2}{2\phi}\right) + (1-\lambda)\frac{1}{n}\sum_{i=1}^{n}\left[1 - (1+\pi^e-\pi)b_{1i} - \psi(d_{2i}-\bar{d}_{2i}) + \frac{\psi}{n-1}\sum_{j=1,j}^{n}(d_{2j}-\bar{d}_{2j})\right]$$
(4.33)

After some transformations and calculations the function can be minimized to (cf. Appendix A.2)[1]

$$U_{CCB} = -\frac{\pi^2}{2\alpha} + 1 - (1+\pi^e-\pi)\tilde{b}_1, \qquad \alpha := \frac{(1-\lambda)\phi}{\lambda} \geq 0.$$
(4.34)

Before we presenting our model extensions to analyze 'sustainability in debt policy' we need some basic results from the model (Beetsma and Jensen, 2003) presented above.

The optimal inflation rate is calculated from maximizing (4.34) over π. This yields:

$$\pi = \alpha\tilde{b}_1.$$
(4.35)

The entire solution of the basic model can be summarized in a result as:

Result (i). Let $\epsilon_i = \tilde{\epsilon}$, $\forall i$. One has:

(a) Suppose that $p < 1$. First , if $\psi = 0, \tilde{\epsilon} = 0$ and $p \longrightarrow 1$, then $\tilde{b}_1 = 0$. Second, a fall in p implies a higher $\tilde{b}_1$. Finally, if $\alpha > 0$, $\partial\tilde{b}_1/\partial n > 0$ and $\partial\tilde{b}_1/\partial\alpha < 0$.

(b) $\partial\tilde{b}_1/\partial\psi < 0$, unless $\alpha = 0$, in which case $\partial\tilde{b}_1/\partial\psi = 0$

(c) $\partial\tilde{b}_1/\partial\epsilon < 0$. Moreover, if u is quadratic and $\alpha > 0$, $\partial\tilde{b}_1/\partial\tilde{\epsilon}$ decreases with n and increases with ψ.

The result above implies in easy words: (a) If the re–election probability p decrease then the optimal debt level in period 1, is higher. Behind that result is a kind of debt–bias for the incumbent party. Moreover an increasing number of monetary union member countries imply an increase of the optimal debt level, because of more free–riding incentives. Finally, higher weight to the inflation objective imply a decrease in the debt level. (b) The sanction mechanism ψ

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[1]Cf. Beetsma and Uhlig (1999).

discipline the debt variable. (c) The debt increase in response to shocks if the monetary union is larger because each government internalizes the costs only to a lesser extent.

Finally, we will mention here one important proposition which characterized an optimal pact. In our later work we refer to that Proposition:

Proposition 4.10. *The first–period governments all prefer the pact characterized by $(\psi, \delta) = (\frac{n-1}{n}; 1)$.*

The intuition behind this proposition is that an optimal pact solve two roles simultaneously. First, it fully internalize the consequences of individual debt policies for the common inflation rate. Second, the reference deficit level to the shocks, is fully effective to eliminate country specific movements in public spending. Now we are ready to discuss our model extension and analyze sustainable debt policy in a European framework within the SGP.

4.3.2 Modelling 'Sustainable debt consolidation'

The new research focus is to analyze similar to the model in section 4.2 the problem of 'sustainable' policy but in a model which describes a monetary union. From EU-Treaty provisions and the Stability and Growth Pact there is a clear focus on 'sustainable' debt consolidation.

We will take the notation from section 4.3 and now extend the basic model. Variable e_i is the debt stock consolidation effort of country i. The motion of the debt stock '$s(e_i)$' depends on the consolidation effort 'e_i'. Thus the government i's expected utility is now given by:

$$U_{Fi} = E[-s_i(e_i) + u(f_{1i}) + pu(f_{2i}) - \pi^2/(2\phi)], \qquad \forall i, \qquad (4.36)$$

where $s_i(e_i) = (1/2)(e_i - \frac{k}{2})^2$ represents the costs of 'sustainable' consolidation within the European fiscal framework, especially of the 'Stability and Growth Pact'. The function above is crucial because it defines the 'maximum sustainable yield' value by '$k/2$'. Moreover the costs for the member states increase if consolidation is too high because of giving up long–run structural reforms and

distribute the costs of such projects above generations. However, too low consolidation implies also higher costs because from section 4.2 we have shown that this corresponds with an 'excessive deficit'. Apart from other functional forms the interpretation of the following budget constraint is very similar to equation (4.30):

$$f_{1i} + g_{1i} = 1 + \epsilon_i + e_i + b_{1i} - \psi(d_{1i} - \bar{d}_{1i}) + \frac{\psi}{n-1} \sum_{j=1, j \neq i}^{n} (d_{1j} - \bar{d}_{ij}). \quad (4.37)$$

where now,

$$\bar{d}_{it} = \bar{d} - \delta(\epsilon_i + e_i), \qquad and \qquad \bar{d}_{2i} = \bar{d}. \quad (4.38)$$

Besides of the definitions above we need additionally one assumption which induce the trade–off among sustainability consolidation between deficit and debt levels. In the following we define the deficit as (notice, $d_{i1} > 0$):

$$d_{it} := b_{it} - b_{i,t-1} + \left(\frac{k}{2} - e_i\right).^{[1]} \quad (4.39)$$

The last term consists of the MSY optimum of consolidation minus the actual consolidation variable. A too low consolidation i.e. — below the MSY target — implies an increase in short–run deficit and long–run debt. However, consolidation in the MSY–Optimum $e_i = k/2$ have no impact on debt and deficit levels. But a very high consolidation amount above the MSY–Value, reduce on the one hand the current deficit but on the other hand imply more costs through the sustainability function $s(e_i)$ in the expected utility function U_i. Two important questions arise now: First, what is the optimal consolidation effort and so the debt level? Second, what happens with the social utility value if the MSY value 'k' changes (interpreted as a change of the debt threshold in the SGP)? Hence, both questions are now analyzed in the extended model framework.

Using (4.37) and (4.31), the first– and second–period spending on good F; can be written as (appendix A.2):

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[1] Notice that I assume also that $d_2 = -b_{i1}$.

$$f_{1i} = 1 + \tilde{\epsilon} + e_i + 2\tilde{e} + \tilde{b} + \left(\frac{n}{n-1}\psi - 1\right)[(\tilde{b} - b_{i,1}) + (\tilde{e} - e_i)] +$$
$$+ \left(\frac{n}{n-1}\psi\delta - 1\right)[(\tilde{\epsilon} - \epsilon_i) + (\tilde{e} - e_i)] \quad (4.40)$$

$$f_{2i} = 1 - \tilde{b_1} - \left(1 - \frac{n}{n-1}\psi\right)[(\tilde{b_1} - b_{i,1})]. \quad (4.41)$$

The simple model extension and the incorporation of a sustainability function have an tremendous impact on the model results. This is seen in the above two time-constraints. They are completely different from the analogue part by Beetsma and Jensen (2003).

4.3.3   Model Solution

The optimal behavior of the government of country i, in terms of the choice of effort and debt issuance, are characterized by the following necessary and sufficient first–order conditions:

$$\frac{\partial U_F}{\partial e_i} = 0 \Longleftrightarrow s'(e_i) = E[u'(f_{1i})[1 + \psi(1 - \delta)]$$

$$\Longleftrightarrow s'(e_i) = [1 + \psi(1 - \delta)]E[u'(f_{1i})] \qquad \forall i \quad (4.42)$$

$$\frac{\partial U_F}{\partial b_i} = 0 \Longleftrightarrow 0 = E[u'(f_{1i})[1 - \psi] + pE[u'(f_{2i})][-(1 - \psi)] - E[\frac{\alpha^2}{\phi}\tilde{b_1}]$$

$$\Longleftrightarrow E[u'(f_{1i})[1 - \psi] = pE[u'(f_{2i})](1 - \psi) + E[\frac{\alpha^2}{\phi}\tilde{b_1}], \qquad \forall i \quad (4.43)$$

While the second condition (4.43) corresponds to that in the basic model, the first condition (4.42) hints the new effect. It represents the optimal consolidation effort. Hence, it equates the government marginal costs of consolidation through effort with the expected marginal gain from period one and two (in terms of a

lower debt level close to the equilibrium MSY value). The stronger the response of the reference debt level ($\delta \uparrow$), the weaker is the 'excessive deficit procedure' ($\psi \downarrow$)[1], and thus the smaller is the expected marginal gain. These reactions are important new findings for the 'sustainable debt policy' within the Stability and Growth Pact'.[2] An interesting finding is that through consolidation the marginal gain of the RHS (4.42) increases by ψ in comparison to a situation without consolidation. An increase in strength of the 'excessive deficit procedure' thus increase the marginal gains from consolidation. That result illustrates that for sustainable debt policy, a tougher Stability Pact can improve the marginal gains, ceteris paribus.

For an explicit and closed–form model solution we assume a linear–quadratic specification of the function u (Cf. Beetsma and Jensen, 2003):

$$u(f_{ti}) = -\frac{(\xi - 1)}{2}(f_{i1})^2 + \xi f_{ti}, \qquad \xi > 1 \qquad and \qquad 0 \leq f_{it} < \frac{\xi}{\xi - 1}. \quad (4.44)$$

This is very convenient for explaining the intuition behind the new results. To see how to solve the (Bayesian) Nash equilibrium in this case look in the Appendix A.2. With the functional specification above the consolidation effort and public debt levels can be expressed as:

$$b_{1i} = B - B_\epsilon \epsilon_i \qquad\qquad\qquad (4.45)$$

$$e_i = D - D_\epsilon \epsilon_i. \qquad\qquad\qquad (4.46)$$

where $D, B_\epsilon, D_\epsilon > 0$. The explicit expressions for B, D, B_ϵ and D_ϵ are contained in the Appendix A.2. We limit the attention to cases in which $E[\tilde{b}_1] = B > 0$.

As seen before, there is an active role for a stability pact. A growing size of the union ('n' increases) implies an increase in the average expected debt level.

Result (iii). Let $\psi > 0$. Then,

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[1] and the re-election probability ($p \downarrow$) in a more general framework see appendix B.

[2] This result show that the re-election probability is very important. A reform proposal which define a debt level per law for all different Government is from that perspective desirable (De Grauwe, 2003) but it is not really implementable because a new government implement their own consolidation level.

(a) $\frac{\partial D_\epsilon}{\partial \delta} < 0$ and $\frac{\partial B_\epsilon}{\partial \delta} < 0$.

(b) $\frac{\partial D}{\partial k} > 0$ and $\frac{\partial B}{\partial k} < 0$.

Part (a) implies that an increase in the reference deficit level of country i induce a smaller sanction fee if a bad shock occur, and thus decreases debt and consolidation effort. Therefore, the incentive to exert more consolidation effort is weakened. Contrary: an increase in debt imply symmetrical an increase in the consolidation effort (also seen in our model in section 4.2) to achieve sustainable public finance.[1]

The results in part (b) focus more on 'sustainable' policy implications. An increase of the MSY value k (interpreted as an increase of the excessive debt threshold) implies a higher 'D' and therefore a higher consolidation effort. The intuition behind this result is that a lower threshold in the long–run does not change the initial defined debt equilibrium. Therefore to achieve that equilibrium debt level, despite the lack of clear and credible deficit ceilings; a need for a higher consolidation effort. Apart from the reactions to the consolidation effort the debt level declines. Because: On the one hand lower deficit ceilings implies lower excessive debt in the future and on the other hand higher consolidation effort which accelerate the decrease in B and thus the debt value.

4.3.4 Are relaxed deficit thresholds compatible with 'Sustainability'?

Proposition 4.11. *In the situation of sustainable consolidation; i.e the equilibrium level, is equivalent to the 'maximum sustainable yield' value; parties welfare function is increasing with relaxing the debt and deficit threshold; $\partial V_{Fi}(\psi, \delta)/\partial k > 0$.*

Proof 4.7. *See Appendix A.2.* □

Hence, this proposition states there are several gains from a 'sustainable consolidation' policy in equilibrium. However, if the debt/deficit stock is below the

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[1]These results are also in line with Beetsma and Jensen (2003).

'MSY' threshold there are no clear benefits from relaxing the 'excessive deficit procedure' in the SGP. On the one hand we can argue that might depend on the re–election probability and the debt amount in period one. In fact, a low re–election probability and a low debt level imply rather a negative influence to the parties utility. A big surprise in our model is that the gains from relaxing the sustainable thresholds in the SGP arise only if countries consolidate today more than necessary. However it is easy to show (empirically) that since the start of EMU nearly all participating countries decline their consolidation effort in fiscal policy tremendously in comparison to the pre-EMU amount (Fatas et al., 2003). Therefore it is possible to assume that all countries have more disadvantages and costs if they relaxes the 'sustainable–thresholds' in the SGP.

4.4 Institutional Interaction with Differential Equations

The huge reform discussion about the Stability and Growth Pact which emerged with the failure of the early warning in February 2002 and the failure to impose sanctions against Germany and France in November 2003 is reason enough to analyze the current Stability Pact and the fiscal–monetary interaction framework in more detail. Finding out the relevant trade–offs in the European fiscal–monetary interaction framework is a new research field in the short term.[1]

It is therefore not surprising that there are relatively few models and theoretical arguments for the Stability and Growth Pact, which was established in the subspace of fiscal–monetary interaction, since monetary union in 1999 (Dixit, 2001a). One of the most prominent results of the qualitative analysis of fiscal rules in the pre–1990s is that: free–riding, moral hazard and asymmetric information are challenges in a monetary union, because of the new interactions. However, nobody knows a *good* and *efficient* rule to manage fiscal–monetary interaction, and there is no economic theory which explains the current 3% to GDP deficit threshold and the 60% debt threshold (De Grauwe, 2003a). Rather, it seems non–trivial to analyze the European fiscal framework and especially the Stability and Growth Pact, because it links on the one hand monetary and fiscal theory as well as incentive theory with institutional economic analysis on the other (Brunila et al., 2001). The two theory blocks are hardly linked: Institutional economic analysis aims to overcome the major drawbacks of pure economic theory.

This paper focuses on the existing pre–embryonic model framework and tries to extend it to a more appropriate form for policy conclusions. Therefore we begin with a new model framework that is based on an interdisciplinary approach using Economics and Mathematics.

When dealing with fiscal–monetary interaction in a monetary union it is a common practice (Beetsma and Bovenberg, 1999; Beetsma and Jensen, 2003;

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[1]**The section is based on the following published Working papers: 'New Economic Windows' on 2004 Conference-Proceedings and 'New Frontiers of European Union' Conference-Proceedings 2005.**

Dixit and Lambertini, 2003) to study models which are based on Barro and Gordon (1983b), Kydland and Prescott (1977), and thus on simple game theory. The weakness in all these models is the *non-dynamic* structure between the more complex institutional framework of fiscal–monetary interaction and the Stability and Growth Pact. The construction of these models is based on the idea of modelling the Stability and Growth Pact as a fixed fine 'ψ' for each additional unit of debt that is issued (Beetsma and Uhlig, 1999). To use this modelling form is simple because at the moment there exists no other real option to make the Stability Pact also traceable in analytical models.

To extend the horizon of the existing models in that environment and to make the results more relevant for policy conclusions at least for the current reform discussion about the Stability and Growth Pact, we created a new model approach based on *dynamic differential equations* (Hairer and Wanner, 2002).

The remainder of the paper is structured as follows. Section 4.4.1 explains the main modelling idea. In section 4.4.2, we present a elementary–interaction model between fiscal policy and the Stability and Growth Pact. Section 4.4.3 extends the framework to a full interaction model between Fiscal–Monetary Policy and the Stability and Growth Pact. After solving and analyzing the stability of the model we interpret the model results in subsection 4.4.4. Finally we summarize the model conclusions and present some policy relevant modifications for the current Stability and Growth Pact. Section 4.5 concludes the main body of all papers presented in chapter 4 as well as the conclusions from our earlier theoretical analysis.

4.4.1 Model Framework

The model framework consists of three interacting institutions (Beetsma and Uhlig, 1999). The first is the centralized monetary policy (European Central Bank, ECB). The primary objective of monetary policy is to maintain price–stability (article 105 ECT). The monetary policy mainly interacts with fiscal policies through the determination of price–levels (FTPL) and interest rates. The second important institutional framework is the decentralized fiscal policy. The

main difference between monetary and fiscal policy is that the nation retains a large degree of responsibility over its own fiscal policy. This implies three different interactions:

(i) Fiscal policy interacts with monetary policy. Budget decisions about deficit and debt have an impact on price–stability and thus on monetary policy (cf FTPL).

(ii) A nations fiscal policy interacts with the other fiscal policies in the monetary union because of the competition around the public good 'price–stability' provided by monetary policy. Thus one fiscal policy can undertake free–rider behavior against the other participating member states within the monetary union. This free–riding incentive actually increases in the framework of EMU (Beetsma and Bovenberg, 1999). To eliminate or discipline this free–rider behavior in the European Monetary Union the so–called 'Stability and Growth Pact' was implemented.

(iii) The Stability Pact is the third institution in the EMU. On the one hand the SGP disciplines fiscal policy and free–rider behavior. On the other hand it helps monetary policy to maintain the primary objective 'price–stability'. Hence, the objective of the SGP is twofold and it thus represents an intermediary institution.

The main task in the following paper is to analyze the interactions or interrelations in the European Monetary Union between these three institutional agents. We choose a dynamic concept that uses differential equations. The existing economic literature analyzes fiscal–monetary interaction (Dixit and Lambertini 2003, Beetsma and Bovenberg 1999) in a game theoretic framework. The first approach to analyzing the Stability and Growth Pact (Beetsam and Uhlig 1999) again uses a game theoretic framework but without the real fiscal–monetary interaction structure. Moreover the economic approache focuses more on monetary and real variables and their developments in the monetary union (Aarle et al.,

European Monetary Policy (Art. 105 ECT)

Breaching SGP

Disciplining

$y(t) = $ **interestrate**

Stability and Growth Pact (SGP)

Sanctions

Fiscal Policy 1   Fiscal Policy 2   Fiscal Policy 3...   Fiscal Policy N
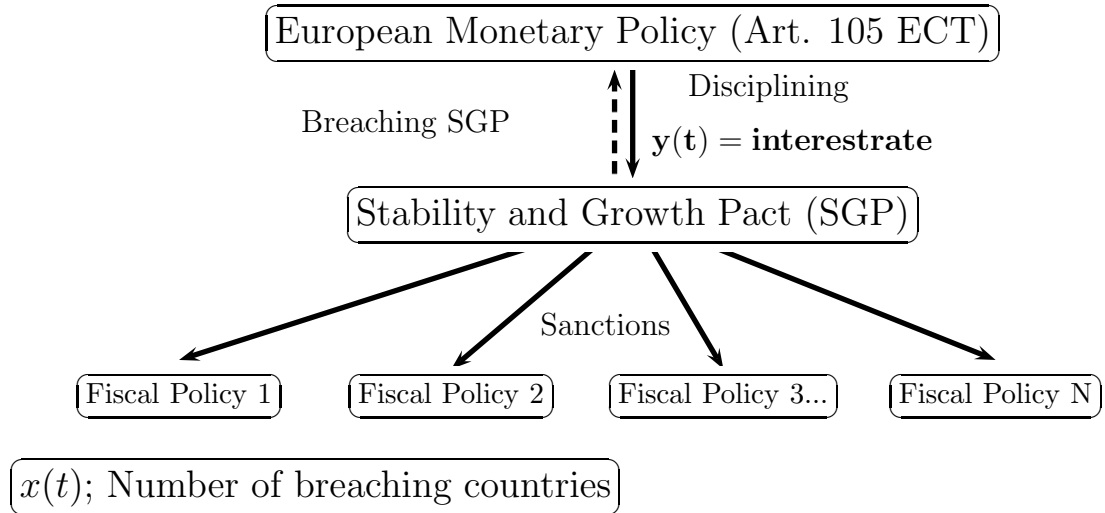
$x(t)$; Number of breaching countries

Figure 4.4: Institutionell Interaction in EMU

2001). But nobody tries to analyze the institutional interaction in the European Monetary Union simultaneously using a dynamic framework.[1]

To illustrate the model framework graphically look to Figure 4.4. Fiscal policy can influence the SGP and the monetary policy through lax deficit and debt policy. The incentives to do this are: national interest, increase of re–election probability, national output stabilization, reaction to asymmetric and idiosyncratic shocks and the new free–riding behavior. ζ represents the different incentive channels.

The next section tries to model the interaction relationships between all three institutions with differential equations. The stringent modelling of that complex framework helps us to learn something new about the interactions, impacts and causalities of the 'European Monetary Union'.

4.4.2 Basic Model

The following section describes the basic interaction model between European fiscal policy and the Stability and Growth Pact. The primary target is to under-

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[1]cf a non-technical or analytical institutional analysis (R. Ohr und A. Schmidt, 2003).

stand the evolution of breaching countries $'x(t)'$. Modelling the dynamic results in $(x(t) \geq 0)$ (Schmeiser, 2000):

$$x' = (g - p * s)x, \qquad t > 0, \qquad x(0) = x_0 \qquad (4.47)$$

where 'g' is the benefit from free–rider behavior of fiscal policy in the European monetary union (Beetsma and Bovenberg, 1999)[1] and 's' represents disciplining sanctions from the 'Stability and Growth Pact'. The parameter 'p' is the probability of imposing sanctions. The intuition behind the first–order differential equation is:

- the increasing free–rider behavior $'g > 0'$ in a monetary union increases with the number of countries that violate the Stability and Growth Pact (SGP), because of the expected benefits.

- the sanction procedure $'s > 0'$ of the Stability and Growth Pact tries to reduce or discipline the free–rider behavior of national fiscal policies and thus reduce the number of breaching countries. But this mechanism works efficiently only if the probability of imposing sanctions $'p > 0'$, is sufficiently large.

The solution of this model is $x(t) = x_0 e^{(g-p*s)t}$. This implies an increasing number of breaching countries in the SGP, if free–riding incentives 'g' are larger than the disciplining sanctions 's'. In the current fiscal–SGP interaction system the probability of imposing sanctions is very small.[2] This implies $'g > p * s'$; thus the number of breaching countries might be increasing.[3] But this model approach is simplified in the sanction mechanism and its impact on national fiscal policy. A more realistic sanction mechanism looks like:

$$s = s(x) = s_0 + a * x, \qquad s_0, a \geq 0, \qquad (4.48)$$

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[1]cf Beetsma and Bovenberg (1999) show in the paper that free-riding behavior even increase in a monetary union.

[2]cf the failures of imposing early warnings against Germany, France (2002) and for example Italy (2004) and no sanctions against sinner states as Germany and France (2003) confirm that.

[3]This describes the current situation in the EMU empirically. The new breaching countries are Netherlands, United Kingdom, Greece and some of the new EAC.

where s_0 represent the basic sanction amount and a the marginal sanction rate or the idiosyncratic influence of the national fiscal policy. Substituting equation (4.48) in to equation (4.47) yields:

$$\frac{dx}{dt} = x' = (\zeta^F - p * a * x)x, \qquad with \qquad t > 0, x(0) = x_0, \qquad (4.49)$$

and $\zeta^F := g - p * s_0$. The differential equation above is a so–called logistic–differential equation (or 'Verhulst–Model'). The logistic modelling framework also shows the sustainability of the number of breaching countries 'x(t)'. The solution of that differential equation through integration is:

$$t = \int_0^t = d\tau = \int_{x(0)}^{x(t)} \frac{dx}{(\zeta - pa * x)x} = \int_{x_0}^{x(t)} \frac{1}{\zeta}\left(\frac{1}{x} + \frac{pa}{\zeta - pa * x}\right) =$$
$$= \frac{1}{\zeta}\left(\ln\left[\frac{x(t)}{x_0}\right] + pa * \ln\left[\frac{\zeta - pa * x_0}{\zeta - pa * x(t)}\right]\right). \qquad (4.50)$$

Solving the last term to $x(t)$ results in:

$$x(t) = \frac{\zeta * x_0}{pa * x_0 + (\zeta - pa * x_0)e^{-\zeta t}}. \qquad (4.51)$$

For $t \to \infty$:

$$x(t) \longrightarrow \begin{cases} \zeta/(p * a) & : \zeta > 0, \\ 0 & : \zeta < 0. \end{cases} \qquad (4.52)$$

If the sanction mechanism is fully credible i.e. the implementation probability 'p' and sanction 's' are high, then the number of breaching countries converges to zero. But if free-riding behavior 'g' dominates the disciplining mechanism '$(p*s_0)$' then $\zeta > 0$ and thus the number of breaching countries convergs to '$\zeta/(p * a)$', a positive figure. The final number of violating countries increases with higher free–riding incentives but decreases if the sanctions are more credible and the economic impact of fiscal policy 'a' in the MU is relatively high.[1] The intuition behind the last term is that higher influence of fiscal policy 'a' in MU normally implies a stronger sanction procedure (higher sanction amount or a punishment

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[1]vice versa for a high policy impact of fiscal policy member states.

through the monetary policy) because of the increasing inflation danger. This might be a strong disciplining effect for member countries to reduce the fiscal policy below the 3% deficit and 60% debt thresholds. This finding suggests a sanction–threshold that depends on the national GDP rate. The term $\zeta/(pa)$ could be interpreted as the natural intake capacity of breaching countries in a Monetary Union.

The next section extends the simple model with the monetary interaction level. Monetary policy interacts both with fiscal policy and the Stability and Growth Pact. Now we take into account monetary policy and analyze the full interaction framework.[1]

4.4.3   Full–Interaction–Model

Similar to the model description in section 4.4.2, we now extend the model with the monetary authority. Analyzing the complete–complex system explains the current European fiscal–monetary interaction framework and the connection with the Stability and Growth Pact in a more realistic way than all the other existing economic models.

To model the evolution of monetary policy 'y(t)', we follow a similar approach with differential equations:

$$y' = (\zeta^M - d^{-1} * y)y, \qquad t > 0, \qquad y(0) = y_0 \qquad (4.53)$$

where 'y' is monetary policy (for instance interest rates) and '$d \geq 0$' reflects the independence of monetary policy (or a weight; i.e. it is possible to follow other objectives such as output stabilization as well). In the following section, we define $c := d^{-1}$. The intuition behind equation (4.53) is:

- if free–riding behavior is dominant in the MU $\zeta^M > 0$ (inflation target) then monetary policy might punish fiscal policy additionally with higher interest rates.

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[1]cf because independent European monetary policy can also discipline fiscal policy, for instance with higher interest rates.

- on the other hand if the monetary policy is fully independent $(d \to \infty)$ then the primary objective 'price stability' (ζ^M) has the whole weight. A more dependent Common Central Bank (CCB) $(d \to 0)$ implies that output targets are more important. This has an explicit negative impact on interest rates (i.e. a decline).

In a more realistic interaction framework, free–rider incentives 'ζ' depend also on the current number of fiscal policy breaching countries (Herzog, 2004b)[1]:

$$\zeta = \zeta^M(x) = -\zeta_1^M + \zeta_2^M x, \qquad with \qquad \zeta_1, \zeta_2 \geq 0 \tag{4.54}$$

where ζ_1 represents disciplining incentives (for the number of non–breaching countries) and ζ_2 describes the 'Cascade to the top' effect which was first explained by Herzog (2004a). Moreover the fiscal policy free–rider incentive ζ^F also depends on monetary policy:

$$\zeta^F(y) = \zeta_3^F - \zeta_4^F y, \qquad with \qquad \zeta_3, \zeta_4 \geq 0 \tag{4.55}$$

where ζ_3 represents the increasing free–rider behavior in the Monetary Union (Beetsma and Bovenberg 1999) and ζ_4 describes the 'Disciplining–Monetary–Policy' effect (interest rate effect).

Substituting equation (4.54) into equation (4.53) and also equation (4.55) into equation (4.49) yields the following system of differential equations. This system is very similar to the so-called 'Lotka–Volterra equations':[2]

$$\begin{aligned} x' &= (\zeta_3^F - \zeta_4^F * y - pa * x)x & t > 0 & \qquad x(0) = x_0 \\ y' &= (-\zeta_1^M + \zeta_2^M * x - c * y)y & t > 0 & \qquad y(0) = y_0 \end{aligned} \tag{4.56}$$

To understand how the solution of the system evolves, we first simplify the system and assume $a = c = 0$.

$$\begin{aligned} x' &= (\zeta_3^F - \zeta_4^F * y)x & t > 0 & \qquad x(0) = x_0 \\ y' &= (-\zeta_1^M + \zeta_2^M * x)y & t > 0 & \qquad y(0) = y_0 \end{aligned} \tag{4.57}$$

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[1] cf Fiscal Theory of Price Level, Woodford (2003).
[2] Goes back to Alfred James Lotka (1880–1949) and Vito Volterra (1860–1949).

This system of differential equations has two possible solutions $(x_1, y_1)'$ and $(x_2, y_2)'$:

$$\begin{pmatrix} x_1 \\ y_1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \qquad and \qquad \begin{pmatrix} x_2 \\ y_2 \end{pmatrix} = \begin{pmatrix} \zeta_1^M/\zeta_2^M \\ \zeta_3^F/\zeta_4^F \end{pmatrix}$$

To show the (asymptotic) stability or instability of the two solutions, we define the function $F(x, y)$ and calculate the eigenvalues of the system:

$$F(x, y) = \begin{pmatrix} (\zeta_3^F - \zeta_4^F * y)x \\ (-\zeta_1^M + \zeta_2^M * x)y \end{pmatrix} \qquad x, y \geq 0, \tag{4.58}$$

and so the derivatives in the associated points are:

$$F'(0, 0) = \begin{pmatrix} \zeta_3^F & 0 \\ 0 & -\zeta_1^M \end{pmatrix}, \qquad \wedge \qquad F'\left(\frac{\zeta_1^M}{\zeta_2^M}, \frac{\zeta_3^F}{\zeta_4^F}\right) = \begin{pmatrix} 0 & -\zeta_4^F * \frac{\zeta_1^M}{\zeta_2^M} \\ \zeta_2^M * \frac{\zeta_3^F}{\zeta_4^F} & 0 \end{pmatrix},$$

Now we calculate the eigenvalues of $F'(0, 0)$:

$$det|F'(0, 0) - \lambda I| = -(\zeta_3^F - \lambda)(\zeta_1^M - \lambda) = 0, \tag{4.59}$$

which implies $\lambda_1 = \zeta_3^F$ and $\lambda_2 = \zeta_1^M$. Because of the assumption that all $\zeta_i > 0$ $\forall i$, the two eigenvalues are positive. Hence, there is an unstable equilibrium point $P_1(0, 0)$.[1]

To determine the eigenvalue for $F'\left(\frac{\zeta_1^M}{\zeta_2^M}, \frac{\zeta_3^F}{\zeta_4^F}\right)$, we have to solve the following equation:

$$det\left|F'\left(\frac{\zeta_1^M}{\zeta_2^M}, \frac{\zeta_3^F}{\zeta_4^F}\right) - \lambda I\right| = \lambda^2 + \zeta_2^M * \frac{\zeta_3^F}{\zeta_4^F} * \zeta_4^F * \frac{\zeta_1^M}{\zeta_2^M} = \lambda^2 + \zeta_3^F * \zeta_1^M = 0, \tag{4.60}$$

the system is also unstable if Re $\lambda_1 < 0$ and Re $\lambda_2 > 0$ (Strang, 1988, 2003). Therefore the system is unstable around the second point $P_2(\zeta_1^M/\zeta_2^M; \zeta_3^F/\zeta_4^F)$.

---

[1]The instability can also be seen from: $det|F'(0, 0)| < 0$.

However, it follows directly from (4.60) that the eigenvalues are: Im $\lambda_{1,2}$. The possibility of complex eigenvalues implies no real solution. To describe the solution behavior of the system near the point $(\zeta_1^M/\zeta_2^M; \zeta_3^F/\zeta_4^F)$, we rewrite the differential equation system (4.57) in the following shape:

$$\frac{dx}{dy} = \frac{\frac{dx}{dt}}{\frac{dy}{dt}} = \frac{x'}{y'} = \frac{(\zeta_3^F - \zeta_4^F * y)x}{(-\zeta_1^M + \zeta_2^M * x)y}, \qquad (4.61)$$

and after integration we can rewrite the equation above as,

$$-ln[x^{\zeta_1}] + \zeta_2 * x = \int \frac{-\zeta_1 + \zeta_2 * x}{x} dx = \int \frac{\zeta_3 - \zeta_4 * y}{y} dy = ln[y^{\zeta_3}] - \zeta_4 * y - \alpha, \qquad (4.62)$$

where $\alpha \epsilon \Re$ is an integration constant. Thus *all* the solutions $(x(t), y(t))'$ satisfy the implicit solution:

$$ln[x(t)^{\zeta_1}] + ln[y(t)^{\zeta_3}] - \zeta_2 * x - \zeta_4 * y = \alpha \qquad \forall t \geq 0. \qquad (4.63)$$

The integration constant α can be calculated from the initial condition (x_0, y_0):

$$\alpha = ln[x_0^{\zeta_1}] + ln[y_0^{\zeta_3}] - \zeta_2 * x_0 - \zeta_4 * y_0. \qquad (4.64)$$

We suggest that the solution set $(x(t), y(t))$ satisfies a closed–form solution in the environment (ϵ, δ) around the point (x_2, y_2):

$$x(t) = \frac{\zeta_1}{\zeta_2} + \epsilon * \sin[\omega t], \qquad \wedge \qquad y(t) = \frac{\zeta_3}{\zeta_4} + \delta \cos[\omega t], \qquad (4.65)$$

with $\epsilon > 0$, $\delta \ll 1$ and $\omega > 0$. When $t = 0$ after trivial aggregation we get the result:

$$\alpha = \zeta_1 \ln\left[\frac{\zeta_1}{\zeta_2}\right] + \zeta_3 \ln\left[\frac{\zeta_3}{\zeta_4}\right] - \zeta_1 - \zeta_3 + |O(\delta)| \qquad (\delta \longrightarrow 0). \qquad (4.66)$$

The next step is now the approximation of the general solution $(x(t), y(t))$ (with second-order Taylor series) in the environment of $x_2 = \zeta_1/\zeta_2$ and $y_2 = \zeta_3/\zeta_4$:

$$\zeta_1 * ln[x(t)] + \zeta_3 * ln[y(t)] - \zeta_2 * x(t) - \zeta_4 * y(t) \qquad (4.67)$$

is equivalent to:

$$= \zeta_1 \ln \left[\frac{\zeta_1}{\zeta_2} \right] + \zeta_2 \epsilon \sin \omega t + \zeta_3 \ln \left[\frac{\zeta_3}{\zeta_4} \right] + \zeta_4 \delta \cos \omega t + \frac{\zeta_2^2}{2\zeta_1} \epsilon^2 \sin^2 \omega t +$$
$$+ \frac{\zeta_4^2}{2\zeta_3} \delta^2 \cos^2 \omega t - \zeta_1 - \zeta_2 \epsilon \sin \omega t - \zeta_3 - \zeta_4 \delta \omega t + O(\epsilon^3 + \delta^3), \quad (4.68)$$

$$= \zeta_1 \ln \left[\frac{\zeta_1}{\zeta_2} \right] + \zeta_3 \ln \left[\frac{\zeta_3}{\zeta_4} \right] - \zeta_1 - \zeta_3 + \frac{\zeta_2^2}{2\zeta_1} \epsilon^2 \sin^2 \omega t + \frac{\zeta_4^2}{2\zeta_3} \delta^2 \cos^2 \omega t + O(\epsilon^3 + \delta^3),$$
$$= \alpha + O(\epsilon^2),$$

if we choose

$$\frac{\zeta_2^2}{2\zeta_1} \epsilon^2 = \frac{\zeta_4^2}{2\zeta_3} \delta^2.$$

Thus we can conclude that our specified solution (4.65) solve the general system $(x(t), y(t))$ until a error term of order $O(\epsilon^2)$. Moreover we can see that the *Trajectories* $\{(x(t), y(t)) : t \geq 0\}$ are approximative ellipse around the point (x_2, y_2).

The intuition in the short term: The simplified system–dynamics imply that the number of breaching countries increases so long as the monetary policy sees no danger for price–stability in the future. After the reaction of the monetary policy (increase in interest rates) the number of breaching countries decreases.

But the most interesting case is the general model (4.56) with $a \neq c \neq 0$. Now we calculate the general solution and prove the stability of the associated differential equation system. Starting from the bottom, we are now ready to solve and analyze the interaction relationships between all the interacting institutions: Fiscal Policy, Monetary Policy and the Stability and Growth Pact.

The general model is described through the function $F(x, y)$:

$$F(x, y) = \begin{pmatrix} (\zeta_3^F - \zeta_4^F * y - pa * x)x \\ (-\zeta_1^M + \zeta_2^M * x - c * y)y \end{pmatrix} \qquad x, y \geq 0, \qquad (4.69)$$

There are the following four solutions for the general model:

$$\begin{pmatrix} x_1 \\ y_1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \quad \wedge \quad \begin{pmatrix} x_2 \\ y_2 \end{pmatrix} = \begin{pmatrix} 0 \\ -\zeta_1/c \end{pmatrix} \quad \wedge \quad \begin{pmatrix} x_3 \\ y_3 \end{pmatrix} = \begin{pmatrix} \zeta_3/(pa) \\ 0 \end{pmatrix}$$

and $(x_4, y_4)'$ is the solution of the linear equation system:

$$\begin{pmatrix} pa & \zeta_4 \\ \zeta_2 & -c \end{pmatrix} \begin{pmatrix} x_4 \\ y_4 \end{pmatrix} = \begin{pmatrix} \zeta_3 \\ \zeta_4 \end{pmatrix}$$

using *Cramer's-rule* results in:

$$\begin{pmatrix} x_4 \\ y_4 \end{pmatrix} = \frac{1}{pac + \zeta_2 * \zeta_4} \begin{pmatrix} \zeta_3 * c + \zeta_4 * \zeta_1 \\ \zeta_3 * \zeta_2 - pa * \zeta_1 \end{pmatrix}$$

with $A := \zeta_3 * c + \zeta_4 * \zeta_1$ and $B := \zeta_3 * \zeta_2 - pa * \zeta_1$.

The second solution (x_2, y_2) is a non possible stationary point because we have assumed $x, y \geq 0$. To find out the stability of the other three solutions, we deviate the function $F(x, y)$:

$$F'(x, y) = \begin{pmatrix} \zeta_3 - \zeta_4 - 2ax & -\zeta_4 x \\ \zeta_2 y & -\zeta_1 + \zeta_2 x - 2cy \end{pmatrix}. \tag{4.70}$$

Similar to the model in subsection 4.3 the point $(x_1, y_1)' = (0, 0)'$ is a non stationary solution because of $\text{Re}\lambda > 0$.[1] The point (x_3, y_3) is unstable, if $\zeta_1/\zeta_2 < \zeta_3/a$, and asymptotic stable, if $\zeta_1/\zeta_2 > \zeta_3/a$. The point (x_4, y_4) is positive i.e. $x, y \geq 0$ for $\zeta_1/\zeta_2 < \zeta_3/a$. The eigenvalues from $F'(x_4, y_4)$ are:

$$\lambda_{1,2} = -\frac{1}{2}(aA + cB) \pm \sqrt{\frac{1}{4}(aA + cB)^2 - (\zeta_2\zeta_2 + ac)AB},$$

with $A, B > 0$. Because of $\text{Re}\lambda_{1,2} < 0$ the point (x_4, y_4) is asymptotic stable, i.e. $(x(t), y(t)) \longrightarrow (x_4, y_4)$ for $t \longrightarrow \infty$. This implies that the number of breaching countries converges after a necessary time to:

$$x_4 = \frac{\zeta_3 c + \zeta_4 \zeta_1}{pac + \zeta_4 \zeta_3}. \tag{4.71}$$

---

[1]cf Heuser (1986a,b) because of Lipschitz-stetig (steady) or Bronstein et al. (1997).

The following equation system summarizes the general model results:

$$
\begin{aligned}
\frac{\zeta_1}{\zeta_2} > \frac{\zeta_3}{pa} \quad &: \quad x(t) \to \frac{\zeta_3}{pa} \quad and \quad y(t) \to 0 \quad for \quad t \to \infty; \\
\frac{\zeta_1}{\zeta_2} < \frac{\zeta_3}{pa} \quad &: \quad x(t) \to \frac{\zeta_3 c + \zeta_4 \zeta_1}{pac + \zeta_4 \zeta_3} \quad and \quad y(t) \to \frac{\zeta_3 \zeta_2 - pa\zeta_1}{pac + \zeta_3 \zeta_4} \quad for \quad t \to \infty.
\end{aligned}
$$
$$(4.72)$$

The interpretation of the results is relegated to the next subsection.

4.4.4 Interpretation of the Model Results

Now we discuss the mathematical analysis above and show some numerical simulations. Moreover the numerical simulations proofs the robustness and stability of our theoretical results, even in a more complex model framework.[1]

The first part of our general results is very similar to the findings in the basic model in subsection 4.3. However, the implications from the assumed constellation $\zeta_1/\zeta_2 > \zeta_3/(pa)$ are not so realistic because of the monetary policy variable convergence to zero; $y(t) \to 0$. Despite this problem we can show that even in that case the number of breaching countries converges against a fixed ratio. This is a really surprising finding because it illustrates that monetary policy alone is not sufficient to discipline breaching countries in a monetary union.

Moreover, assume that the free–rider incentives in a MU are small ($\zeta_3 \to 0$) and the number of disciplined member countries within the SGP are big ($\zeta_1 \to \infty$). Now, the ratio above exceeds the ratio of fiscal policy '$\zeta_3/(pa)$'. This illustrates our first proposition:

Proposition 4.12. *The number of breaching member states depends on the real benefit from free–riding (ζ_3^F) and the probability (credibility) of sanctions 'p' as well as the influence on fiscal policy of the aggregate variables 'a'.*

Proof 4.8. *The proof follows directly from the first part of the model.*

---

[1]cf figure 2 and 3 in the graphical appendix.

Remark 4.4.1. Hence, we can see that either a high sanction probability or a high influence of monetary variables (on the big countries) reduces the number of breaching countries. On the other hand the free–riding incentives induce the problem of lax fiscal policy behavior in this framework. It is clear that the implementation of sanctions within the Stability and Growth Pact depends on the probability and credibility of the enforcement mechanism. On the one hand, the current sanction procedure within the SGP is poor because the sanction probability is too low and the credibility of the enforcement procedure is too weak. On the other hand the partisan influence within the ECOFIN–council and the pretty vague fiscal–institutional framework in the EMU are reasons for the past failures in the SGP. That situation implies an increasing number of breaching countries despite the fact that the sustainable member countries dominate the EMU by definition.

The second part of our results is more interesting, because of the following more realistic assumptions:

(a) The impact of an individual country on monetary policy is relative small ($a \to 0$) and the sanction probability 'p' within the SGP is rather low. Moreover the public good 'price–stability' induce a strong incentive of free–riding ($\zeta_3^F \to \infty$), as shown by Beetsma and Bovenberg (2002). Thus the following ratio converges to infinity ($\zeta_3^F/(pa) \to \infty$). Otherwise the intended disciplining ratio ζ_1^M/ζ_2^M is lower because of the weak fiscal consolidation effect in the MU, 'ζ_1', and the so–called new 'Cascade–to–Top' effect within the interaction framework, 'ζ_2'.

(b) Moreover, in the observed case a stabil and strict positive outcome exists for both solution variables $(x(t), y(t))$.

First, we discuss the determinants of 'x(t)':

Is monetary policy sufficient to constrain the number of breaching fiscal policies in the EMU? To answer that question, we find new trade–off's in the monetary–fiscal interaction framework. The determinants of the breaching countries depend

on the monetary independence variable 'c' and on the fiscal policy impact variable 'p * a' to monetary policy. This illustrates a trade–off between central bank independence and the credibility of the SGP. Unfortunately this trade-off is not discussed at all in the reform discussion of the Stability and Growth Pact.

Proposition 4.13. *Monetary policy independence 'c' and fiscal policy impact on monetary policy 'p*a' can influence the number of breaching countries. Moreover monetary policy 'ζ_4' reduces the number of breaching countries but the consolidation incentives (good guys) from the SGP increase the number of breaching countries 'ζ_1'.*

Proof 4.9. *Derivation of $x(t)$ is: $\frac{\partial x(t)}{\partial c} = \frac{\zeta_4(\zeta_3^2 - pa\zeta_1)}{(pac + \zeta_3\zeta_4)^2} > 0$, because of the assumption $\zeta_3 \to \infty$ and $a \to 0$. Increasing monetary independence (c $\downarrow$) implies a reduction in the number of breaching countries. The impact of ζ_2 is independent from the number of breaching countries. This is immediately clear from equation (4.19). But a higher impact of fiscal policy 'a' reduce the number of breaching countries in the interaction framework through a more restrictive monetary policy (ζ_4). The disciplining effect through monetary policy is:*

$$\frac{\partial x(t)}{\partial \zeta_4} = \frac{c(\overbrace{p * a}^{\to 0}\zeta_1 - \overbrace{\zeta_3^2}^{\to\infty})}{(pac + \zeta_3\zeta_4)^2} < 0$$

.

On the other hand, the fiscal policy framework, especially the Stability and Growth Pact 'ζ_1' generates an increasing number of undisciplined countries in the EMU. See also equation (4.20) $\square$

Remark 4.4.2. A very interesting and new insight is the impact of ζ_1. This variable describes the impact of the good guys (non–breaching countries) or the incentives of 'sound' and 'sustainable' fiscal policy. If the number of good guys increases in MU '$\zeta_1 \uparrow$', a simultaneous increase of the breaching countries 'x(t) $\uparrow$' is immediately implied, because of the increasing free–rider incentives and the influence of the declining sanctions. The main problem with this paradoxical finding is again the redistribution of sanction revenues to the other member countries.

Second, we discuss the determinants of 'y(t)':

Assume an initial constellation of parameters, where monetary policy can increase the interest rates. The following proposition shows that monetary policy

is *very constrained* in the European Monetary Union when it comes to punishing the breaching countries 'x(t)':

Proposition 4.14. *An increasing fiscal policy impact ζ_2 increases monetary policy $y(t)$ but restricted to: (i) Monetary impact on reducing the free–rider incentives 'ζ_4' and (ii) the number of good guys i.e. the fiscal rules like the SGP 'ζ_1'.*

Proof 4.10. *The derivation is:* $\frac{\partial y(t)}{\partial \zeta_2} = \frac{\zeta_3}{(pac + \zeta_3\zeta_4)} > 0$ $\square$

Remark 4.4.3. The innovative model result in proposition 4.14 is pretty surprising. It shows that a strong monetary policy, with an independent central bank, is not sufficient to limit the number of breaching countries. Or in other words, monetary policy alone is unable to discipline fiscal policy free–rider behavior in the European Monetary Union. Hence, if the number of disciplined member states (good guys) decreases or the fiscal framework reveals several weaknesses in disciplining the free–riding behavior, then a strict monetary policy CB — committed to 'price-stability'— will fail. The reason for this is the limitations and constraints in the fiscal–monetary institutional interaction framework within the European monetary union. Again this finding shows how important a sound and efficient fiscal framework such as the Stability and Growth Pact is. A strong and independent 'Common Central Bank' is not enough to solve the 'new' incentives to more free–riding behavior in the European Monetary Union.

This paradoxical situation where a fully independent monetary policy is unable to discipline lax fiscal policy confirms the necessity of a strong and efficient fiscal–coordination framework in the European Monetary Union. Some modification proposals to the current SGP are in the next section.

Last but not least we briefly discuss the results for a theoretically complete independent monetary policy. The result (4.72) changes to:

$$\frac{\zeta_1}{\zeta_2} < \frac{\zeta_3}{pa} \qquad : \qquad x(t) \to \frac{\zeta_1}{\zeta_3} \qquad and \qquad y(t) \to \frac{\zeta_3\zeta_2 - pa\zeta_1}{\zeta_3\zeta_4} \qquad for \qquad t \to \infty.$$
$$(4.73)$$

Remark 4.4.4. The last case illustrates that the number of breaching countries depends only on the impact of fiscal policy free–riding incentives ζ_3 and the number of good guys (i.e. fiscal policy rule; SGP) ζ_1. Hence, if the number of disciplined countries (good guys) is larger and/or if the fiscal rule is sufficiently strong then the number of breaching countries might be increasing. Moreover

in the fully independent case the monetary policy is more contractive but also more restricted. So a weak fiscal framework 'ζ_1' and a low disciplining impact of monetary policy on fiscal policy 'ζ_4' are both big limits for monetary policy in reducing the free–riding incentives in the EMU. This is a really surprising result and shows the clear disadvantage of a fully independent monetary policy within a monetary union framework with a weak Stability and Growth Pact. Basically this finding suggests a clear benefit from more *fiscal policy coordination* because of the strong limits of monetary policy independence in the EMU.

4.5 Concluding the Model Results

We are now ready to give the main result of this chapter, which is quite technical, but applicable to several situations discussed later. To be on the right track, if there is too much rigidity policymakers will be unable to plug gaps and asymmetric shocks in temporary hard times. Too much laxity, and the integrity of monetary policy may be violated by incompatible objectives or by the budgetary machinations of myopic policy, vote–hunting or even debt–racing. How to draw and tread the thin line between these two is a challenge for any jurisdiction, national or supranational, in future.

The main findings in section 4.1 illustrate that the breach of the SGP depends on the country's own expectations of breach but also very much from the expectations of the other countries in a monetary union. Due to that mechanism, a "deficit- or debt cascade to the top' is induced if at least two countries breach the SGP. This finding is in line with several other theoretical and empirical observations in the literature. At the same time, we can also show that the Stability and Growth Pact disciplines the EMU member states merely as long as no or only one country breaches the rules of the SGP. Therefore the SGP is necessary but not sufficient to discipline fiscal policy. To protect 'European price-stability' we need further mechanisms or a modification of the current SGP.

A rethinking of the fiscal–monetary framework for the EMU is necessary and urgent. Revising the Stability and Growth Pact will not be easy, because we have a heterogenous target set of a 'magic Polyeder'. The analysis of 'sustainability' in the European fiscal framework again shows that this term seems very important.

Unfortunately there is no clear definition of 'sustainability' either from the academic side or from the EU-Commission. Hence, our approach is certainly only a first step to an implementation theory that explains necessary and sufficient ingredients and definitions for a sustainable policy framework. Further research in this field is necessary for the success of the EMU and the 'Euro'.[1] This seems an important topic for future research. Additionally the results and the development of public debt in reality in France, Germany, Portugal, Italy and so on show us how urgent further research on this topic is.

The definition of a sound fiscal architecture of EMU is still in progress. Many aspects and problems will be clarified merely as time goes by. However, as shown in section 4.3, identifying key issues and the relevant trade–offs is essential for designing appropriate policy responses at the EMU and at the national level. We have shown in the model that often the sustainability objectives in the SGP induce welfare losses. But after February 2002, with the story of the early warning against Germany and after November 2003, with the decision against imposing stronger sanctions, everybody knows a reform of the Stability and Growth Pact is only a matter of time. Now it is time to look for an appropriate 'sustainable' fiscal framework which cure the main problems and drawbacks particularly the current rules of the 'STABILITY AND GROWTH PACT'.

Our novel approach of modelling fiscal–monetary interaction with the current Stability and Growth Pact through differential equations shows new and sometimes surprising results. The first new finding is that the system is stable with a positive number of breaching countries. The second and really astonishing result is that monetary policy is despite its independence restricted in punishing the breaching countries through higher interest rates. Moreover we find some new interaction channels, for instance the positive–relation between the disciplined member states (strong fiscal rules) and the number of breaching countries. All the findings invalidate the existing studies of the Stability and Growth Pact. For this reason we can show that the ECB is not able to discipline (eliminate) the free–riding behavior of the bad guys. This finding disproves nearly all those

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[1]The importance of good fiscal policy coordination in monetary unions is also obviously shown in historical monetary unions in Europe -Scandinavian and Latin coin unions- and current monetary unions in Africa.

studies which propose that influence channel. Several policy conclusions from this model show again how necessary and important an efficient fiscal framework like the Stability and Growth Pact is in the European Monetary Union. Furthermore, we present some ideas for the design of a new Stability and Growth Pact (cf. chapter 6 and 7).

If the theory expounded in these papers were valid empirically, there would be major implications for the manner in which fiscal and monetary policies are related in a monetary union and how necessary an efficient fiscal framework might be.

In this section we have introduced some economical models that lead to a fairly general treatment of the European Monetary Union as well as the Stability and Growth Pact. An important role is played by the phenomenon of "free–riding" and the "fiscal–monetary interaction" associated within a "Monetary Union". The existence of these continuous externalities and spill–overs can be characterized by a purely economic property of the underlying space, which is defined in the well–known 'Coase–Theorem'. In the next section we introduce both concepts and establish the connection between them and analyze: Why do bigger countries have more problems with the "Stability and Growth Pact".

Chapter 5

Why do bigger countries have more problems with the SGP?

5.1 Introduction

The Economic and Monetary Union (EMU) in Europe has a common central bank that decides about monetary policy, but each member country's government retaining simultaneously a large degree of fiscal autonomy. Since 1 January 1999, one of the most illustrating example in European Monetary Union integration are their growing interactions between sovereign countries fiscal policy and the European central bank monetary policy. Moreover to ensure European price–stability (article 105 ECT) in EMU the Maastricht Treaty was supplemented with the European Stability and Growth Pact in Amsterdam 1997. The implementation of the Stability and Growth Pact (1466/97 and 1467/97) introduce additionally new conflicts and gets to one of the mainstays in the European fiscal framework. But since the Ecofin–Council fails to send early warnings — so called Blue-letter's — to Germany and France and fails to impose sanctions against sinner states, in November 2003, the 'Stability and Growth Pact' (SGP) is subject of lively academic and public debates. Different suggestions and proposals to modify the current

'Stability and Growth Pact' are in discussion (Bayoumi and Masson, 1996; Buti et al., 2003). But one of the most surprising and interesting question about the Stability and Growth Pact emergences in the last two years. Why have obviously bigger countries more problems with the budget consolidation and thus with the Stability and Growth Pact (Rodrik, 1998)? or why breaching countries are more larger countries as Germany, France and likely in year 2004 also Italy?[1]

In this paper, we examine the fiscal consolidation behavior within the European Monetary Union and find some new results and suggestions regarding the design of the European fiscal framework especially the Stability and Growth Pact. Moreover we try to analyze the trade–offs among the rigidity and demanded flexibility in the current reform discussion about the Stability and Growth Pact. We consider a model where fiscal policy reputation, homogeneity and output variance affects the consolidation speed, and explain so the problem of huge differences in budget consolidation in Europe. Countries with high past fiscal reputation as for instance Germany consolidate their budget slower because of a lower risk–prima on interest rates, higher free–riding incentives in a monetary union and the well–known signaling effect by asymmetric information (Bohn, 1998). Delays in consolidation are particularly inefficient if the longer countries waits the more costly is the policy adjustment. The reason is that longer periods of instability implies higher inefficiencies and sanction fees from the SGP. This paper studies the economic determinants of delays in the consolidation of fiscal policy adjustment programs.

We present a simple model that describes some determinants of delayed consolidation due to a strategic–interaction game in a monetary union. Concerning the determinants of the budget consolidation speed, we find that the value of output volatility and the homogeneity within fiscal programs are the most relevant to explain the distinguish budget consolidation between the larger and smaller countries (cf Alesina and Drazen (1991) and Alesina and Spolaore (1997)). Besides we explain one unsolved 'stylized fact' in empirical macroeconomics (Fatas

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[1]**The section is based on the following published paper: Quarterly Journal of Economic Research 3/2004 and EcoMod04 Conference Proceeding (and online: http://www.ecomod.net/conferences/ecomod2004/ecomod2004_papers.htm).**

and Mihov, 2001; Gali, 1994): Why all the empirical evidence points to the presence of a negative relationship between output variability and the government size?

Moreover it is well known that in models of monetary policy alone, precommitment leads to better outcomes, and avoid the inflation bias (Kydland and Prescott, 1977). Unfortunately that simple relation is not fully true for fiscal-monetary interaction in a monetary union (Dixit and Lambertini, 2003). In the European fiscal framework particularly in the reform discussion about the Stability and Growth Pact is rather the bias to more discretion than commitment (De Grauwe, 2003a). This development has a strong impact to the future consolidation behavior in the European Monetary Union. Therefore it is of highly interest to understand fiscal policy consolidation behavior in a game–theoretic interaction framework.

The model results suggest that, when there is a difference in budget consolidation speed in a monetary union, the limits set by the Stability and Growth Pact, may be useful on the one hand to reduce the free–rider incentives and on the other hand to close the gap between the bigger and smaller countries. Nevertheless the current Stability and Growth Pact does not solve the second objective in the last three years. Moreover von Hagen et al. (2001) conclude in a first empirical assessment about fiscal policy consolidation in the European Monetary Union (EMU): 'The fiscal framework of Stage III of EMU will work more effectively in the small European states than in the larger states.' Thus there are some systematic incentives to play weak off against tough. To understand this phenomenon is an important issue for a future reform of the Stability and Growth Pact. In sum, the evidence indicates that the SGP need a more transparent and a more credible enforcement mechanism.

The remainder of this paper is structured as follows. Section 2 presents a short literature review and discuss several aspects of the current reform literature about the Stability and Growth Pact. Section 3, starts with the construction of the model and proceed with the discussion of the results. Policy conclusions for the current reform discussion about the Stability and Growth Pact are taken up in section 4. The last section 5 provides discussion and concluding remarks.

5.2 Literature Review

Our approach is related to the literature on dynamic games between a monetary and fiscal authority, initiated by Kydland and Prescott (1977) and Barro and Gordon (1983b). The paper covering two analyzes of delayed stabilization. (A) Tabellini (1986) consider a war of attrition that is played between the fiscal and monetary authorities: an unsustainable combination of monetary and fiscal policies in place until one side concedes. (B) Alesina and Drazen (1991) build a war of attrition model, however they shift the focus to a game between interest groups. They show why are stabilizations delayed.

My paper differs from Tabellini (1986,1987) and Alesina and Drazen (1991) in several ways. First, we concentrate on the consolidation of deficits and debts, and therefore abstract from pure politic–economic determinants. Second, we try to analyze a strategic situation in a Monetary Union that fits the situation in the European Monetary Union with the current Stability and Growth Pact, since 1999. Finally, and most important, the model attempt to explain not only the fact why consolidation speed is delayed and different in the European Monetary Union, we show also why consolidation is different between larger and smaller countries in the EMU.

The results illustrates that larger countries consolidate slower than smaller countries because of greater differences in the public sector and output variations. Indeed, the model focus on a few details to explain the current empirical case in the EMU but together with the paper by Alesina and Drazen (1991) it is a reasonable explanation for the current phenomenon of breaching countries and refers to the discussion around the Stability and Growth Pact (von Hagen et. al, 2001).

There is also a huge literature about the economic impacts and reasons for the European Stability and Growth Pact and the new fiscal–monetary interaction relationships. An early attempt to model the SGP is provided by Beetsma and Uhlig (1999). They present in a two–period model of monetary union that governments have incentives to issue more debt than a social planner would choose. They conclude therefore that the incentives to restrain debt accumulation are diminished in a monetary union and, hence, the excessiveness of debt will be

exacerbated. Thus, the spill over effect arise through increasing public debt in a country, which leads to a looser common monetary policy and hence, affect all the union participants. Similarly to Beetsma and Uhlig (1999) is the work by Chari and Kehoe (1998, 2003) who explore the need for debt restrictions in a two–country model of monetary union. They conclude, that restrictions on public debt are needed, because union members do not fully internalize the welfare effects of an increase in nominal debt on the common union–wide inflation rate.[1] Actually Dixit and Lambertini (2001, 2003) and Beetsma and Jensen (2003) model a monetary union with fiscal–monetary interaction. The main results of these models in concern to the Stability and Growth Pact are: (A) Fiscal discretion eliminates the gains of monetary commitment. But monetary discretion does not completely eliminate the gains of fiscal commitment within rules. (B) Shock–contingent budgetary targets (or sanctions) leads too an increasing free–riding behavior and thus eliminates the disciplining character.

All the papers mentioned so far have in common that the union's central bank is not only concerned with low inflation, but also with other objectives. Debrun (2000), in contrast provides a rational for short–run (deficit–based) fiscal constraints, despite of the assumption that the ECB is totally committed to its objective (Beetsma and Bovenberg, 2002). The important point here is that fiscal policies affect aggregated demand and supply and, hence the price level in the monetary union. Through a lack of commitment in monetary and fiscal policy the public deficit biased up: First, governments try to stimulate aggregate demand by expansive fiscal policy and second, they use deficits to move the common inflation rate into the direction they individually prefer.[2] This model prediction is perhaps an empirical rational for the reason why France and Germany with very low 'national' inflation rates and growth rates breach the SGP. Also Herzog (2004a) found that the current SGP works not really to secure price stability. He shows, if more than one country breaches the Pact, a deficit-spiral (debt-spiral)

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[1]Cf. Giovannetti, Marimon and Teles extend the paper of Chari and Kehoe into various directions.

[2]Cf. If the actual inflation target is to be too tight, they boost aggregate demand further, which increase inflation.

to more excessive government spending will be induced. Moreover Herzog (2004) shows that monetary policy in the EMU in combination with the current Stability and Growth Pact is more limited to punish undisciplined fiscal policy. That imply under specific circumstances a higher optimal inflation rate than intended by the ECB. The theoretical analysis in that topic explain on the one hand the need of fiscal restrictions and on the other hand the implementation problems of the current SGP. Despite Beetsma (2001) conclude, that the theoretical literature cannot pass any clear verdict on the SGP: *'Therefore, the pros and cons of the SGP need to be assessed using qualitative arguments.'* We show here a further argument for the necessity of an efficient and strict Stability and Growth Pact in the European Monetary Union.[1]

5.3   Consolidation Model: Big vs. Small

The positive issue of how policymakers choose sustainable debt policy and consolidate the budget remains unexplored in the current literature. We provide on basis to the simple stylized model below a formalization of signaling effects. Thus we build up a reputation game between two governments which differ in their ability to sustainable debt consolidation (spending cuts) and in their size. In that model we examine separating equilibria and pooling equilibria.

The governments objective is to reach a sustainable debt level x^* that stabilize the debt–to–GDP ratio. We use the following loss function similar to Drazen and Masson (1994)[2]

$$L = p\Lambda + \frac{1}{2}(T)^2 \tag{5.1}$$

where p denotes the probability that the sustainable stabilization fails, and Λ is the fixed cost of failure. The costs of failure Λ include possible sanction fees Γ^S from the current Stability and Growth Pact.[3] The government chooses first taxes

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[1] Strengthening the SGP corresponds with the proposal by the EU-Commission.

[2] Cf. Dornbusch, 1991.

[3] Sanctions fees are between 0.2%-0.5% of GDP. I abstract from complex details and assume fixed fees because it does not change the model results.

T to achieve their consolidation target value. The cost of taxation is standard, while the cost of a failed consolidation reflects either the reputational and political costs of missing the announced budget target or the higher inflation and sanction fees within the SGP which may result if the stabilization fails.

The sequence of events is as follows. At the beginning of period 0 the government issue debt and decides about the relative amounts of one- and two–period consolidation. At the end of period 1 the government chooses taxes to meet the announced budget target. However, whether or not the target will be met remain uncertain, since it depends of a shock, Z, which hits the budget after taxes have been set. The success of consolidation depends on the realization of Z. The probability that the consolidation fails is

$$p = prob[Z > T - G - X], \tag{5.2}$$

where G denotes government spending and X the consolidation effort which depends on the revenue and output in each period. The distribution of the shock Z is triangular with mean zero, $E_1 Z = 0$, and a support ranging between -a and a. With this assumption we capture the fact that shocks of larger size are less likely to occur. Equation (2) shows on the RHS the distribution of Z, since we focus on a government which expects to succeed, in the sense of that it chooses a level of taxes T, for which the expected budget is larger than the announced target; i.e. T-G-X>0. The consolidation effort is equal to

$$X = (1 - \psi)Y + (\psi)[E_0[Y] + pE_0[\Gamma^S]] \tag{5.3}$$

where ψ is the share of consolidation in period two, Y is the output and $E_0 Y$ respectively the expected output (similar to budget growth revenue) and p is also the probability to breach the deficit threshold within the Stability and Growth Pact Γ^S (sanction fees). Additionally we assume that output Y depends on fiscal policy stabilization. There are different governments in reference to size and fiscal policy in the monetary union. The government can be two types — tough or weak — depend on the level of spending in period 1. A tough government has a level

of spending, G^L, lower than the level of spending, G^H, of a weak government. Moreover the governments are distinguishing in size. This result in

$$Y = Y\left(\frac{G^i}{s_j}\right) + \mu \qquad i = H, L \qquad j = B, S \tag{5.4}$$

where $Y(\mathbf{G}) \geq 0$, s_j is a scaling parameter reflecting the fact that the different members of the monetary union are of different size; s_B for big countries and s_S for small countries with $s_B \geq s_S$. Moreover μ is an independent shock, distributed on the compact support $[\mu^l; \mu^h]$, with mean $E_0\mu = 0$ and variance $E_0\mu^2 = \sigma^2$ that reflects some uncertainty. There is empirical evidence that smaller countries are more open to trade and a positive relationship between trade openness and government size exist (Alesina and Wacziarg, 1998). We argue in line with Rodrik (1998) that small–open countries are more subject to external shocks, and therefore have positive incentives in a monetary union to consolidate faster.[1] The current Stability and Growth Pact boost that consolidation incentives more in smaller countries because of the high degree of openness and the higher amount of government transfers in these economies (Alesina and Wacziarg, 1998).

Substitution $X + G - T$ into the value of p, and replacing p in equation (1), we obtain the loss that the government expects after observing X, but before knowing the realization of Z:

$$L = \frac{\Lambda}{2a^2}[a + G + X - T]^2 + \frac{1}{2}(T)^2. \tag{5.5}$$

Then, the optimal value of taxes is equal to $T^* = \zeta[a + G + X]$ where $\zeta = \Lambda/(a^2 + \Lambda)$. All technicalities are relegated to Appendix (A.4). Substituting T^* into equation (5), and taking expectations conditional on the information at time 0, yields the value of the expected loss after some transformations as

$$E_0L^* = E_0\left(\frac{\zeta}{2}\right)[a+G+X]^2 = E_0\left(\frac{\zeta}{2}\right)[a+G+((1-\psi)Y+(\psi)[E_0[Y]+pE_0[\Gamma^S]])]^2 \tag{5.6}$$

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[1]Alesina and Wacziarg (1998) find some evidence of a direct relationship between openness and government size of government transfers.

The loss function (6) is minimized choosing $\psi = 1$, or respectively setting $x^* = -a - G$. The last solution imply that sustainable debt policy is $x^* < 0$ and depends from government spending and shocks 'a'. Higher government spending imply also relativ higher sustainable budgetary targets. The explicit solution for $\psi = 1$ imply that the government insulates the budget from budget shocks and thus eliminate all the uncertainty regarding the cost of consolidation. This policy is optimal because it rules out that the stabilization may fail as a result of a negative shock to the budget. Intuitively, a government which expects to succeed will not take the whole consolidation effort in period 1 because there are also budget risks in the meantime. Thus the government decide to consolidate optimally in period 2.

Consider now a class of separating equilibrium where believes have the following form: for consolidation levels shorter than ψ^S, the other governments expect to be tough. If the consolidation take first place in period 2, the government is identified as weak (W) because their consolidation effort X is lower and thus slower than in the case of a tough (T) government. This imply the following two conditions:

The weak government compare

$$E_0 L^W(W, \psi = 1) \leq E_0 L^W(T, \psi \leq \psi^S), \qquad (5.7)$$

that inequality holds for

$$\psi \leq \psi^S = \frac{\sigma^2 + \lambda\alpha - \sqrt{\lambda^2\alpha^2 + \sigma^2\lambda(2\alpha - \lambda)}}{\sigma^2 + \alpha^2}, \qquad (5.8)$$

where $\alpha := a + G^H + Y\left(\frac{G^H}{s_j}\right)$ and $\lambda := Y\left(\frac{G^H}{s_j}\right) - Y\left(\frac{G^L}{s_j}\right)$ and it is the solution of the square equation of the expected loss of the weak government under full information. The intuition for this result is as follows. A short and thus fast consolidation carries no benefit for a weak government, expect for allowing to distinguish itself as tough. Since by mimicking a tough government, consolidation payments are saved merely for two-period consolidation. Such gain disappears if the weak consolidate faster. In contrast the consolidation risk increase in the short–term, because of shocks which can arise after the consolidation imply that

the weak reveals itself by choosing $0 < \psi^S < 1$. It is also worth to mention that the consolidation speed increase with the variance of output shocks σ^2, and decreases with the difference, λ, between the efforts of fiscal policy stabilization.

A separating equilibrium of the tough government thus exists if and only if the though government is willing to slow the consolidation down to ψ^S. This happens if,

$$E_0 L^T(T, \psi^S) \leq E_0 L^T(W, \psi^S < \bar{\psi} \leq 1), \tag{5.9}$$

and the incentive compatibility constraint is satisfied if

$$(1 - \psi^S)^2 \sigma^2 \leq (1 - \bar{\psi})^2 \sigma^2 + \bar{\psi}^2 \lambda^2 + 2\bar{\psi}\lambda\beta, \tag{5.10}$$

where $\beta := a + G^L + Y\left(\frac{G^L}{s_j}\right)$. The necessary condition for equation (10) depends also crucially of σ^2 and λ. If the shock σ^2 is too large then the tough government would prefer not to reveal its type. When such a separating equilibrium does not exist, pooling equilibrium may exist, where both governments choose the same consolidation speed and amount.

In a pooling equilibrium both governments choose the same consolidation, i.e. the forward output rate, is equal to

$$E_0 Y_1^P = E_0[qY_1^T + (1 - q)Y_1^W] = [Y\left(\frac{G^L}{s_j}\right) + (1 - q)\lambda] \tag{5.11}$$

where q, is the probability that the government is tough, depends on the believes of the other governments in the monetary union. Moreover the probability that the government is tough q, depends on the economic and political impact in the EMU. Since the tough government chooses ψ^P, the consolidation speed which minimizes its expected loss, a pooling equilibrium exists if and only if ψ^P satisfied the incentive compatibility constraint of the weak government, $E_0 L^W(Pool, \psi^S) \leq E_0 L^W(W, \psi = 1)$. This requires

$$\psi^P = \frac{\sigma^2 - (1 - q)\lambda\beta}{\sigma^2 + (1 - q)^2\lambda^2} \geq \psi^W := \frac{\sigma^2 + \lambda\alpha q - \sqrt{\lambda^2 q^2 \alpha^2 + \sigma^2 \lambda q(2\alpha - \lambda q)}}{\sigma^2 + \lambda^2 q^2}. \tag{5.12}$$

Condition (12) shows that for a pooling equilibrium to exist the initial reputation, q, must be sufficiently high. Intuitively, a better reputation in fiscal policy imply a lower risk to breach the SGP, lower interest rate risk premium and thus making the tough government willing to choose instead of a high speed consolidation a slower speed to consolidate the budget ψ^P.

Summing up the following results: First, if a pooling equilibrium exists, the corresponding consolidation amount and speed ψ^P is slower than the separating equilibrium speed ψ^S, which induces a weak government to reveal itself, because $\psi^W > \psi^S$. Second the consolidation speed increase with the variance of output shocks in period 1, σ^2, and decrease with the difference, λ, between the fiscal stabilization efforts by the two governments. Thus the reputation game shows that if the variance σ^2 is relative low to λ the differences in fiscal stabilization (automatic stabilizers), a separating equilibrium is more likely. Instead, in a pooling equilibrium, is debt consolidation slower (longer) than in a separating equilibrium. In both constellations is the consolidation speed ψ faster with higher variances σ^2 and smaller λ. Now we summarize the results in the following propositions.

LEMMA 1: $\lambda \geq 0$.

The proof of Lemma 1 follows straight forward form the model assumptions. We now want to find the adequate equilibrium condition in which the European Monetary Union is probably situated.

PROPOSITION 1: *A monetary union with dezentral fiscal policy imply high differences in fiscal stabilization λ and because of the convergence criteria a lower European variance σ^2 than within single states.*[1] *Thus a monetary union with a dezentral fiscal framework imply more likely a separating equilibrium.*

The intuition of this result suggest that consolidation speed is different between the different governments in the monetary union. Moreover heterogeneity

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[1]cf. empirical findings confirm that constellation in the EMU. See De Grauwe (2003), von Hagen, Hallett and Strauch (2001), Fatás and Mihov (2001) and Gali (1994) and also David Fielding (2002).

alone is not sufficient, however, to delay consolidation. There must also be uncertainty about the variance of output. Comparing the findings in the war of attrition model by Alesina and Drazen (1991) they show that stabilization is delayed. However the model here explains the delay and differences in consolidation around members in a monetary union. The following proposition can explain the consolidation behavior of the bigger countries like France, Germany and Italy. Moreover from Proposition 1 and Proposition 2 is clear that the pooling equilibrium in the group of larger countries is more likely because of the higher probability q, that imply slower budget consolidation.

PROPOSITION 2: *If $\lambda > 0$, fiscal consolidation differs; for $\lambda = 0$ no difference occur.*

PROOF OF PROPOSITION 2: The first part follows directly form Lemma 1. That imply a relationship between government spending and their government size:

$$\frac{G^H}{G^L} \geq \frac{s_B}{s_S} > \frac{s_B}{s_B} = \frac{s_S}{s_S} > \frac{s_S}{s_B}.$$

The inequalities proofs the case that a higher discrepancy between government spending and size imply slower consolidation. The second part is immediately clear from equation (10).

Proposition 2 states that countries government expenditure and thus partially debt is more than proportional to their size. Moreover it is obvious that small (weak) governments have an higher burden than the larger countries (de Haan et al., 2003). Fielding (2002) argues that marginal costs are inversely proportional to their size. So smaller countries tend to a have higher marginal costs of debt. Therefore government debt consolidation is proportionally more in smaller countries. This stylized finding is generally true of the West African Monetary Union, with Côte d'Ivoire and Sénégal. The empirical result by Fielding (2002) shows that both states representing the larger country case and Burkina Faso, Niger and Togo the small country case. Several other empirical studies show also that phenomenon in the (Pre-)European Monetary Union (von Hagen et al., 2001; von Hagen and Harden, 1994; Perotti et al., 1998). A more intuitive argument

for that empirical evidence are the following facts: The EU's average debt ratio was 60 per cent in 1992, it climbed to 73 per cent in 1996. Not surprising, this increase was entirely driven by the debt expansion in five 'larger' states: Germany (44% to 61%), France (40% to 56%), Spain (48% to 70%), Italy (109% to 124%) and the UK (42% to 55%). In contrast, the debt ratio of the other more smaller countries were stabilized or fell after 1992.

The empirical evidence in line with the theoretical model and particularly with Proposition 2 confirms the model framework and its relevance for the European Monetary Union, where we observe such behavior in the last 2 years.

PROPOSITION 3: *Important determinants of consolidation speed are fiscal policy rules (homogeneity)* λ *and output variance* σ^2.

This Proposition explains that in the European monetary union exists many different consolidation amounts and speeds. The consolidation effort (speed) depends on output shocks and the differences in governments spending. There are several empirical evidence that countries or regions with large governments display less volatile economies, as shown in Gali (1994) and Fatas and Mihov (2001). This empirical 'stylized fact' imply in our model a slower consolidation speed for larger countries. Exactly what we can observer the last three years in EMU (von Hagen et al., 2004): 'Since output volatility is generally higher in small and fast growing economies, this empirical finding can also be read as an indication that small countries are more able to engage in fiscal consolidation, or that governments there are more willing to do so (see Figure 1).'

Moreover the stylized fact why government size can have an effect on the volatility of output fluctuations was up to now unexplored in economic theory. Due to the fact in the standard RBC model is no clear connection between both variables (Alesina and Wacziarg, 1998). This unexplored phenomenon can partially explained in our model. Larger countries hope to have higher economic and political influence, which affect countries reputation in negotiations. That relationship imply a slower consolidation and thus in connection with proposition 3 a decline in output volatility. The correlation between size of government and volatility has also been refined by several other recent studies in the European context. For example, Martinez-Mongay (2002) and Martinez-Mongay and
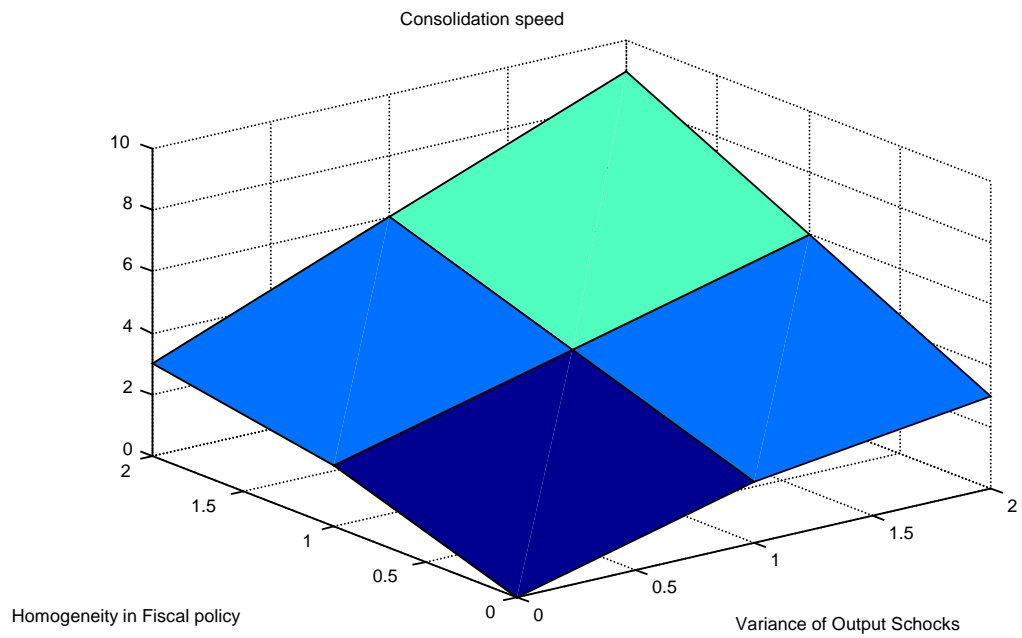
Figure 5.1: Large vs. Small countries consolidation speed

Sekkat (2003) have looked at which measure of government size captures this correlation better (e.g. personal versus indirect taxes). The empirical evidence and the economic theory here imply a higher consolidation speed in the smaller countries as illustrated in 5.1.

The same is approximative true for the other dimension homogeneity in fiscal policy rules (Fatas et al., 2003; von Hagen and Harden, 1994).

PROPOSITION 4: *The consolidation speed differs between countries in fiscal policy homogeneity* λ *as follows:*

(a) *Weak/Tough government is big imply* $\lambda^{W,B}$ */* $\lambda^{T,B}$

(b) *Weak/Tough government is small imply* $\lambda^{W,S}$ */* $\lambda^{T,S}$

(c) *Weak or Tough government are both small or big imply* λ*.*

Thus it is: $\lambda^{W,S} > \lambda > \lambda^{W,B}$ *and/or* $\lambda^{T,B} > \lambda > \lambda^{T,S}$*.*

The proof of Proposition 4 follows directly from Lemma 1 in connection with Proposition 2. The intuition is: If the weak government is also small $(\lambda^{W,S})$ then fiscal policy is totally different (heterogenous). That constellation imply a slow consolidation for the tough and large government because of free–riding of the weak. In the other case, if the weak government is big $(\lambda^{W,B})$, fiscal policy is more homogenous. Thus imply that the tough and small government speed–up their consolidation because of real benefits through spill–over from the weak and big country (Heise, 2001). Summing up, the parameter fiscal policy homogeneity imply faster consolidation for a tough and small government and for the unlikely situation of a weak and big government (i.e. more open).[1] It is well–known that for smaller countries gains from free–riding and spill–over effects are more important than the own expansive fiscal policy. This imply costs in favor of the larger countries. The intrinsic motivation of smaller countries imply thus a faster consolidation in the EMU particularly because of the current decision weights in the current Stability and Growth Pact. This finding is also consistent with

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[1]cf. A tough and small is for example Luxemburg and Austria and weak and big is Belgium, Finland, Ireland.

the theoretical argument by Buti and van den Noord (2004): 'Most importantly, the political ownership of the fiscal rules seems to be shifting towards smaller countries with sound public finances which, although numerous, have a relatively small weight in the euro area. It is fair to recognize that this shift has weakened the enforceability of the rules, especially vis à vis larger countries.' Moreover von Hagen et al. (2001) shows that most of the smaller countries follows a contract approach, that worked more effectively in fiscal consolidations. Countries as Germany that was indicated as tough in the preliminary phase of the EMU, consolidate slower if the different amounts in fiscal stabilization is more varying in the other European countries (free–riding) and affect thus through spill–over the national decision. This fact is still empirically right in Europe (von Hagen et al. 2003). Another past event that confirms what we found was the violation of the Ireland government against the BEPG's in February 2001 (Hallerberg, 2001).

The puzzling question why some of the EMU member countries do not consolidate immediately, once it becomes apparent that current policies are unsustainable could partial explained with the model above. Large deficits implying an explosive path of government debt and it is apparent that such deficits will have to be eliminated sooner or later because of the SGP excessive deficit procedure. The spirit of our analysis is similar to recent attempts to explain other stylized facts of fiscal policy. Starting from that results we discuss in the following section now some policy conclusions for the reform discussion about the Stability and Growth Pact.

5.4 Policy Conclusions

Delayed consolidation in the EMU under the Stability and Growth Pact can be explained in a model of strategic–interaction between 'weak' and 'tough' member states in the European Monetary Union. Now we conclude the paper by discussing some generalizations and by touching on some issues that the model did not address but which are important in explaining consolidation speed.

First of all, my argument is much more general as initially considered. Thus the results are very similar to the model of Alesina and Drazen (1991) but the re-

sults show that within a Monetary Union the determinants for consolidation and stabilization are more complex and general than in a pure national framework. Moreover the model shows that credibility the missing parameter by Alesina and Drazen (1991) plays a very important role in the case of fiscal policy stabilization in a Monetary Union. Second, the model fits the empirical observations in the AFC Monetary Union and in the European Monetary Union and is consistent with several other theoretical findings in that literature. A third generalization in that model is the explicit modelling of: sanction fees within the Stability and Growth Pact, the different size and behavior of governments and the interaction of fiscal policy consolidation in a monetary union. Finally, we note some issues that we did not discuss in the current paper. The major missing part is a closer endogenously politic-economic description of the model. For instant important political events such as elections, veto power and decision about distribution policy. Moreover we do not focus on the fact that smaller countries typically pay more attention to international and European organizations than larger countries do, and the do more so, the more the receive transfers from these organizations (Katzenstein, 1991). These determinants are not modelled explicit but all playing a very important part for a better understanding: why bigger countries consolidate slower?

Our model suggest that successful consolidation within the restriction of the Stability and Growth Pact needs a efficient and credible enforcement mechanism. A main message is that necessary harmonization or co–ordination in fiscal policy as well as some discretionary policy is needed to close the gap between the larger and smaller countries to consolidate public finance.

Chapter 6

Revising the European Fiscal Framework

> *(...) "Of course, the stability pact restricts the room for manoeuvre enjoyed by national fiscal policymakers. But this is the price that must be paid for a common currency. Historically, stability between currencies has been possible only when countries have been prepared to relinquish some national sovereignty."*

> Horst Siebert, Financial Times, 6 August 2002

In this chapter we analyze the reform discussion about the European fiscal framework, especially the Stability and Growth Pact (Buiter, 2003). The stability pact is widely regarded as major innovation. Artis (2002) says: '...the pact must rank as one of the remarkable pieces of policy coordination in world history. Its construction makes it in some respects comparable to the founding of the Bretton Woods system.' But in the same time the pact has been on the subject of a heated controversy and extensively criticized by academic and opinion makers. This debate has accelerated in 2002 under the influence of public finance developments in a number of euro countries and break-out fully after the ECOFIN meeting in

November, 2003. A number of countries which are in conflict with the 3% deficit threshold called its effectiveness and wisdom into question. While proposals to revamp the SGP appear by hundreds each day, no systematic analysis has been carried out so far of the 'quality', 'ingredients' and 'impacts' of the existing EU fiscal rules.[1] We review the criteria which have been identified in the literature as important in the success of fiscal rules and assess their relevance in the EMU. The theory developed in this chapter has an interesting application to the current reform discussion and alternative proposals which are examined in a subspace of the next chapter.

6.1 Designing fiscal rules?

Before assessing the recent proposals to address the alleged shortcomings of the SGP, it is necessary to put the controversy on the SGP in the context of a wider debate on fiscal rules (Kopits and Symansky, 1998). In the recent years, the role of fiscal institutions and procedures in shaping budgetary outcomes has been increasingly recognized. In this context, institutional reforms in the fiscal domain have been discussed and introduced in several countries. These reforms come in two main categories: (A) procedural rules conducive to responsible fiscal behavior and (B) numerical rules, such as permanent constraints on the budget balance, borrowing debt of central and/or local government. The national experience is a mixed blessing in containing political biases in fiscal policy–making and in achieving sustaining budgetary discipline (von Hagen and Harden, 1994). In the early 1990 the EMU decides in a clear consensus about the introduction of common numerical rules and a multilateral surveillance mechanism (Stark, 2001). Compared to institutional or procedural reforms, numerical rules are simpler to evaluate, easier to grasp by public opinion and policy–makers, and faster to implement. Institutional reforms would have represented a feasible alternative only if more decisive steps towards political unification has been taken.

EMU fiscal rules reflect the interaction between the multinational nature of EMU and the lack of a political authority of federal rank (Balassone and Franco,

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[1]The only exception is the Paper by Buti et al. 2003.

2001). The highly decentralized setting of fiscal policy in EMU gave prominence to moral hazard issues (Buti et al., 2003). Summing up, the approach taken by the EU is stricter than the solutions adapted in some federal economies. This strictness reflect the heterogeneity of the EMU and the need for building up an sustainable and stability–oriented fiscal policy framework.

6.1.1 What is an optimal fiscal rule?

The concept of restricting fiscal policy behavior through rules is not new. Many US states impose restrictions on government deficits and debts, and there is a growing number of countries where different forms of numerical constraints are discussed or implemented (von Hagen et al., 2003). What are the principle under which such rules should be designed? At this stage we want to be broad in our analysis, rather than focusing narrowly on the problems that the SGP has generated. We limit ourselves for now, however, to the analysis of numerical rules constraining the discretion of policy–makers.

When thinking about the principles upon which optimal rules might be based, it is useful to separate two dimensions: efficiency and enforceability. Efficient rules are those that meet the given objectives while minimizing any costs or side–effects that they might impose on the economy. Enforceable rules are those that can be effectively imposed on the relevant policy–makers. Rules are about constraining discretion. Constraining discretion can be justified on several grounds, but it comes at the cost of reducing the flexibility of fiscal policy and its ability to react to economic shocks.[1] To make sure that a rule can achieve its goals at minimum cost, we want it to follow certain principles.

1. Consistency with its sated goal
While this may seem obvious, it requires a clear understanding of the reasons why fiscal policy should be constrained. In Chapter 1, we have pointed to several motivations why this might be the case. Is it to ensure sustainability of public finance, or is the goal to seek restricting politically motivated changes in fiscal

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[1]Cf. chapter 1.

policy? If so, a limit to the debt burden as a ratio to GDP would be appropriate. Or is the goal to restrict politically motivated changes in fiscal policy? In that case, limits to the size of the deficit might be required. Or is it a matter of ensuring an optimal combination of fiscal and monetary policies both within the national economies and across Europe? In that case, limits to the size of the deficit and spending might be used to prevent spill-overs and interference with monetary policy. Optimal policy rules must therefore differ according to the ultimate goal. What is clear is that the rule must set limits that become binding on those sense to be sub–optimal. Thus, we need a clear definition of what constitutes a sub-optimal use of discretion and the rule must be adequate to address that specific problem.

2. Credibility

Regardless of the exact type of inferior discretion a rule aims at, it must be credible and well understood by economic agents to be effective. Credibility requires consistency with the general goals of fiscal policy, i.e. it must be clear that violating the rule can never be in the best interest of fiscal policy-makers. Credibility also requires transparency in the formulation and implementation of the policy rule. Deviations from the rule must be observable and verifiable.

3. Adaptability to changing circumstances

In order to limit the costs of constraining discretion, a rule should never leave as much flexibility as possible for fiscal policy to adapt to changing economic circumstances. In the context of rules for deficits and debts, this concerns in particular the ability of budgetary policies to play their desired role of macroeconomic stabilization. While there is no disagreement on this principle, the natural trade-off that exists between constraints and flexibility leads to a debate on how to balance both principles.

4. Clarity and transparency

Within the set of rules that achieve the desired objectives, a simple rule is always preferable to a more complex one. Indeed, this requirement is probably implicit in some of the previous ones, as rules need to be well defined and simple to be understood, to be implemented correctly and to be credible.

Now one must also think about the process and the principles on which implementation and enforcement of fiscal rules will be based of. The rule itself, its process for implementation, the penalties in case of violations, have to be defined and made sufficient precise, so that the enforcement process is done effectively and at the minimum of possible cost.

Monitoring compliance with the rule should be ex post. That is, it cannot only be about presenting budget plans that are in accordance to a rule but it must include an assessment of how well these proposals were delivered. Budget plans are subject to many assumptions about future economic conditions, some of which are uncertain and will turn out to be wrong. Unless the review process is ex post, enforcement will be weak, as governments will find arguments based on changing economic conditions to justify deviations from the plan.

Moreover, monitoring compliance should be the task of an independent and impartial body which is transparent, can imposed sufficiently severe penalties on policy–makers defecting from the rule and cannot be overruled by any other institution. There should be no expectation that different standards might be set for different people, or that warnings and sanctions could be blocked after having been issued. Finally, and related to the previous point, a rule should not be easily amendable. That is to say, the spirit of the rule and compliance cannot simply be achieved by frequent changes to the principles and mechanisms underlying them.

The wish to improve efficiency and enforceability can be found behind most of the recent reform proposals for the SGP. However, it is important, to note that many of the principles listed as requirements for optimal rules are interlinked and cannot easily be separated. For example, transparency cannot be achieved unless the enforcement process is credible and consistent. The same is true for simplicity. A rule based on a numerical limit for budget deficits satisfies the requirement of simplicity; but if there is added flexibility in its interpretation when it comes to enforcement, its simplicity is meaningless. Thus, one cannot separate the enforcement process from the rule itself.

Finally, although there is not much disagreement about most of the principles above, there are significant trade-offs between them, which are often neglected in the current debate. These trade-offs require compromises along some dimensions. Current reform proposals differ in the emphasis given to the different criteria and

their willingness to sacrifice some of the criteria in order to obtain better outcomes in others. An example is the tension between simplicity and adaptability to changing economic circumstances. Those who advocate a more flexible rule for the current framework implicitly argue for rules that are less simple and more difficult to define or implement. We come back to these points later in the chapter.

6.1.2 Kopits–Symanski's criteria

Are the fiscal rules of EMU "good" and "efficient" rules? Kopits and Symansky (1998) identify a number of desirable features which the quality of fiscal rules should be assessed (Kopits, 2001). According to these criteria, an ideal fiscal rule should be well–defined, transparent, simple, flexible, adequate relative to the final goal, enforceable, consistent and underpinned by public finance reforms.

The following Table 6.1 illustrates the Kopits–Symansky criteria but extend with our new criteria, we have found in our theoretical analysis in chapter 4 and 5. In column two we provide a checklist for the current "quality" of EU fiscal rules.

Table 6.1: Quality of Fiscal Rules

No.	Ideal fiscal rule	EU fiscal rule
1	Well-defined	++
2	Transparent	++
3	Simple	+++
4	Flexible	++
5	Adequate final goal	++
6	Enforcement	+
7	Consistent	++
8	Underpinned by structural reforms	+

Legende: +++ very good, ++ good, + fair
Source: Modified from Buti and Giudice (2002)

It is immediately clear from that objectives there are several conflicts and

trade-off's between all of them.

A *well–defined* fiscal rule, in terms of the indicator to be constrained, institutional coverage and escape clauses, is paramount for effective enforcement. The Treaty criteria is well–defined as to the policy variables subject to constraints. The SGP specifies the escape clauses and the penalties to be applied in case of persistent excessive deficits. However, elements of ambiguity remain. First, it is not specified how close to the ceiling the deficit should remain without being deemed excessive. Second, the SGP medium term target of "close to balance or in surplus" remains vague. This proofs the significant ignorance in all the member states. Finally, the SGP is silent on how to apply the 'Excessive Deficit Procedure' in the case of violation of the public debt criteria of the Treaty which requires the debt ratio to be on a declining trend as long as it is above the 60% of GDP reference value.

Transparency has several dimensions as shown in chapter 1. It includes accounting conventions, forecasting exercises and reporting practices. The Treaty and the Stability and Growth Pact (SGP) use ESA–95 accounting. The EU–Commissions forecasts are the reference point for assessing the risk of an excessive deficit or for detecting a "significant divergence" from the set of budgetary targets. However, the respective roles of Commission and national forecasts in the assessment of Stability and Convergence Programmes remain undefined. Budgetary reporting take place in March and September of each year. Data, however, are frequently revised at subsequent dates and moral hazard problems may occur especially when countries are close to the deficit ceiling.

The EU fiscal rules are *simple.* The Maastricht criteria, particularly the 3% deficit and 60% debt thresholds, enjoy high transparency. Unfortunately, some simplicity has been lost by the more complex mechanisms and procedures in the SGP. However, compared to other fiscal rules — for example in federal states as Germany — those underpinning the EMU remain simple.

As to *flexibility*, different elements play differently. On the one hand, the SGP includes a tight specification of the escape clause, thereby reducing the discretion of the Council and flexibility of the rules. On the other hand, by putting more emphasis on medium–term targets and highlighting of cyclical fluctuations, it

increases flexibility compared with a simple deficit ceiling expressed in actual terms.

Adequacy of the rules has to be assessed in relation to their final goal. The main goal of fiscal rules is ensuring sustainable public finance. The deficit limit guarantees fiscal discipline on a yearly basis, but there is no consideration of long term sustainability, i.e. of the future deficit path inherent in current policies which may imply large contingent liabilities. Moreover, the current rules may not be adequate for peripheral countries which have large public investment needs (Buti et al., 2003). This may a further concern in the context of EU's enlargement. Finally, from the short–run view, the current rules do not address the pro–cyclical bias in good times.

The implementation of the SGP with sanctions and timetables in Amsterdam are set of rules to improve *enforceability*. Unfortunately the empirical cases disprove that intended advantage. However, doubts can be expressed on the plausibility of the imposition of sanctions on sovereign countries. This is heightened by the fact that the Council is in charge of the final decision on the implementation of sanctions and hence a risk of a partisan applications of the rules exists. It remains to be seen whether peer pressure involves reputational costs is sufficient to discipline national authorities. De Grauwe (2003) proposes a reform of the SGP, which is only based on peer–pressure as a disciplining device.

A good fiscal rule has to be internally *consistent* with other policies. The SGP implies that countries attain broadly balanced budgets in cyclically–adjusted terms and then let automatic stabilizers play freely. From a procedural standpoint, the overall framework of the Pact is set to ensure consistency of policies by moving towards a better integration of fiscal surveillance and economic policy coordination under the Broad Economic Policy Guidelines (article 99). However, a strong stress on annual targets may create a tension between fiscal policies and structural policies. For instance, the existing rules may deter reforms and structural investment needs for not violating temporary against the deficit target.

From the analysis above we have seen that the structure of a good coordination mechanism depends strongly from the environment. Additionally in fiscal policy there are also some normative claims: (1) the financial sustainability of the state, (2) the efficient financing of public spending and (3) macroeconomic stability,

that is, the elimination of unnecessary and undesirable fluctuations in economic activities (Buiter, 2003). Now it is a formidable task to design a rule, or a set of rules, that makes sense for the whole Euro area.

In the list below we summarize criteria for good coordination rules between a 'supranational–national' gravity field:

- Good rules are simple and easily verifiable.

- Good rules should ensure the solvency of the government.

- Good rules should not encourage pro-cyclical behavior.

- Good rules makes sense also in the long-run.

- Good rules allow distinguishing in economic structures.

- Good rules make sense at the national level and for the EMU as a whole.

- Good rules are credible.

- Good rules are enforced impartially and consistently.

- Good rules include efficient incentives to the targets.

- Good rules discipline the actors by positive incentives (sanctions).

The ingredients seen in the list above are a multi–dimensional target set with perhaps partially conflicting directions (Buti and Giudice, 2002). So we can call this as a 'Magic Polyeder'. The rational for some requirements are obvious. Complex rules are likely to add noise and uncertainty to the system. Based on the aim for more 'financial sustainability' we need rules which ensure the solvency, make sense in the long–run and not encourage to pro–cyclical behavior. It's also well–known that numerical constraints as in the SGP imply 'one size fits all'. Moreover the four last points are more technical assumptions for a good rule. These final facts are more and more important in the actual reform discussion because the enforcement mechanism fails in each observable situation. The greater the danger of an external influence is, or the decision–actor to the national or supranational level belongs, the higher the probability that the rules lose: credibility, efficiency

and its disciplining character. All mentioned ingredients above are necessary for an efficient and good fiscal framework. But the finial rule (combination of the ingredients) is only sufficient if it possesses credible sanction threats. The current crisis in the Stability and Growth Pact emerged crucially because of the high inaccuracies in the institutional credibility of the sanction mechanism. Having this in mind the following proposal focuses mainly on the last four points and contrasts them with the theoretical findings above. The next subsection characterizes the modification proposal more circumstantial.

All in all, Buti et al. (2003) conclude: "...the EU fiscal rule appear to fare relatively well against Kopits–Symansky criteria. Their strongest point is simplicity while their weakest aspects concern enforceability." But the Kopits–Symansky criteria were devised for assessing the quality of domestic fiscal rules. The multinational character of EMU rules clearly affect their design and implementation in at least three missing respects:

First, national sovereignty and subsidiarity concerns had to be respected. This imply that the rules had to be as neutral as possible vis–à–vis the countries social preferences which are heterogenous in the EU.

Second, there are many trade–off's between the various criteria, namely between simplicity and flexibility, between simplicity and adequacy, and between flexibility and enforceability. These trade–off's are influenced by the multinational nature of the rules. On the one hand, there may be a preference for simplicity and transparency over flexibility to allow peer pressure, central monitoring and prevent moral hazard. On the other hand, a multiplicity of countries increases heterogeneity and dispersion of preferences with the consequence that one–size–fits–all fiscal rule is likely to be sub–optimal.

Third, the growing fiscal–monetary interaction in a MU (Dixit and Lambertini, 2003) imply a close connection. Therefore a mechanism that discipline one side without rewards for that efforts is not efficient. Moreover a sanction threat is in that interaction framework nonsense because it helps rather the price–stability nor the national state and it does not solve the main problem. Instead the impact is contrary because it aggravate the situation of states with financial problems.

Moreover Pollack (1997) identifies three necessary ingredients affecting the likelihood that sanctions will imposed. In closing the gap between the economic

and political science literature we review now these points:

First, Pollack (1997) mentions that the extent that principals preferences have to converge for a secure imposition of sanctions. Second, there must be clear decision rules governing the application of sanctions. Last but no least the 'default condition' where there is no agreement among the principals have to be known. What we can learn from that literature is that clear and transparent institutions as explained above in the economic analysis for fiscal policy are robust and of primary need. Furthermore, it is necessary that all policy–makers in the ECOFIN council have to be clear about national and supranational preferences and the default condition.

6.1.3 Compliance: Inman's criteria

Once a rule has been established, the right commitment technology has to be devised in order to ensure compliance. Based on his analysis of US states, Inman (1996) indicates four main criteria for compliance: timing for review, overriding, enforcement and amendment. Table 6.2 gives the characteristics of weak and strong fiscal rules according to Inman's criteria (see also Amtenbrink et al. (1997)). In column four we assess the performance of EU rules especially the Stability and Growth Pact.

Table 6.2: Specification of Fiscal Rules

Specification	*Weak* Fiscal Rules	*Strong* Fiscal Rules	EU Rules
Rule Timing for review	Ex ante	Ex post	Ex post
Override Majority rule	Allowed	Not allowed	Not allowed
Enforcement			
Enforcer	Partisan	Independent	Partisan
Access	Closed	Open	Closed
Penalties	Small	Large	Large(?)
Amendment	Easy	Difficult	Difficult

Source: Inman (1996) and Buti et al. (2003)

An efficient fiscal rule must be *ex post* and not ex ante. Ex ante rules apply only to the beginning of the fiscal year and ex post rules require fiscal balance at the end of the year. Second, a fiscal rule is strong when it cannot be *overridden or temporarily suspended* by a simple majority vote. Third, rules have to be *enforced* by an open and political independent, not partisan agency and/or a court. Independence solve the problem of vote–trading, time–inconsistence, myopic behavior and enforce credibility in the rule. Finally, when the fiscal rules are violated, there must be significant sanctions. The penalties must be enforceable and sufficiently large. The main problem of the SGP is: tough and high sanction threats, however zero probability of implementation because of several political interference by ECOFIN council.[1] Moreover when *amendment* of rules is too costly, sticking to the current rules is more attractive than changing to a better one.

Again, the multinational character of EU fiscal rule affects Inman's basic features fundamental. In a supra–national context, is a higher risk of moral hazard and a higher difficulty in monitoring ex ante policy announcements. Hence in a multi–country set of rules, one has to stress the reputation effects of the 'early warning' and excessive deficit positions.[2] Overall, the EU fiscal rule perform on the paper quite well but in reality it under–perform in each situation.

6.1.4 Is the SGP an optimal fiscal rule?

In order to illustrate the optimality principles we have just described, we now ask weather the SGP fits them, and, if not, in which dimensions the SGP could be improved (Fatàs et al., 2003). Among the 'Kopits-Symansky' principles described in the previous subsection, it is clear that the SGP emphasizes the notion of simplicity. The target for deficits and debt are made to leave as little room for interpretation as possible. Moreover, the SGP imposes uniform limits on all member states, regardless of any differences in their long–term growth prospects

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[1]Similar to treats against tax evasions.

[2]Reputation effects are: early-warnings (blue letters) and/or compliance with the BEPG.

or the actual level of debt. Regarding enforcement, there is a contradiction between a seemingly straightforward comparison of actual levels of deficit and debt with the ceilings defined in the Maastricht Treaty, and the more complex process subject to political influence that has emerged in practice.

1. The goals of the SGP are not transparent

As discussed in subsection 6.1, the current goals of the SGP is to safeguard the sustainability of public finance in EMU. The SGP imposes its rules to prevent the ratio of public debt to GDP from rising to unsustainable levels. In the meantime, however, the goal has become less clear. The interpretation and implementation of the fiscal policy framework have been moving away from the simple objective of sustainability towards a more ambitious goal of ensuring that all countries follow sensible fiscal policies.

The resulting lack of clear and unambiguous definition of the ultimate goal of the current fiscal policy framework has led to diverging opinions as to whether the SGP is adequate for what it is trying to achieve (see subsection 4.2). For those who see the ultimate goal as sustainability, the current framework seems too intrusive and aggressive. For those who see the more ambitious goal of enforcing optimal fiscal policies, the rules fall short of preventing policies with negative consequences for the economic performance of EMU. For example, the limits on deficits cannot remove pro–cyclical fiscal policy in good times unless one can argue that such policies are going to lead to unsustainable deficits in the future. Moreover, they will prove pro–cyclical in bad times.

Finally, and for those who seek multiple goals, the recent events have proven that it is very unlikely that one rule can achieve more than one objective. Attempts to make the rule achievable to several objectives can only lead to a lack of transparency and dilution of the original principles behind the restrictions.

2. Strict limits on deficits and debts are not flexible enough

The notion of simplicity goes against the idea of adaptability to different circumstances. Simple rules cannot take into consideration the differences in the business–cycle position, changes in growth potential, or the need for reform processes that might stretch over several years.

3. Uniform rules are inadequate relative to final goal

The 3% deficit limit and the 60% limit were initial chosen to be consistent with a stable debt ratio and a trend annual growth rate of nominal GDP of 5%. With 5% growth, the increase in debt implied by a 3% deficit exactly offsets the reduction in a debt ratio of 60%. It is now clear, however, that the EMU countries did not and will not grow uniformly at a rate of 5% annually. Some countries achieved growth rates significantly above the rate; others, Germany, France and Italy in particular, achieved less than that. If nominal trend growth is 2.5%, which is likely to be the case in Germany today, deficit must be only 1.5% of GDP to stabilize a debt ratio of 60%. Thus, slow–growing countries like Germany, France and Italy can experience rising debt ratios even if they stay below the 3% limit for the deficit. The current framework does not safeguard sustainability for these countries. At the same time, the 3% limit is excessively tight for countries with high growth trends, an issue which will be particularly contentious once the current accession countries are full member of EMU.

4. There are serious problems with enforcement of the rules

These problems start with the fact that enforcement is left to ECOFIN, which is not an independent or disintegrated body (von Hagen et al., 2003). Also, in the run–up to EMU, there were very clear penalties that were received as being large and avoidable by most members. But the system of penalties that is to be applied now still has to be tested. Given that the process by which countries are judged to be in breach of the Treaty's provisions is not completely transparent, and because different countries are perceived to have been treated differently, the SGP has suffered from a serious lack of credibility. These shortcomings have led to a large number of reform proposals that aim to improving the SGP. Of special interest is the view of the European Commission, because it highlights the difficulty of resolving the contradiction inherent in the current framework.

6.2 Political Economy of the Pact

"In fact the motivation of the SGP was largely political"

Alesina and Perotti (2004)

The scientific analysis about the European Monetary Union has been dominated by (political) economists (Alesina et al., 2002). Political science is only beginning to take up the issue.[1] A political interpretation of the pact is that it was proposed by former German finance minister Waigel in 1995 not primarily as a response to the recognized need for enhanced fiscal discipline but, more profanely, in order to counter the growing fears of the German public about EMU and to pre–empt moves of the opposition, poised to capitalize electorally on these worries. The major political–economy argument in favor of the Stability Pact is that it servers to guarantee the credibility of the political independence of the ECB, whose price stability orientation (article 105 ECT) is called into question by the inflationary effects of fiscal policy — proof in the models and the FTPL — if not openly jeopardized by bail–out demands. Nevertheless, the Pact can be seen as a useful commitment technology of policymakers to their domestic constituencies and a welcome source of external discipline of national economy (Allsopp and Vines, 2002).

6.2.1 Non-Compliance

The problems of non–compliance within the Stability Pact are not surprising, given alone the pact's incompatibilities with some of the national fiscal–policy arrangements across the Eurozone. It is possible to show that national fiscal systems follow either a delegation approach or a contract approach. The delegation approach is based on a hierarchical relationship that internalize the inherent externalities in the monetary union. In contrast, the contract approach emphasizes horizontal connections. The SGP is based on a contract approach. There

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[1]Cf the recent special issue of International Organisation 56, 4, 2002.

are recent empirical evidence that the effectiveness of the Stability and Growth Pact depends strongly on the national implementation of the fiscal rules. Countries close to the deficit limit, as Germany, France and Italy follows a delegation approach. That approach is more easy to implement in larger countries but is also more unstable (von Hagen, 2002). However, Portugal with a 'contract approach' and small size, seems to be more willing to comply based on its rhetoric cooperation with the EU–Commission. This is illustrated by the successful consolidation of budget deficits in Portugal, in spring 2004. The consequences of non–compliance would be a general undermining of the Stability Pact due to the lost credibility, possibly triggering the whole range of problems associated with fiscal looseness that the pact was designed to prevent.

From a political economy point of view is the Stability and Growth Pact surely not the optimal solution. However, the Pact is still better than nothing. Those states who currently undermine the Pact will have to show that they prefer a superior alternative to the vacuum would leave. Therefore we have to search a new disciplining scheme that is perhaps a kind of 'incentive' improvement.

6.2.2 Modes of economic governance in the EMU–Fiscal Framework

The new trade–off's and the new interaction interdependencies within the monetary union raise a huge debate about the correct 'Modes of economic governance'. We try to establish a new model approach, which explains the appearance of e–governance. The model shows under which conditions e–governance is successful and what are the necessary and sufficient ingredients. This is shown for the area of fiscal–monetary interaction especially the Stability and Growth Pact. More information exchange, monitoring and mutual control advance on the one hand the application of 'New information and Communication Technology' and on the other hand the emergence of e–regulation and for this reason e-governance.[1]

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[1]**The section is based on the following published paper: ECEG-2004 Conference-Proceeding on E-Governance; http://www.academic-conferences.org/eceg2005/2-**

Introduction

The most illustrating example in history of European Integration is certainly the supranational Monetary Union, since 1999. The economic and political costs and benefits of European Economic and Monetary Union (EMU) haven been subjects of lively public debate. A wonderful by–product for the economic profession has been the emergence of a new research topic (Dixit, 2002). The EMU is involved in many interactions for instance between the common monetary policy, the domestic fiscal policies and some other related national policy fields. These new interaction conflicts raises a huge debate about the correct 'Modes of economic governance' especially because of the current problems with the 'Stability and Growth Pact' (SGP). In the following paper we will analyze this topic in the background of a further discussion about the transformation from e–Government to e–Governance (Finger and Pcoud, 2003).

There are three different governance solutions in the literature of governance architecture (Aoki, 2001). Starting from this background we search an answer to the following questions: "Why does the hard co–ordination policy emerge in fiscal policy and not in economic policy?" And "What are the consequences for an evolvement to more e–Governance onto a supranational level in Europe?" The novelty in this approach is to show that the current structure of economic governance in Europe advances the new methods of e–governance and that again enforce crucially the structure of the national (e–)Government.

The remainder of the paper is organized as follows. In the next subsection, we present the existing different 'Modes of Economic Governance'. In the section 'Model Framework', we evaluate the prevalent forms of governance in the European Framework and analyze these in a simple model. We show what are the consequences for an evolvement of e–governance. Thereafter, we discuss in more detail the interaction between fiscal and monetary policy. We focus on an opportunity cost and benefit analysis to show, that e-governance is the dominant 'mode of governance' in fiscal–monetary interaction in Europe. Finally, we conclude the paper.

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proceedings-eceg2004.htm.

Modes of Economic Governance in Europe

The question of how to advance both effective and legitimate modes of decision-making and political action in and through the enlarged European Union is not merely an academic one, but also discussed in mass media and in the national parliament. The increasing salience of these issues stems from the adoption of Economic and Monetary Union (EMU), which has opened up new interactions and therefore opportunities for the co–ordinated pursuit of European citizens. At Lisbon (2001) the European Council extended the scope of economic governance within the European Union, first by setting a new target set for the EU's economic development, i.e. 'to become the most competitive and dynamic knowledge–based economy in the world, capable of sustainable growth with more and better jobs and greater social cohesion' (EU-Council, 2000). Secondly, the European Council implicitly incorporates other policy fields into the economic strategy, like social policy, education policy and a new mode of governance, that is the 'Open Method of Coordination' (cf. Colligon, 2003). The new modes of governance (cf. H. Wallace, 2000 and Kohler-Koch, 1999) in policy fields of macro-economic policy–making differs considerably from the 'traditional' models of EU governance, particularly from the regulatory model (Majone, 1996 and 2004) and the 'Community method' based on European Commission, European Council, European Parliament and the European Court of Justice (Wallace, 2000). New theoretical findings in the light of the theory of democratic experimentalism (Eberlein and Kerwer, 2004) are recently coming up. They show that new modes of governance lead to more effective rules and more opportunities for political participation. Additionally they present us how a voluntary mode of governance can coexist with compulsory regulation. In that light we discuss now in more detail the 'Future of Economic e–Governance' (Lamy, 2004).

Supranational Policy–Making

In monetary policy treaty provisions, the 'European System of Central Banks' (ESCB) as well as the 'European Central Bank' (ECB) are complete independent from high national and partisan influence. This kind of policy-making can

be labelled as supranational. The primary aim of the ECB is to maintain 'price stability' (art. 105 ECT). Instruments, at least those concerning interest rate and intervention operations, will be applied in the ESCB–Governing council after majority voting, but without a formal decision–making role (Eijffinger and de Haan, 2000). Contrary to the monetary policy targets, fiscal policy will be able to negatively influence the price stability through excessive debt and deficit accumulation (free–riding). That reflect the reason why we need an additionally coordination mechanism like the SGP in a monetary union.

Policies of Co–ordination

There are three different types of coordination policies — hard, soft, and open — modes of governance (Issing, 2002; Linsenmann and Wessels, 2002). These three modes of governance have their foundation in the associated policy fields: a) Fiscal policy co–ordination (article 104 ECT), b) Economic policy co-ordination (article 99 ECT), and c) Employment policy co-ordination (article 128 ECT). In fiscal policy, member states have established distinct rules for coordination. The basic rule article 104 ECT, completed by the fifth protocol describes the general targets. Since Amsterdam 1997, the fiscal framework is extended by the well-known 'Stability and Growth Pact', to put into practice the excessive deficit procedure for all 'Euro–member' states haven been participated in the EMU. The key ingredients of fiscal policy coordination are:

- Fixed targets

- Cyclical monitoring

- Information exchange

- Mutual control

- Council recommendations (i.e. early warning)

- Sanction mechanism

Given the possibility of sanctions against sinner states, fiscal policy coordination puts considerable constraints on euro member states. The actual problems of the SGP are based on two main different reasons. First, institutional and procedural inconsistencies and secondly content problems with the target values and the time horizon. Besides of all drawbacks this mode of governance can be labelled as hard co–ordination because of the binding procedures in the Maastricht Treaty (supplementary protocols) and the two council regulations of the SGP (EC-No 1466/97 and 1467/97). In contrast to the hard coordination of fiscal policy, the procedures in the area of economic policy co–ordination, article 99 ECT are soft. The main economic co–ordination procedure is the annual 'Broad Economic Policy Guidelines' (BEPG). This framework has no direct legal impact for member states and do not include any sanction mechanism as in the field of fiscal policy. The main points here are monitoring, bench–marking and the publication of best practices. The modes of economic governance include recommendations of the Council to member states which deviating from principles of the BEPG's. The BEPG should be on the center of coordination. It consists of: (A) Cardiff Process, (B) Luxemburg Process, (C) Cologne Process and finally (D) Stability and Growth Pact. While fiscal and economic policy has been incorporated into the Treaty in Maastricht, the employment part was first added in Amsterdam, 1997. The key difference is that article 128 ECT do not foresee a formal recommendation of the Council to one member state in case of non–compliance. All soft co–ordination logic is oriented towards the good will of actors and works without any legal incentives. Since Lisbon the so–called 'Open method of Coordination' (OMC), was established. The key tool is based on peer pressure (peer group review) and the EU's institutions surveillance procedure. This new mode of governance was underlined in the Laken Declaration of the European Council and formulated as a broader long–term strategy. Apart from the fact that there exists no real incentives in the OMC, a game theoretic perspective show us a more ambivalent result. If the OMC implement the best practice in European member states, then countries could have an intrinsically motivation that her own system is moved to the European level. But there exists probably an extrinsically motivation because an implementation of a national system onto the European level saves the transformation costs. The other countries, which

must transform her national systems onto the 'Best practice' system, carry then the whole costs. Therefore governments could have today an incentive to improve the current national systems because they hope on the one hand that their own system will in future be transformed at the European level and on the other hand to save then the implementation costs of the new 'Best practice' system. The new challenges between the interaction of centralized European Monetary Policy and decentralized Fiscal Policy need an adequate coordination mechanism like the 'Stability and Growth Pact'. But the current problems within the SGP induce a search to 'New modes of economic governance' or 'New modes of cooperation' for the Euro-member states (Scharpf, 2003). The first question is: Are there more efficient coordination mechanisms? And second: Which policy fields must be more coordinated because of monetary–fiscal interaction?

Model Framework

The primary task of this section is, as stated, to identify several important types of governance architecture and discuss their fits with emergent of the 'New Information and Communication Technologies (NICTs). First we note that there can be only three generic modes of information–connectedness in either vertical or horizontal relationship. Then we allocate these models to the existing modes of governance and conclude with the consequences for e–governance in Europe. Suppose that there are only two elementary political task units, denoted by P_1 and P_2 in an abstract domain. At this stage, take the two units as abstract entities, although it does not do any harm to imagine them as two policy objectives, as we will assume later. The payoff depends on the configuration of the decision choices of the policy task units, a_1 and a_2, as well as on the state of environments, E_s and E_1, E_2 and stochastic parameters like 'm'. The states E_s and E_1 affect the productivity condition at P_1, and the states of E_s and E_2 affect that at P_2, where E_s is referred to as the systemic segment of the environment, and E_1 and E_2 as idiosyncratic segments. Assume that idiosyncratic segments of environment can only be observed by the relevant policy task unit, there are and only these three–generic modes of information connectedness (modes of governance) among the two units (Aoki, 2001).

1. Hierarchical decomposition (HD). Here $'E'_s$ is observed only by P_1, which adjust then its own choice variable a_1 according to its own estimates and including its estimates about the idiosyncratic environment. The other part is later informed.

2. Information assimilation (IA). Both policy task units monitor the systemic area $'E'_s$. Suppose that their observations $'E_i'$ (i=1,2) are correlated so that they benefit from assimilation $'P_{1,2}'$ of the systemic segment of environments.

3. Information encapsulation (IE). Both polity task units observe both systemic and idiosyncratic areas independently. Additionally is here assumed that the observation errors are uncorrelated and each party 'hidden' some information from the others.

The question is now: Which of the three modes exists in the European economic framework? And what are the implications for e–governance? The first question is partial answered above. The three modes of European economic governance — hard, soft and open — are different about the political fields and in their scope. The typical characteristics in fiscal–monetary interaction is on the one hand the hard co–ordination framework with sanctions and on the other hand the huge amount of information assimilation, exchange, peer–review and mutual control. These features explains that in fiscal policy at least two or more actors monitor the environment and co–ordinate their policies onto the European level because of high correlations, growing 'spill–over' effects (free–riding behavior) and finally increasing interactions within the European monetary union. That are the criteria in the model of information assimilation above. Now it is possible to analyze the consequences in more detail.

The first important Proposition labelled to Cremer (1992) in that framework is: If the tasks of the units are complementary, the information assimilation mode is more efficient than the information encapsulation mode. Intuitively, if two tasks are complementary, it is always desirable to adjust the choice variables of both units in a coordinated manner in response to changing environments to maximize

payoffs. This objective can essentially better achieved by assimilating the information for decision choices by both agents. In the European Monetary Union you can see a strong evolution of information exchange and assimilation. This is seen also in economic policy through the system of 'Broad economic policy guidelines'. Moreover in fiscal policy that system is more pronounced particularly through the Stability and Growth Pact and the quarterly 'Stability programmes'. Moreover it is clear that information assimilation require time and effort, but if there is a significant degree of similarity in the information–processing capacity and their communication costs in pooling sample observations and constructing a common perception about the environmental conditions are relatively low, the information assimilation mode is also more efficient than hierarchical–decomposition (Aoki, 2001). The conjunction of the Proposition by 'Cremer' and the last by 'Aoki' imply a dominance of the information assimilation mode for certain circumstances. Mainly in fiscal policy especially within the Stability and Growth Pact the common perceptions are very clear because of detailed target definitions and their exceptions. Thus the communication costs are relatively low solely they are all explicit in the fiscal framework. The implications for e–governance are now presented in the following two Propositions, which are intuitively clear and close to Aoki (2001).

Proposition 6.1. *Whenever the use of 'New information and communication technology (NICT) can reduce the disparity of information–processing capacity across the policy task units, the relative advantages of the hierarchical–decomposition mode diminishes against the information–assimilation mode, assumed the policy tasks are complementary.*

That is a very strong Proposition, which show us that the scope of e–governance in the European economic and fiscal framework raises with the application of NICT because of more information–assimilation (Proof: $2Pi = P_1 + P_2 < P_{1,2}$, which results through assimilation and NICT). As we have argued above that information–assimilation is the dominate mode in Europe, we see from Proposition 1 that more applications of the NICT could induce an additionally advantage

of information–assimilation and so an enforcement of e–governance in Europe. To make the last point more clear look to the next proposition.

Proposition 6.2. *If the correlation between the environments of the policy task units is very high, and if they are additionally characterized through free riding then information–assimilation is optimal organized through NICT or e–governance.*

The idea behind the proposition is that in an environment with strong interactions like that in the monetary union between fiscal- and monetary policy the information–assimilation mode is necessary (cf Cremer–Proposition) and optimal organized through NICT i.e. e–governance. One conclusion is that the current mode of governance system in Europe supported by communication technology enforces perhaps the development of e–governance at the supranational level. Surely that scenario depends on many other environmental conditions like that described in the model by Finger and Pécoud (2003). But this case study in a very special but open field — because of the strong interdependences of economic and fiscal influences within other policy fields — show us how e–governance will emerge. From this perspective we outline an inductive model for a complete evolvement towards e–governance.

Empirical evidence: An opportunity cost and benefit analysis

On the basis of the model, we assess now the implications in monetary–fiscal interaction for the development in e–governance. Why does 'hard coordination' emerge in fiscal policy and not in economic policy? The answer depends crucially on expected costs and benefits and transaction–cost arguments like that from Coase (1937). Monetary and fiscal policies are highly interdependent (cf FTPL). These incorporations increases even with the establishment of a monetary union. On the one hand explain these facts why fiscal rules in the monetary union originated and one the other hand why in the whole economic policy area only soft and open policies arises. Additionally there exist one important difference between the consequences of both policies: While a weak price stability and high inflation (high volatility) have a strong and permanent effect in monetary

policy because of the future expectations about the monetary policy relevant variables, is the danger in economic policy rather temporary. The costs of ups and downs in the business cycles appear to be less in comparison to long–run inflation costs (De Grauwe, 2003). Starting with the model which we have observed: The supranational unity P_1 with the primary aim preserving price–stability and the twelve national units P_{2i} (with $i = 1, ..., 12$) which manage the national economic policy with their last policy instrument fiscal policy e.g. tax, debt and deficit policy. The task of both entities are correlated and even complement because stable prices are a precondition for growth (Buti, 2003). Moreover high debt policy a_{2i} implies also higher sanctions a_{1i}. In order to evaluate the opportunity costs of governance in fiscal policy, we compare the following: First, the sanction costs a_{1i} with inflation costs through debt policy a_{2i}. The decision to hard co–ordination like that of the Stability and Growth Pact implies that the opportunity costs are mainly inflation. Typical inflation costs are shoe leather costs, menu costs and so on (De Grauwe, 2003). These costs are very difficult to assert but empirical studies and historical experience show that they are higher than the opportunity costs of the current sanction fees within the Stability and Growth Pact (De Grauwe, 2003). The current sanction fees in the Stability and Growth Pact are in a maximum level 0.5% to GDP (see chapter 2). Rational economic actor's choice that alternative, which minimize the opportunity costs. That imply in this case to take the current Stability and Growth Pact because it minimizes the opportunity costs. So it is rational for the member countries to implement hard coordination in fiscal policy. Moreover there is in fiscal policy more asymmetric information than in economic policy, which reinforced the differences.

While in economic policy the state compare 'recession costs' with the costs of more coordination and sanction fees, they decided for 'soft' coordination. The following two points explain that: (1) the costs of ups– and downs in the business–cycle are only 'temporary' and (2) the loss of sovereignty in economic policy — no reaction possibility to idiosyncratic shocks — induces prohibitive high costs. To minimize opportunity costs imply in that field only 'soft' coordination without binding thresholds as in fiscal policy. Both policy task units P_1 and P_2 observe in fiscal–monetary interaction their systemic environment E_S and decide about inflation a_1 and debt policy a_2. It is obvious that these decisions are correlated.

Moreover higher debt induce a higher inflation so that they are also complement. Within such a constellation information–assimilation as described above is dominant and NICT improve the situation. Summing up: Monitoring, information exchange and information assimilation is very strong in the European fiscal framework. More tasks, more interactions and more member countries in future increase the necessity to manage the situation in that field. That is certainly only done with more information–assimilation and with more NICT. But these developments might induces a new cascade to e–governance in economic regulation in Europe.

The current debate about efficient modes of economic governance in the European fiscal framework particularly the reform debate about the Stability and Growth Pact is perhaps an illustrating case study for the evolvement of e–governance in regulation policy. As we show in our paper the current development and architecture of economic policy in Europe advance e–governance because of the advantage in 'New information and communication technology' in the area of information assimilation. That dominance has a strong implication for possible developments in e–Government and e–Democracy in Europe.

6.2.3 International Political Economy

In recent years emerge a new research program — so–called 'International Political Economy' (IPE) — in political science to explain European Integration with more appropriate methods. There have been claims that International Relation (IR) would no longer be useful for explaining European integration (Jachtenfuchs, 2001). So IPE would offer a suitable body of literature to explain European integration. The agenda of IPE follows a clear multidisciplinary approach and overcome the dichotomy of 'rationalists' and 'constructivists' (Pollack, 1999) or the 'rationalists' and 'reflectivists' (Smith, 2001). Verdun (2004) motivate that new approach further.[1]

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[1]Good overview is given by Verdun and Jones (2004): The Political Economy of European Integration, Theory and Analysis.

To understand the dichotomy of idiosyncrasy and integration, i.e. despite high integration in the monetary union, there coexists a huge amount of distinctive national character or idiosyncrasies. We use now the IPE approach in line with Jones (2004) to explain the consequences for the EMU. The EMU is characterized through central monetary policy (highly integrated) and totally dezentral fiscal policy with some interactions and linkages as the SGP. So that dichotomy is no more conspicuous and surprising than in the EMU. Our case study to the SGP from a IPE perspective is therefore very promising. The idea of that relationship is based on Karl Polanyi's (1957) analysis of the 'double-movement' behind the social embeddedness of market institutions. With that work it is possible to explain both why countries differ in some specific areas and how European unit might contribute to national diversity. Therefore, Polanyi (1957) explains the causality that runs from integration to idiosyncrasy. The simplest example is the family: High integrated but each member is idiosyncratic. However, what happens on the state level? The new institutionalism tells us countries remain different because institutions matter. That imply in the European fiscal framework national differences are idiosyncratic because institutions matter as for example tax system, transfer system, federal system, social and security system. All systems have been build different and differ between the European countries. That is perhaps the political perspective of Polanyi's *double movement* for the Stability and Growth Pact. That paradox is confirmed in the whole bunch of political and sociological literature as in the 'Varieties of Capitalism' (Hall and Soskice, 2001) and in Scharpf's and Schmidt's expression 'diverse response to common challenges' (Dalton, 1968; Myrdal, 1956). Indeed (Myrdal, 1956):

> "It is a paradox that only a well–integrated community can abide by the rules of economic competition."

Is that also true in the EMU? The "new" effects are the interactions between the integrated and disintegrated part. However, that is the missing part and really overseen in Myrdal's analysis. Therefore, we can conclude that there is a dichotomy in each integrated framework but interactions between them imply the need of governance or rules to organize the competition between the nation states. That rules are the SGP. So we have to find a "new" or "novel" political economic

argument for an Stability and Growth Pact. Garrett (1995, 1998) analyze the impact of monetary integration and found more likely a convergent influence on fiscal policy. But Jones (2003) concludes that Garret avoid Polanyi's results. Therefore, Jones (2003) argues that there are more likely differential responses to monetary integration as anticipated in the logic of the 'double-movement'. But despite that Jones (2005) says:

> "...the Stability and Growth Pact can only be viewed as an added constraint. When the emphasis shifts to focus on divergent reactions (...) the importance of agreeing standards for fiscal performance increases."

Again we have an argument for an SGP also with the dichotomy relationship between idiosyncrasy and integration. Summing up: The persistence of national idiosyncrasy forces us to reconsider the process of integration, especially within the EMU. Using the insights of IPE and Polanyi's and Myrdal's work, it is possible to construct an interpretation of events in Europe which illustrate that idiosyncrasy and integration are two elements in the integration process. The great virtue of such an interpretation is that it focuses attention on the diverse reactions of groups within countries to common features at the European level.

6.3   Development of the Fiscal Framework

In this section we state some well known properties of the essential spectrum in the form applicable to the situations arising later. We start with a few definitions and introduce notation and terminology that is consistent throughout this chapter.[1]

The need to reform the SGP became more and more obvious in the course of 2002. A number of economists have made different and sometimes contradictory proposals. Thus there are many coordination mechanisms, which transform non–cooperative constellations into cooperative one. The current reforms can be categorized into:

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[1]**The section is based on the following published papers: ATINER-Conference Proceeding 2003.**

- Radical reforms like more market or more central co–ordination

- Modification reforms to a new target structure and

- Modification reforms on the basis of the current Pact.

Moreover there exist different advantages and disadvantages but for all distinguishing proposals some basic principles are necessary for a good interaction management. The question is, weather the mechanisms are also sufficient? This is certainly in general open. But it depends on the assumption and the structure of interaction. The radical reform proposals are connected with fundamental changes of the fiscal policy framework. For example 'Tradable Deficit Permits' (Casella, 2001), 'Rating Agencies to evaluate national Debt' (Eichengreen, 2002) and all proposals to a closer fiscal policy coordination or centralization at the European level (Heise, 2002; Euromemorandum, 2003). The suggestions by Casella (2001) and Eichengreen (2002) aim towards a market solution that works efficient and solves the interaction problem. The other direction is to solve the problem efficiently with a future European economic government. But the knowledge that these radical reforms need either a majority around the European countries and/or a closer political union makes both directions in the near future probably unlikely.

On the other hand modification proposals are only a change in the current fiscal framework of fiscal policy in Europe. The reform alternatives in that field are: First to define a new target which transforms the only focus today (deficit) to a more–dimensional view and connects this with a wider time horizon. The second group of reforms work close to the current Pact. But similar in all modification suggestions is, they plead for a non–partisan or more independent agency (committee) establishment. In Table 1, we summarize the most prominent reform proposals in each category.

	Market	Hierarchy	Coordination
Radical Reform	Casella (2001), Eichengreen (2002)	Heise (2002)	
Modification Reform		Wypolsz (2003), von Hagen (1999)	DeGrauwe (2003), Buti(2003)

An other prominent alternative is the 'Golden Rule'. Balassone and Franco (2001) point out that the risk of revising the rules could harm the credibility of the fiscal policy commitment to budget sustainability, which in turn may prevent the adoption of the appropriate policy mix. The authors distinguish between three types of 'Golden rules':

(a) Proposal made by Modigliani et al. (1998). They are suggesting the use of a net deficit equal to net investment.

(b) German–Rule (Art. 115 of the Constitution), yearly deficits are allowed up to the level of gross investment in the federal budget.

(c) The UK–Rule in which public borrowing cannot exceed the level of net investment over the cycle.

The advantages of these drafts are that they can be inserted just–in–time in the existing system of the European fiscal framework and the SGP. Besides, the basic idea is always that the net deficit should never be higher than the public investment. Also Creel et al. (2002) and Mathieu and Sterdyniak (2003), proposes to import this rule in the euro area:

> 'structural current government borrowing, i.e. excluding public investment, should be permanently in balance or in surplus'.

The ambiguity in the definition of public investment implies that their proposal is different to the three 'Golden rule' cases mentioned above. In that tradition Buiter and Grafe (2003) propose, that countries which have significant public investment needs not to cut government borrowing. They mention that lowering public investment is harmful in terms of potential output growth if the endogenous growth theory has some relevance. In the line with Buiter and Grafe (2003), an analogical approach is the suggestion by Buiter (2003) to propose a permanent balance rule. This rule leaves room for an active economic policy in the short–run. It would allow countries with relatively higher output growth and inflation to run higher public deficits. To raise the intergenerational equity and public spending, this rule cannot be ensured by an automatic rule (Buiter,

2003) and it requires beforehand an optimal national fiscal rule (see also Box 1). Based on these facts you can find out three theoretical solution mechanisms for 'supranational–national' interaction conflicts:

(a) Market,

(b) Hierarchy and

(c) Coordination.

The next sections of our article focus on the structure of efficient 'coordination mechanisms'. In spite Eijffinger (2003) has stated: 'In the end it will be more hierarchy in the fiscal framework', most similar to monetary policy but with an other structure. We focus now on co–ordination mechanisms because we think that a political union is in the near future really unthinkable. Moreover all people in Europe know that we need a better Stability Pact as the current one to avoid past drawbacks.

Box 1: Recent academic ideas for reforming the Stability and Growth Pact

Fiscal–fiscal co–ordination: A new level of commitment: Pisani–Ferry (2002) argues that Eurogroup should agree on a set of broad non–binding policy principles outlining the operation of fiscal policy to complement the fiscal–fiscal–monetary interaction.

Fiscal policy committees: Wyplosz (2002) and Ohr/Schmidt (2003) proposes the creation of new independent fiscal policy committees in each member states and on the EU level. These committees would have authority over the deficit in each country, but no influence on the size and composition of expenditures or taxes. The committees would be given the long–term mandate for maintaining debt at a certain target, but would be able to manage the size of the deficit in the short term to stabilize the economy.

New monitoring institutions: Several authors suggest that independent bodies would be more credible in assessing whether discretionary fiscal

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policy compromised sustainability. Begg et al. (2002) argue that the EU should also delegate the task of monitoring to an independent body. Fatás et al. (2003) and von Hagen (2003) propose the creation of an independent European fiscal sustainability council to monitor the sustainability of member states finances.

Allowance for public investments: Blanchard and Giavazzi (2003) argue that investment spending should be excluded from deficit calculations under the SGP. They argue this would increase transparency, permit quality public investment, and prevent pro–cyclical tightening of fiscal policy in the short–run. A permanent balance rule: Buiter and Grafe (2002, 2004) favor a permanent balance rule , whereby the net present value of total future government revenues should be at least equal to the net present value of total future expenditure, including debt repayments. Although both sides of this equation would be hard to calculate accurately, the authors see benefits for allowing a counter–cyclical policy and public investments outweighing any implementation costs.

More clarity of monetary reaction function: Allsopp (2002) proposes that a key requirement for effective fiscal co–ordination is an "appropriate and transparent monetary policy reaction function." The higher transparency in that topic increase the understanding for the national fiscal authorities and helps to find the correct responds around the economic fluctuations.

Tradeable deficit permits: Casella (2001) propose the introduction of tradeable permits to run deficits. Countries that wanted to run higher deficits would have to buy such permits from other countries before they could do so. A similar mechanism proposes Eichengreen (2003) with a 'rating agency' to evaluate the sustainability of national public finance.

A more pragmatic Pact: Buti et al. (2003) propose a collection on measures designed to deliver on a more pragmatic interpretation of the Pact including: modifying the interpretation of the 'close–to–balance or in surplus'

rule on a country–by–country basis; take a better account of public sustainability; improving transparency by distinguishing between long–lasting measures; a better monitoring on cash flows; devising sanction for member states not undertaking sufficient consolidation during economic up–turns; making the implementation mechanism less partisan by strengthening the role of the Commission in assessing compliance with the rules and in the application of sanctions; no monetary sanctions but instead more 'mutual–supervision' (De Grauwe, 2003).

More co–ordination between fiscal–monetary policy: Heise (2002) and Pinzler and v. Heusinger (2004) suggest a closer co–operation between the ECB and the member countries fiscal policy. They propose the so–called "move to the middle" as the only successful solution in EMU.

6.3.1 Taken reforms by the EU–Commission

Even the 'European Commission' proposes the same changes for the 'Stability and Growth Pact'. In June 2001, on a proposal from the EFC, the Ecofin council adopted the first reform of the procedures (European Commission, 2002). The main changes were:

1. a more effective surveillance process,

2. the presentation of annual stability programs and

3. a closer insert in the framework of the BEPGs as well as a new focus on the time horizon (medium–term) and target objectives like ageing populations.

On September 13, 2002, Pedro Solbes was speaking before the European Convention and stated that the functioning of the EMU was satisfactory. However the Commission proposed additionally three further reforms: (A) The Commission should be entitled to send recommendations directly to the States. (B) The

Council should not depart from the Commission's recommendations on BEPG's and on warnings addressed to member countries, unless acting by unanimity. (C) Member countries concerned should not take part to the vote on warning. Although on September 24, 2002 it was recognized officially, that the target of close–to–balance was out of reach for 2004, the Commission did not intend to put the Stability Pact into question:

> "The experience of the early years shows that the question is not about the framework itself, but how can the system be better managed so that the rules are followed the 3% of GDP deficit threshold that is the cornerstone of our stability framework."

Solbes reasserts the necessity to strengthen the fiscal policy co–ordination, but especially within the Stability Pact. After Prodi's words in 'Le Monde' the Commission presented a set of 'five' new measures to strengthen the co–ordination of budgetary policies, on November 21, 2002.

(a) The 'close–to–balance or in surplus' target should be interpreted in terms of cyclically–adjusted budget balances.

(b) National structural deficits will have to be cut by at least 0.5% of GDP per year, even more rapidly in countries with a high deficit or debt, or 'favorable growth conditions'.

(c) Avoid the occurrence of expansionary fiscal policies in times of favorable growth.

(d) The Commission wishes to give its authorization for a 'small temporary deterioration in the underlying budget position' to the countries which undertake structural reforms in line with the Lisbon strategy.

(e) The sustainability of public finance should become a core policy objective.

The Commissions proposal mentioned a necessity to transfer as many decisions as possible from the national to the community level, from political to the technocratic level. In this respect, the institutional logic is based on the model

of the ECB, hence to increase its authority in detriment of the Member States. After some political disputes, the Ecofin Council (March 7, 2003) and the European Council (March 20-21, 2003) have finally adopted a proposal very close to the Commission's proposal. As Paul de Grauwe wrote in 2002:

> (...) "The stability pact is a vote of no confidence by the European authorities in the strength of the democratic institutions in the member countries. It is quite surprising that EU–countries have allowed this to happen, and that they have agreed to be subjected to control by European institutions that even the International Monetary Fund does not impose on banana republics."

> Paul De Grauwe, Financial Times, July 25, 2002

The most recent reform developments in the Stability and Growth Pact focuses on the claim for more (a higher degree of) coordination (Pinzler, 2004 and Ceps-Org., 2004). Unfortunately the coordination of monetary–fiscal policy within the economic policy framework (BEPG's) is not really realistic. The target of the European Monetary policy is to maintain price–stability. The policy instruments of the European Central Bank are independent from political influence. Because of that reason the ECB is against each 'pre–coordination' (ECB, 2000):

> The role of the Eurosystem is determined by the stipulations of the Treaty governing its status and activities, notably its independence and the primary objective of maintaining price stability. As a consequence, the Eurosystem cannot engage in any form of agreement aimed at bringing about a predetermined "policy mix", since this could commit the Eurosystem to pursue a monetary policy which might conflict with the primary objective of price stability. The clear separation of policy responsibilities between monetary authorities and governments is rooted in the belief — confirmed by decades of practical experience and a substantial body of economic research — that

committing monetary policy–makers to the primary objective of main-
taining price stability helps significantly to achieve price stability in a
credible and lasting manner. In this way, monetary policy will make
the best possible contribution to the broader economic objectives of the
European Union and its citizens. Since economic policy co–ordination
relates predominantly to co–operation among the Member States them-
selves, the ECB's contribution to the overall co–ordination process lies
in a dialogue with competent European bodies, notably the Council of
Ministers and the Euro–11 Group, whereby views and information are
exchanged. In this dialogue, the prerogatives and independence of pol-
icy actors are respected.

The position of the ECB is clear, but in the current Convention proposal
(2004) is a clear attempt from the political side to get more influence in that
direction. However this development was criticized by the ECB (ECB–report,
2003). As a result of possible changes the ECB are only on the bases of the
current Stability and Growth Pact. The ECB sees the SGP as an key mechanism
for the policy co–ordination in the euro area. Furthermore, the ECB called the
SGP set up as the best mechanism for information sharing through the stability
programmes, and thereby aid the policy co–ordination laid down in the BEPG's.
Moreover there is in process of fiscal–monetary co–ordination in EMU the oppor-
tunity for the EU–Commission and the chair of Eurogroup to attend the ECB
Governing Council meetings to enhance the understanding of the ECB reaction
function. There is some suggestion and evidence that this mechanism for infor-
mation sharing is not used to its full potential, and there is a scope for further
work on monetary–fiscal co–ordination issues.

6.3.2 Commission proposal after March, 2004

In June 2004 the EU–Commission proposed further changes on the fiscal frame-
work especially on the Stability and Growth Pact in reaction to the European
Court of Justice (ECJ) jurisdiction. The Commission believes that the EU frame-
work should be strengthened in order to (EU–Commission, 2004):

1. combine fiscal discipline with economic growth considerations;

2. focus more on the sustainability of the member states public finances;

3. improve implementation.

The ideas to move forward include: rebalancing the role of the Broad Economic Policy Guidelines (BEPGs) with respect to the Stability and Growth Pact (SGP), bringing the budgetary policy coordination calendar more into line with our general coordination cycle and ensuring the implementation of the BEPGs through early warnings. Regarding the strengthening of the SGP implementation called for by the European Council of 18 June experience to date shows that the way forward could be built around the following pillars: (i) more focus on debt and sustainability, (ii) more incentives for fiscal consolidation during periods of economic growth, (iii) taking into account country–specific circumstances when defining the medium term budgetary objectives, (iv) taking more into account economic developments when formulating recommendations for the correction of excessive deficit situations.

The Report on Public Finance includes a review of the objective of fiscal discipline pursued with the objective of growth and how synergies can be improved by making the EU framework for budgetary surveillance and economic governance more effective. By considering these issues, the Commission aims to lead the way to improve economic governance and to focus on more specific orientations for rejuvenating the framework and strengthening economic governance in the near future.

Table 6.3: Main Academic Reform Proposals

Critical issue	Reform proposal	Authors	Institutional Implications
SGP is well-defined but there is a bad enforcement. We have to strengthen the current rules.	Strengthen the SGP. Combine discipline with economic growth considerations. Focus on the sustainability and improve the implementation.	EU-Commission (2004)	Reform only slightly the SGP. No changes in the Treaty.
Numerical rules do not tackle at source the budgetary misbehavior; SGP needs a more credible and non-partisan enforcement	Improve national budgetary procedures; create independent Fiscal Policy Committee. Strengthen financial market discipline	Wypolsz (2002), Wren-Lewis (2002) von Hagen (2002)	Reform the Treaty, abolish Excessive Deficit Procedure. Amend Large Exposure Directive.
The SGP pay too much attention to the deficit, not to the quality of public finance.	Introduce expenditure rule; move to golden rule.	Mills and Quinet (2001), Brunila (2002), Fitoussi and Creel (2002)	The golden rule requires changes in the Treaty and the SGP. The only version that is not inconsistent.

Sustainability depends on the stock of debt, not on the deficit	Introduce a Sustainability Pact; move to a country-by-country articulation of the close-to-balance target	Pisani-Ferry (2002), Fatas et al (2003)	The sustainability Pact or the council requires changes in the Treaty. For some countries it replace the SGP
The 3% of close-to-balance target are arbitrary and inconsistent with an appropriate fiscal stance	Move to structural balance; introduce the notion of Permanent Balance Rule	Buiter and Grafe (2002)	Abolishing the close-to-balance requires changes in SGP; abolishing the 3% requires changes in the Treaty
The SGP does not address the issue of the appropriate fiscal stance for the euro area	Agree on the aggregate budget balance. Market solution via deficit permits. Market solution via rating agency	Casella (2001) Eichengreen (2002)	Within the 3% threshold, it is not incompatible with the current rules.

Source: Herzog, B. (2004)

Sims (2004) conclude in his recent economic analysis of the ECB central banking model:

> "...EMU will need to develop fiscal institutions capable of prompt and strong actions at a Europe–wide level. This is a tall order, so it may not be filled any time soon, unless a financial crisis forces some rapid political innovation.

The last three years are crisis enough to develop the Stability and Growth Pact further. However, the myopic behavior of politician in that issues dominante the discussion without seeing the danger of a too weak fiscal framework.

6.3.3   General Reform Ideas

The fiscal policy framework in the euro area especially the Stability and Growth Pact raises a number of problems. What is its real objective? Is the objective to avoid that a country generates negative externalities on partner countries, then the rules should bear directly on theses spill–overs. If the objective is economic policy co–ordination, then the ECB and the Member States should discuss and define openly the policies to be implemented within Europe, taken into consideration the different business cyclical developments in Member States. Finally, if the objective is to adopt a common economic policy then a democratically elected economic government of Europe is necessary (cf. Mathieu/Sterdyniak, 2003). Within a more precise comparison of the above suggestions, four main points distill out:

1. Independence

2. Sustainability

3. Wider target set

4. Longer time horizon

Now it is a matter of evaluating these four main points again more exactly, analyzing it and bringing them in connection with the original proposals. Subsequently we look no more to the radical reform suggestions. Because of the topical discussion above and the political weather condition — after the European Union's enlargement in May, 2004 — we think that a radical reform of the SGP is not achievable anymore. Thus it is rather more likely to find a majority to modify the SGP in the existing framework. The ideal image of independence orientates itself in the EU always by the model of the ECB. However, within the scope of the discussed reform alternatives, fiscal policy in the EMU is relatively far away from the entire independence model of monetary policy. It is rather a matter of establishing a new committee which will deliver a plausible recommendation to the Ecofin–Council based on account of its expertise and independence. Different models are conceivable. Ohr and Schmidt (2003) propose a new committee to enforce credibility and accountability for a better control and depoliticization of the decision process. After the EU–Commission has assessed the deficit and debt criteria, the new committee evaluates the commission suggestion in reference to the national and global economic conditions. Afterwards the decision passes the Ecofin council. Additionally this committee would negotiate directly with affected countries and when required it imposes the sanction but only on the bases of a more unambiguously economic criteria. The sanction would be no more negotiable by the Ecofin council. This constellation awards a considerable independence to the new council. Another model proposes Eichengreen (2003) to avoid a bias towards an excessive deficit over time. He suggests creating an independent committee of fiscal policy experts that defines an index of budgetary levels. Otherwise permitting the politicians and officials responsible to alter the index of debt target would open the door to lobbying and backroom deal making. The new committee works independent but with much limited power in comparison to the proposal by Ohr and Schmidt as well as from Ricardo Hausmann, Juergen von Hagen or Charles Wypolsz and Simon Wren-Lewis . Eijffinger (2003) proposes also 'Non–partisan' implementation of the rules. He says: "A strong criticism of the Treaty and the SGP is that enforcement is partisan: national authorities are supposed to apply the rules to themselves, thereby having incentives for collusion and horse-trading. In order to move to a non–partisan implementation

(...) one has to distinguish between three types of decisions"; technical, political and implementation (of sanction) decisions. The open question is weather the implementation decision is a technical or a political decision. Eijffinger suggests that the implementation decision is both a technical and a political one. So he pleads to link the sanction decision between the ECOFIN–Council and the new independent committee (Eijffinger and de Haan, 2000). Leading the implementation decision exclusively to the independent committee (EU–Commission) would be unthinkable. Another possibility to overcome a complete independent council would be to move from a Commission recommendation to a Commission proposal. The difference is that the Council can move away from the Commission proposal only with unanimity and not with a qualified majority as in the case of a Commission recommendation (Eijffinger). Finally the last models of an independent fiscal council or committee, are correlated with the new target of 'sustainability' in public finance. The organization CEPR proposes explicitly such a sustainable council that operates in entire independence. This council should receive no concrete political competence in contrast to the ECB. Rather it should make public warnings and wake up with comments to the consciousness for public finances which are unbearable on a continuing basis. The Ecofin council covers sanctions further. The advantage would be that the complete fixation on the annual budget deficit in favor of a more long–term, sustainable and load–bearing consolidation of the national public finance. A right draft of lasting financial policy seems to exist in none of the suggestions. The reason for that is perhaps that a sustainable draft is brought immediately in connection with the 'Golden rule'. The last two points in the list above — a wider target set and a longer time perspective — is economically absolutely desirable. De Grauwe (2003) and Bofinger (2003) and several other proponents suggest that. There is a flood of opportunities:

- deficit and debt targets

- consider also the inflation rate

- long–run view around the business cycle.

But the main problem is that a change just in that dimension without looking to the real problems of the 'Stability and Growth Pact' covers the view. In November, 2003 the Pact has 'broken down' not because of the 3% deficit threshold, but rather for the reason that some member states in the Ecofin–Council are dominated by other interests (partisan influence).

6.3.4   New Reform proposal: Synthesis

When a father calls his baby ugly, people take notice and expect to find a seriously aesthetically challenged child. When the President of the European Commission calls the fiscal rules of the Stability and Growth Pact 'stupid' and 'rigid' it is clear that changes to the Pact are in the air (Buiter, 2003). In this sense we will establish here a 'New Reform' of the current Stability and Growth Pact. The reform suggestion consists of a detailed analysis of all existing reform proposals and the logic idea, that we have found in the analysis's above. To explain the last comment in more detail look now to figure 6.1. The starting point is a clear 'supranational target' which has priority and is in consensus in all member countries around Europe. This is 'price stability' because everybody benefits from a public good. The conflict comes about because there are partial sovereignty rights in the hands of the member states, which can contradict (pressure) the 'supranational–target'. The knowledge that there is no majority for radical reforms like more market or centralization in the near future, requests to search for a more efficient 'co–ordination' mechanism as the SGP. The middle plain called 'Stability and Growth Pact' in figure 6.1 illustrates this.

Conflict coordination implies always disciplining. The arrows left and right illustrate this. A negative disciplining mechanism like sanctions deteriorate (Danger) the supranational target in this constellation. On the other hand a positive incentive mechanism helps to protect (secure) the supranational target. Additionally the findings in section 4 and 5 show that every disciplining task (consolidation) must correspond with equal rewards. This means that every coordination or interaction mechanism in that constellation should support both discipline and
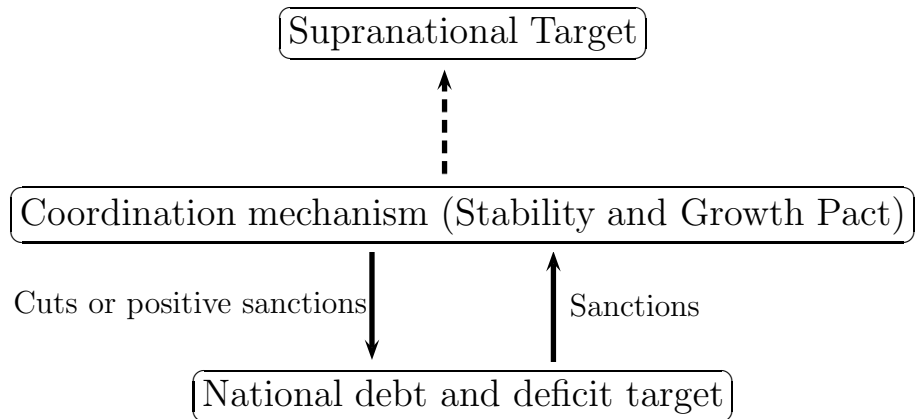
```
┌─────────────────────┐
│ Supranational Target │
└─────────────────────┘
          ↑
          ┆
┌──────────────────────────────────────────┐
│ Coordination mechanism (Stability and Growth Pact) │
└──────────────────────────────────────────┘
   │                              ↑
Cuts or positive sanctions       Sanctions
   ↓                              │
┌──────────────────────────────┐
│ National debt and deficit target │
└──────────────────────────────┘
```

Figure 6.1: Incentive scheme for the EMU

reward for the lost national sovereignty rights. Apart from the economically ab-solutely desirable changes of the target variables and their application period the decision procedure is certainly the most important one for the purpose of 'supranational targets' and a sustainable fiscal policy (De Grauwe, 2003). All other changes to a more–dimensional 'target set' are pointless, provided that there aren't guaranteed and adequate penetrations available. Therefore we need a more independent decision council to increase credibility and to enforce the importance of fiscal policy in Europe. To strengthen the European 'fiscal policy' and thus to generate an adequate opponent to monetary policy lies in the interest of the whole European society. So we suggest a 'negative escape clause'. This has the following function: If the 'supranational' targets are excessively breached by member states then the Ecofin council will pass the decision–making capa-bility to the independent council. The sanction mechanism is as described in the current Pact not anymore monetary fees which would rather aggravate the financial situation of breaching states. Instead, it is an equivalent punishment in the same amount but in a positive manner like binding budget consolidations. A more modest solution for independence in the decision process is achievable with a 'Vote- and Reputation function' (Herzog 2004). The idea is as follows:

Sanction decisions in the Ecofin–council should crucially depend on the number of votes from the countries with a prudent and sustainable fiscal policy. So the number of votes should correspond with its reputation in fiscal policy. A country with a prudent and sustainable fiscal policy structure should get more votes than unsustainable and breaching countries. We construct a 'reputation index', which depends on inflation, debt and deficit (perhaps growth) and calculate the amount of votes for each country. A country with prudent fiscal policy means — low inflation, low debt and deficit — gets more votes than a country with a bad fiscal policy. This mechanism induces two advantages: First it avoids vote–trading and policy dealing in the Ecofin council. Second it generates an intrinsically incentive through a market mechanism to a more prudent and sustainable fiscal policy. Therefore the Ecofin council and the national member states keep their entire sovereignty, as long as they trade according to the treaty. The cost of breaching the Pact is also very high (out–in decision) but without aggravation of the economic situation and with the advantage to make more credible and accountable decisions. This enacts within that circumstances a more fitting opponent to the ECB and works against national financial bankruptcy.

6.4 Fiscal federalism: A critical assessment

Modern research on fiscal federalism has focused mainly on the allocative and distributive consequences of a decentralized government structure (Wellisch, 2000). At the heart of each discussion is the conflict to what extent a decentralized provision and financing of government services leads to externalities which influence the level and the quality of public services in other jurisdictions (Feld and Kirchgssner, 2001, 2003). Moreover it is intensively discussed whether such external effects in fact lead to economically important efficiency losses (Wilson and Wildasin, 2004). Unfortunately, the assessment of the efficiency of fiscal federalism in the European monetary union becomes more complicated if political economy arguments are considered. That imply, if the political economy problems are neglected, the central government could provide public services in a differentiated fashion according to different local and regional preferences and effectively

internalize their externalities. Decentralized service provision would then only be justified by the 'frustration costs' which result from being outvoted. Scharpf (2001) maintains that the problem solving capacity of cooperative federalism — the German variant — is chronically suboptimal so that the capacity to innovate in federalism is noticeably reduced. Because in recent years the second chamber (Bundesrat) is partially responsible for the missing reforms in Germany. The same is true for Switzerland the best exemplar for a totally federalized country. That indicates limits of simple one–way decentralization. These controversial theoretical perspectives do not lead to unambiguous results as to the specific assignment of fiscal competencies in a federal system (Feld and Kirchgssner, 2003).

In the EMU framework, is the fiscal behavior of a government basically constraint by exit and voice (Hirschman, 1970). Voice in the public sector can be exerted by democratic decision–making procedures, like competitive elections, referendum or voter initiatives, while exit requires the possibility of citizens migrate and hence vote by feet (Romer, 1975). The literature on voice mechanism starts with the famous median voter model (Breyer et al. 1993,1994). A related approach focuses on the impact of federalism on government behavior as an investigation of the exit mechanism (Oates, 1972, 1985, 1999) (Bernnan and Buchanan, 1977; Buchanan, 1984). As argued by Brennan and Buchanan, the government is able to behave like a revenue maximizing monopoly called a 'Leviathan'. In a centralized system where only the federal level possesses taxing powers, it is more difficult to restrict such Leviathan behavior than in a strongly decentralized system with considerable powers of state and local governments. Oates (1972) argues that political agents have a better knowledge of the preferences of their constituency if the fiscal power is decentralized, such that the provision of public goods can be tailored more efficiently to their needs. That view favors a smaller size of government areas. But anything in real live has a mixed blessing. Thus Oates (1985) mentions, if local governments have more information about the preferences of citizens than central governments and, therefore, public services can be better tailored to the need of voters, this might increase their demand for public spending leading to a larger share of government. The empirical findings states that it is really difficulty in a multi-country union like EMU to establish

an optimal rule inform as the Stability and Growth Pact. There is no clear argument in favor of or against more centralization or decentralization of fiscal policy in the EMU. Therefore, we have to focus on the specific topics to evaluate the trade–off's to get a reasonable solution.

6.5 Lessons from the current reform debate

> (...) "if the euro increases the political integration towards a fully-fledged federal structure a different and more efficient public finance system could be devised."

> Buti et al. (2003)

Each of the proposals above draws the attention to one or more potentially serious problems with the design and implementation of the SGP. The suggestion to implement institutional and procedural reform highlights the need for an independent enforcer. The idea to move to a golden rule stresses the need to preserve the growth aspect of the SGP. A number of proposals highlights the excessive uniformity of the current rules. Taking into account the different levels of public debt points to the need to insert the sustainability dimension into the core of the SGP. The proposal of establishing a market for deficit permits tackles the problem of the pro–cyclical bias in good times.

However, in our view, none of the proposals outlined above represents a Pareto improvement: while appropriate to tackle some of the problems highlighted in the debate, each of them does not solve all problems and may even aggravate some of them. Some reform proposals present the same element of inflexibility of the current regime (cf golden rule); others require estimates which may turn out problematic in a multinational context (debt sustainability pact; permanent balance rule); others again require a decisive leap forward in the integration of fiscal policy (procedural alternatives). The adoption of some proposals (procedural reforms) would allow to tackle the transition problem by removing the deficit threshold. Nonetheless, of all this improvements can be achieved. In our view, key aspects

are re–balancing sticks and carrots, think about the targets and aims in the EMU, recognize fiscal–monetary interaction and enhance enforcement mechanisms.

The main result in that chapter is that there is no miracle solution to cure the Pact's weaknesses. If one takes into account the political economy of fiscal rules in a multinational context, it is difficult to envisage that, at the existing levels of political integration between EMU countries, the solution would be dramatically different from that introduced in the 1990s. Despite the huge controversy in the reform discussion, any radical change in the EMU fiscal framework would be highly problematic from a political point of view. The obvious risk is that ending up in a vacuum in which the old rules are called into question while the agreement on a new set of rules fails to materialize. Moreover a radical change is rather unlikely as a modification based on the current Stability and Growth Pact.

Chapter 7

Whither "Stability and Growth Pact"?

> *(...) '...the lack of a politically feasible alternative makes it a second best solution that should not be undermined in the present crisis.'*

Heipertz, M. (2003)

The pace of integration amongst European Union (EU) member states has accelerated considerably during the past decade, stimulated by the agreement from the Single Internal Market and further enhanced by the process of forming an Economic and Monetary Union (EMU). Since 1999, a discussion of fiscal policy alternatives has focused upon whether individual member states will meet the Maastricht convergence criteria (MCC) for membership, and whether the Stability and Growth Pact (SGP) will prove too restrictive in practice. Economic sanctions are one increasingly common tool of coercion in disputes. However, an open puzzle is: Why are economic sanctions so often imposed, though they are unlikely to succeed?

7.1 Law and Economics of the SGP rules

The role of legal rules in restoring efficiency in the presence of market failure was critically examined in a seminal article by Roland Coase (1937). Prior to Coase, the prevailing view among economists was that externalities like pollution could only be internalized by means of government intervention, for example by imposing financial liability (a tax or fine) on the polluter. However, Coase's analysis changed that by emphasizing the role of bargaining and transaction costs in determining the ultimate allocation of resources against the background of legal rules.[1]

First, the Coase Theorem implies that the social goals of efficiency and distributional justice are not necessarily incompatible, as is often assumed. Specifically, when the rancher was liable for crop damage, he had to make damage payments to the farmer. In contrast, when the rancher was not liable, the farmer had to pay the rancher to keep the herd size from expanding beyond the efficient level. Thus, variations in the assignment of liability can be used to alter the distribution of wealth without affecting the allocation of resources. This leads to the second important implication of the Coase Theorem: When bargaining costs are high, the law matters for efficiency (Demsetz and Alchian, 1972).

In particular, it bears on the fundamental question of whether to structure laws in the form of inflexible rules that dictate certain conduct or consequences irrespective of circumstances, or whether to leave some discretion so that judges can tailor outcomes to individual cases. In his classic treatise, Hart (1961) framed the choice in this way:

"In fact all systems, in different ways, compromise between two social needs: the need for certain rules which can, over great areas of conduct, safely be applied by private individuals to themselves without fresh official guidance or weighing up of social issues; and the need to leave open, for later settlement by an informed, official choice, issues which can only be properly appreciated and settled when they arise in a concrete case."

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[1]**This section is based on the following published paper: ECPR-Conference Proceeding (online) 2004; http://www.jhubc.it/ecpr-bologna/docs/473.pdf.**

But this world is of limited exchange for most problems confronting the law. More pervasive is the existence of situations involving high transaction costs, which prevent parties from bargaining around inefficient rules and from resolving disputes without legal intervention. In this more realistic setting, the law matters for efficiency, so rules must give way to standards that allow a balancing of costs and benefits in individual cases. This realm will receive most of our attention in this thesis.

This chapter and the next develop the economic model of european fiscal rules, especially the SGP. The model is based on the proposition that the rules of tort law are designed to give parties engaged in risky activities an incentive to undertake all reasonable means of minimizing the costs arising from those risks. For this reason, the economic model of accident is usually referred to as the model of precaution. The purpose of this chapter is to develop this model in a general way so as to derive a set of basic principles that apply broadly to different areas. The next sections then apply these results to specific areas, especially in fiscal policy.

The total costs of high debts and deficits consist of three components: the damage suffered by all states (in euro terms); the cost of precautions against accidents by higher interest rates and inflation; and the administrative costs of the tort system by the SGP. In this chapter, we focus on the first two of these costs as reflected in the model of precaution, while referring to administrative costs only in qualitative terms. In Chapter 6 (modes of economic governance) we undertake a detailed analysis of related administrative costs within an opportunity cost analysis. As such, it will be a useful tool for identifying connections across traditional legal boundaries.

Accident is breaching the 3% rule. Why? In our model the accident ist often planned, however in normal situations output volatility is an economic determinate and difficult to forecast. Therefore to breach the rule is sometimes unforeseen similar to an accident (cf chapter 5).

Society has many ways of controlling risks, including safety regulation, taxation, and even criminal penalties for risky activities. These are all examples of "public" controls imposed by the government. This chapter is concerned instead

with a private remedy — the right of accident victims to sue injurers for damages under tort law.

The primary social functions of tort law are twofold: to compensate victims for their injuries and to deter "unreasonably" risky behavior. Although the economic approach to tort law is not unconcerned with the goal of compensation, its primary goal is optimal deterrence.

7.1.1 Analyzing the Rules

An economic model of legal rules is designed to minimize the total costs associated with the risk of breaching the Stability and Growth Pact. Each EMU member country invests x euro in precaution to avoid breaching the SGP. Moreover we assume that the probability of breaching the rules $p(x)$ and the sanction fee $D(x)$ are decreasing in x.[1] This reflects the fact that greater precaution reduces both the probability and severity of a breach.

The social optimum problem, as noted above, is to choose x — the right amount of budget consolidation — to minimize the costs of precaution plus expected damages. Formally, the problem is to

$$\min_x x + p(x)D(x). \tag{7.1}$$

The solution to this problem is best seen graphically in Figure 7.1. The cost–minimizing level of care, labeled x^*, occurs at the minimum point of the total cost curve.[2] Formally, x^* occurs at the point where the slope of the x curve equals the (negative) slope of of the p(x)D(x) curve. The difficulty for each fiscal authority is not only to find the optimal x^* but also to evaluate the likelihood of breaching the threshold and the possible sanction fee. To include these facts, we extend the baseline model presents here in the following section and analyze an efficient breach of the SGP.

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[1]We assume further that they are decreasing at a decreasing rate. This means that precaution has a diminishing marginal benefit in terms of reducing the risk of breaching the thresholds.

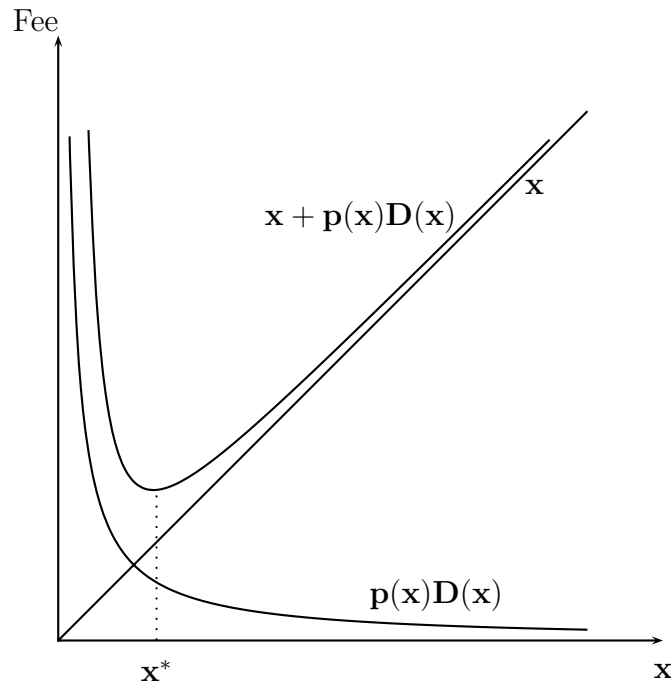[2]The optimal value is exactly like a Pigovian tax.

Figure 7.1: Social Optimum of Legal Rules

The Economic of Contract Law

Contract law provides the legal means by which people enforce promises to one another. Promises come in all varieties, including promises to provide a good or service in exchange for money, promise of marriage, promise to quit drinking or smoking, and campaign promises by political candidates. But people who make promises often wish to break them. The basic question underlying contract law is what sorts of promises should be legally enforceable. This section begins the analysis by describing the elements of a valid contract. In effect, it answers the question of what must be true of a promise for it to be legally enforceable. The next section then asks when someone who has made a contract can legally break it, and what the penalty should be for doing so.

   Definition: *A contract is a legal agreement, explicit or implicit, between two parties to a transaction that allows either party to go to court to enlist the power of the state to enforce the other's promise (Laffont and Tirol, 1993).*

Critics: The paradigm underlying the economic theory of contract law is therefore that of competitive markets. This is based on the well–known results from microeconomic theory, the "Invisible Hand Theorem", that competitive markets maximize the gains from trade.

The preceding examined the question of what contracts are legally enforceable. We argue that the various formation defenses ensure that the law will only enforce contracts that were formed voluntarily and, hence, promise a mutual benefit. Contracts that appear mutually beneficial at the time of formation, however, may not be when the date of performance arrives.

Designing an efficient remedy for the breach of enforceable contracts is the subject of this chapter. We begin the analysis by arguing that the breach of a contract is efficient in those cases where the cost of performance turns out to exceed the benefit of performance. An efficient remedy for breach should give contractors an incentive to breach only in those circumstances. In addition, we will examine the incentive–breach remedies create for parties to make investments in preparation for performance. Finally, we consider the role of breach–remedies in assigning the risk of breach in an optimal way. In examining the above issues, we will focus primarily on money damages since these are the standard remedy employed by courts.

Assume V is the individual value of sustainable fiscal policy and p is the price to achieve sustainable targets in the SGP. Suppose each EMU member state made a 'reliance investment' of R to avoid the sanction fees from the SGP. Let 'C' be the variable cost of producing the good 'sustainable' public finance. Finally, let D be the court– or rule–imposed damage payment that the breaching country must pay to the non–breaching countries. Our goal will be to determine the value of D that induces the state to breach efficiently.

A condition for efficient breach in this model is

$$C > V. \tag{7.2}$$

To see this, look to the following table:

Table 7.1: Breaching the SGP

State	Breaching Country	Sustainable Country	Joint EMU retrun
Compliance	V-R-P	P-C	V-R-C
Breach	D-R	-D	-R

Source: Herzog (2003)

Now consider the actual breaching decision. Potential breaching countries are indifferent in breaching the SGP if:

$$D - R \geq V - R - P \Longleftrightarrow D \geq V - P. \tag{7.3}$$

On the other hand sustainable countries benefit from breach the SGP if:

$$P - C \leq -D \Longleftrightarrow D \geq C - P. \tag{7.4}$$

Potential breaching countries set the sanction fee 'D' equal to the value of sustainable finance minus the price for achieving that goal. That implies that the current breaching countries see a very low additional value of sustainable finance or implicit price–stability and very high costs to achieve that objective in the current situation (to stabilize or consolidate fiscal policy).

The next surprising finding is as follows: Primarily sustainable states follow the breaching countries and also breach the SGP if the difference between costs of sustainable stabilization minus the price of the SGP–rule is lower than the sanction fee. Therefore a sustainable country will breach the SGP when the benefit of sustainable public finance exceeds the costs. The next question is how it relates to actual remedies employed by institutions and courts.

7.1.2 Remedies for Bad Rules

There are four items that can explain the success of economic sanctions. Lacy and Niou (2004) stress the following items: First, the player's preference for the issue under dispute and the imposition of sanctions are critically important in a

sanction game. Second, threatening sanctions is as important as imposing sanctions as a strategy in disputes (Lacy and Niou, 2004). When sanctions are likely to be successful, it is the *threat*, not the *imposition*, of sanctions that changes a target state's behavior. Third, states that ignore the treat of sanction are unlikely to change their behavior after sanctions are imposed. Fourth, sanctions that do not change a target's behavior may still be successful by enhancing the coercer's reputation as resolute player or by producing an outcome that the coercer prefers to the status quo. The following subsections illustrate some opportunities to deal with bad rules:

Elements of a Valid Contract

Having described the ideal contracting environment, we are now ready to confront the question of what contracts are enforceable. According to the law, an enforceable contract must, first and foremost, constitute a bargain. That is, it must arise out of a mutual agreement between the two parties. This makes economic sense since agreement by both parties signifies that each expects to realize some benefit from the transaction.

But how does the law decide when there are mutual gains? Traditionally, three elements must be present: offer, acceptance, and consideration. Consideration is a legal term used to describe the promises; this is what makes the transaction mutual and hence enforceable.

Reasons for Invalidating Contracts

Now, we discuss how contract law deals with those contracts that fail to meet the ideal. In general, our discussion will involve various rules that specify the conditions that must be met for a contract to be enforceable. We see that in sense cases, the rules can be interpreted as straightforward attempts to eliminate sources of market failures as described above. However, we will also see that in some cases the most efficient rule will be far from obvious. The key questions in this discussion is: Are there any circumstances in which it would be efficient to enforce damages that are excessive in expected terms?

One might be when breach is hard to detect, as in the case of employee shirking or malfeasance. To deter inefficient breaches of this sort, damages would have to be multiplied by the inverse of the probability of detection, like punitive damages have been offered as well. An argument in support of the nonenforcement rule is that excessive damages may be a signal of mutual mistake or unconscionability (Rea, 1984). It is a signal of mutual mistake if both parties miscalculated the loss from breach, and it is a sign of unconscionability if one party miscalculated and the other took advantage of that miscalculation. In either case, nonenforcement is justified.

7.2 New Reform Elements

Frameworks for attaining fiscal policy are difficult to design. Because government spending can be aimed at redistributing wealth, as well as financing public goods and stabilizing the economy, the socially optimal level of spending is partly a matter of preference. Given spending, the optimal financing mix depends on the state of the economy. *Ex ante*, it is impossible to describe every conceivable state and to specify the optimal response for each one. *Ex post*, it is costly or impossible to observe and verify the state and whether or not the specified policy has been implemented. This is one argument for the idea that a fiscal framework must be extremely simple to observe and verify, as for example simple numerical restrictions. However, simple does not mean setting up unsatisfactory incentives and designing bad and mishandling institutions.

7.2.1 Paradoxes of Economic Sanctions and the SGP

Studies of economic sanctions have long sought to explain why economic sanctions so often fail (Baldwin, 1985; Blanchard and Ripsman, 1999; Galtung, 1967; Hufbauer et al., 1990; Martin, 1992; Morgan, 1990; Pape, 1997). A large empirical literature, based primarily on data and work by Hufbauer, Schott, and Elliott (1990), illustrate whether sanctions usually succeed and under what conditions

they fail. The observed data set shows failures of sanction enforcement in many cases. Hufbauer, Schott, and Elliott's optimistic view of sanctions is that they succeed in only about one-third of cases, but Pape (1998) pessimistic view holds that they succeed in at most 5% of cases. One of the big mysteries arising in the empirical literature on economic sanctions is: If sanctions are prone to failure and costly to enforce, why are they so often applied in international disputes?

Moreover in the unrealistic case of games with complete information, sanctions should never be imposed because you expect to impose then only if you never breach the rules. However, this is not the case in reality. To analyze this in more detail Lacy and Niou (2004) build a game theoretic model. They found that if sanctions are threatened, they may not be imposed, and, if imposed, they may not be successful. This finding is not only true in international struggles as they show, it is also what we see in the European fiscal framework, especially for the Stability and Growth Pact. The current reform discussions are straightforward in that direction to make the rules less successful if sanctions are imposed against breaching states. Moreover the analysis shows that sanctions are not more potent than the political will behind them. In line with these paradoxes in the economic sanction literature we have found similar developments in our own work. A recent development in the European Fiscal Framework induces the following paradoxical characteristics:

(A) The EMU countries were in the middle of the adjustment process when they were hit by a international depression in the year 2000. Of course the individual countries were hit differently, but the absurdity of the SGP is that the harder a economy is hit the more it is forced to restrict its fiscal policy. This has a damaging effect on the country itself, but also contagious consequences for the neighboring countries, which starts a vicious cycle within EMU because countries now have no macroeconomic policy instrument left to be decided on at their own discretion. Some proponents to the SGP would argue in line with the statement, however there is a problem:

> *The fall–off of the economic growth in the years 2001 and 2002 together with the huge budget problems which Germany and France experienced is a good illustration of the intention behind the Stability*

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*and Growth Pact. Because, if these countries had acted in accordance
with the aim of the Pact and adjusted the budget to the requirement of
'near to balance' during the period 1999-2001, where the growth was
favorable, then, today, they would have had no problems with the 3%
upper limit of the budget deficit.* (Danmarks Nationalbank, 2003)

(B) The economic analysis above also shows the difference in the incentives
for big and small countries. So it is a paradox that the EU-Commission in its
reform proposal tends to have more lax attitudes towards the bigger countries.
This could be interpreted as a renouncement of the SGP but this asymmetry is
totally misleading as argued in chapter 5.

7.2.2 New Incentive Framework: Positive Mechanism

In this section we present a theoretical foundation for incentive based coordina-
tion and interaction mechanisms.[1] All economic transactions need governance.
Much of economic theory assumes that an official legal system provides this ser-
vice. This assumption implies that the law works perfectly and costlessly (Dixit,
2001). In the reality of economic life societies have developed alternative modes
of governance. Understanding of these modes leads to a better understanding of
the official system, and even more importantly, of the interrelations among the
modes — Can alternative governance modes do as well as, or perhaps even better
than, the official law? Are different modes mutual substitutes, or can they be
complements? Every institution is designed to maximize social welfare and solve
two basic problems: It must discourage free riding and it must credibly promise
not to misuse the information, for example for extortion. Similarly to Dixit (2001)
one can describe the solution to this problem as follows: On the left hand are the
expected immediate gains from deviation, conditional on meeting a type without
a public Bad label (reputation loss), and on the right hand side are the expected
future costs of the deviation. The conclusion from this analysis is that an efficient
mechanism balances the benefits of breaching the SGP and the imposed costs.

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[1]**This section is based on the ATINER-Conference paper, 2004.**

In specific constellations in which the public detection probabilities are high self–governance works automatically and no coordination or intermediation is needed. But if the probabilities for detection are both low and the other side cheats then a two–side intermediation (co–ordination) can help. Now we develop a 'national–supranational' interaction model with an efficient coordination agency. A new finding in the model is that the national incentive structure to consolidate the financial budget must be rewarded by the supranational level or the agency. We consider the simple case of an indivisible public project (good) that has value S for national consumers. Each member state of a monetary union can realize the project. Its cost function is

$$C = \delta - e \tag{7.5}$$

where 'δ' is an efficiency parameter[1] which can be described as the costs of deficit and debt accumulation. The parameter 'e'[2] is the household consolidation effort. For expositional simplicity we will assume that efforts remain strictly positive over the relevant range of equilibrium efforts. This can be justified, because the member countries are obliged in their stability programs for steadily consolidations and at the same time the SGP prescribes a well–balanced or even surplus budget. A first question is: What is the optimal consolidation effort? Let U be the nation's utility level:

$$U = \zeta - \psi(e) \tag{7.6}$$

The utility increases with 'ζ' a transfer from the supranational (or agency) level like 'price stability' and it decreases with disutility[3] '$\psi(e)$' from national consolidation because of the partial loss of sovereignty rights in fiscal policy. Now we assume that the coordination agency is a Stackelberg leader and makes a take–it–or–leave–it offer to the member states. The agency maximizes the following

---

[1]Cf. Adverse selection rate. But because of the Stability programs that parameter is observable.

[2]Cf. Moral hazard rate.

[3]With $\psi'(e) > 0$ for $e > 0$ and $\psi''(e) > 0$, and satisfies $\psi(0) = 0$ and $\lim_{e \to \infty} \psi(e) = +\infty$.

welfare function:

$$W^S = S + U - (1 + \lambda)[\zeta + \delta - e] \tag{7.7}$$

Under complete information[1] — that is, knowing d and observing e — the agency would solve and maximize social welfare (Laffont and Tirole, 1993). Now substitute in the welfare function as defined by (7.7), the utility function (7.6), then after some trivial transformations you yield:

$$\max_{U,e}[S - (1 + \lambda)(\delta - e + \psi(e)) - \lambda U] \tag{7.8}$$

subject to $U \geq 0$ and $\lambda \geq 0$ denoting the shadow cost of public finance. The solution of this problem is

$$\psi'(e) = 1 \iff e \equiv e^* \tag{7.9}$$

$$U = 0 \iff \zeta = \psi(e^*) \tag{7.10}$$

That is, the marginal disutility of effort, $\psi(e)$, must be equal to marginal cost of savings, one. Furthermore the existence of a shadow cost of public finance implies that the national member state receives no rent (U = 0).

Proposition 7.1. *In the optimal scenario, the supranational reward 'ζ' is equal to the equilibrium disutility of consolidating the budget.*

Proof 7.1. *Solution set* □

More interesting for our purpose, the agency can offer the member state a fixed–rate contract (with $a = \psi(e^*)$):

$$\zeta(C) = a - (C - C^*) \tag{7.11}$$

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[1]The main general economic conclusions are: (1) Asymmetric incentives (information) allows the regulated actors (nation) to enjoy a rent. (2) Asymmetric incentives (information) reduces the power of the incentive schemes (effort decreases).

Proposition 7.2. *The fixed–rate incentive contract is efficient and implies that the consolidation effort is set at $e = e^*$.*

Proof 7.2. $\zeta(C) = \psi(e^*) - (e - e^*)$ *and for the equilibrium $e = e^*$ result $\zeta(C) = \psi(e^*)$* ∎

Proposition 7.3. *The supranational reward must correspond proportionally with disutility.*

Proof 7.3. *The derivative of $\zeta(C)$ is:* $\frac{d\zeta}{de} = \psi'(e^*) = 1 > 0$ *and* $\frac{d^2\zeta}{de^2} = \psi'(e^*) > 0$ ∎

Proposition 7.2 and 7.3 imply that an efficient 'supranational–national' coordination mechanism must also include a corresponding 'reward' for the budget consolidation effort of every participating member state (Tsebelis, 1990). This implies no negative incentives like sanction fees, but rather positive incentives as described in our proposal for the SGP. This result is consistent with findings in other models by Heinemann and Huefner (2002) as well as Fuchs and Lippi (2003). The novel part in our modelling is an explicit design of a coordination agency (SGP) in a stylized monetary–fiscal interaction framework. In that framework we analyze efficient incentive mechanisms like the Stability and Growth Pact in Europe. The main finding is that all interaction environments, which restrict one policy side (fiscal policy) but allow gains to the other side (monetary policy, price–stability), only work efficiently with equivalent 'rewards'.

7.3 Vote- and Reputationfunction

7.3.1 Key determinants

In theory it would be possible to apply appropriate market design and mechanisms to a huge number of common policy decisions, coordinating fiscal positions, for example. Many such mechanisms have been shown to possess desirable properties and some are simple enough that real world applications could at least be considered (Lane, 2003). The common weakness of such mechanisms is that they rely on profit maximization, which may be problematic in government interactions because the government's goals cannot be reduced to monetary gains. Money is the most natural candidate, but it is ill–suited to political application. Is there any alternative?

Thus it seems very natural for an economist to look for voting rules or interaction mechanisms where votes would function as prices, or more precisely would be equivalent to resources spent to bring about desired outcomes. The classic scheme considered by the literature is 'logrolling'; the possibility of trading votes (Irlenbusch and Sutter, 2003). Under certain circumstances, logrolling may indeed increase efficiency, but it also induce some weaknesses: First, trading votes is illegal in all democratic countries and second, it then only leads to efficient outcomes if 'prices' (votes) are fully flexible, which can only be correct in a full Coasian bargaining framework.

A pioneering alternative to vote trading, shifting votes not interpersonally, but intertemporally is done by Casella (2001). In other words, Casella creats a system of storable votes. This implies that each committee member is allowed to save his votes for future decisions and so increase his relative weight in future deliberations. Intuitively, the possibility of shifting votes across time should allow individuals to smooth their voting utility, or in other words to equate the expected marginal return of casting one's vote (Casella, 2001). Thus the intertemporal arbitrage of voting implies possible efficiency gains.[1]

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[1]Casella show this for the case of two interaction agents.

Starting from the idea in the subsection above we now develop a 'Vote- and Reputationfunction' in the ECOFIN council, which can be a real substitute for a more independent council. We suggest this novel mechanism as a promising alternative for the current SGP because it remedies the current enforcement problems and is not a radical reform proposal like delegating the decisions to an independent council or market mechanism. The main advantage is that it sets the right incentives for sustainable fiscal policy and needs no negative sanction mechanism. Second, it minimizes or eliminates 'logrolling' in the current ECOFIN-Council even though all decisions are taken in that council. As defined, sustainable fiscal policy reputation in the EMU depends on a three–dimensional vector '**r**', based on past fiscal reputation with:

- deficit and debt levels,

- inflation development and

- growth rates.

The fiscal reputation vector '**r**' is correlated with votes in the ECOFIN council. So all countries compete for votes in the council, where their relative voting power depends on their fiscal reputation. Therefore, this mechanism implies a kind of competition for votes.[1] Moreover we assume that each agent (government) has the possibility as described above of saving votes intertemporally. This generates the incentive for states to accumulate votes for situations in which they are absolutely necessary. The advantages of the mechanism are also explained above. However, modelling this functional form implies some interesting findings that are summarized in the following Propositions.

Proposition 7.4. *A vote–reputation mechanism '**r**' improves the welfare of all 'normal' countries in the decision process.*

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[1] An Experimental Analysis of Voting in the Stability and Growth Pact in the European Monetary Union was done by Irlenbusch and Sutter 2003.

Member states must choose *'No sanction'* or *'sanction'* against *'sinner'* states. Ex ante each state votes with probability $1/2$ and with varying intensity ψ, where ψ is drawn from a distribution $F(\psi)$ defined over the support $[0,1]$ and is iid. across time and individuals.

Proof 7.4. *A reputation mechanism is similar to storable votes (Cassela, 2001) where the votes are accumulated intertemporally. Thus, we indicate W as the expected value of the one–period game and $\tilde{W}$ as the value of the corresponding two–period game. The two–period welfare–decision without a reputation effect is: You win the case if your probability is greater than $1/2$ plus the coin choice ($1/2 * 1/2 = 1/4$). Formally, this is*

$$\tilde{W} = W + \delta W \tag{7.12}$$

$$\tilde{W} = \frac{3}{4} \int_0^1 \psi dF(\psi) + \delta W \tag{7.13}$$

On the other hand, if you incorporate reputation effects $\boldsymbol{r}\epsilon(0,1)$ the expected welfare changes and yields:

$$E\tilde{W} = \int_0^r \psi dF(\psi)\left(\frac{2 + F(\boldsymbol{r})}{4}\right) + \int_r^1 \psi dF(\psi)\left(\frac{3 + F(\boldsymbol{r})}{4}\right) + \delta W \tag{7.14}$$

For all $\boldsymbol{r}\epsilon(0,1)$ the last term is bigger than equation (7.13) above because the function is concave ∎

All countries with middle term reputations, meaning, reputations between $(0,1)$ (normal countries) improve their welfare. The rim reputation zero and one is unrealistic to achieve for a more dimensional target set. In the next proposition we show an additional attribute of our 'New' decision mechanism.

Proposition 7.5. *The fiscal–reputation 'r' decreases over time. Moreover structural, economic and political breaks also imply a decrease in fiscal reputation.*

The fact that each member country will maximize its profits and votes in the ECOFIN-council implies that countries in indifferent situations storage votes for situations in which they are more important like the case of 'excessive deficit procedures'. Similar to the literature about 'political business cycles' (Drazen, 2000) our 'Vote- and Reputationfunction' implies incentives to increase reputation by decreasing 'r' over time, if a new and important decision is imminent. The conjuncture of all implications imitates an independent council because there exists competition about votes and the vote decisions depend on fiscal reputation. The ECOFIN council, that indent to use our 'Vote- and Reputationfunction' is approximative the equivalent of an independent council or committee; however with the advantage of further political bargaining in the decision process. This incentive scheme reduces on the one hand logrolling and on the other hand take into account a more long–run perspective for political agents and is enforced with a reduced amount of partisan influence in the ECOFIN–Council.

7.4 Summary

It is again worth to mentioning that fiscal policy in a monetary union is the only policy instrument left to the member countries for individual demand management policies. However, fiscal policy is currently controlled by a number of supranational laws and limitations through the acceptance of the Stability and Growth Pact. The primary aim of our own reform proposal developed in this chapter is to go beyond that view.

Chapter 8

Conclusions

If the rules are considered necessary in a decentralized fiscal frame-
work and no alternative solution is found clearly superior to the SGP,
policy–makers should aim at safeguarding the SGP while improving its
implementation and its incentive structure.

Buti et al. (2003)

8.1   Summary

Designing an optimal framework is difficult; credible enforcement requires sim-
plicity. If the framework is too simple, however, it may produce sub–optimal
outcomes, as in the above scenarios, and incentives for a subsequent renegotia-
tion of the framework.

The stability of the common currency needs an appropriate framework for
fiscal policy to maintain the sustainability of public finance. At the heart of the
current political struggles over the fiscal policy framework of EMU seems to be
the difficulty of translating long–run objectives into meaningful day–to–day fis-
cal policies. As we have indicated in our thesis, there are theoretical, empirical,
operational and institutional reasons why this problem cannot be solved by the
current Stability and Growth Pact. The current simple rules focusing strictly
on numerical values with an aggravating sanction mechanism and a non–credible

sanction scheme are not appropriate for the monetary–fiscal interaction framework. We show theoretically, in chapter 4 and 5 that strict compliance is not achievable under the current SGP. Moreover analyzing the ingredients of macroeconomic institutional structures in chapter 2 and their necessary and sufficient components in chapter 6 illustrates the challenges for the new design of the Stability and Growth Pact.

The increasing necessity for fiscal rules in a monetary union where monetary policy is centralized and fiscal policy is decentralized is sufficiently explained from a theoretical perspective and from the historical record. Furthermore, preliminary empirical evidence, unfortunately with restricted data sets, illustrates that the quality of public finance and the structure of public consolidation softened with the beginning of monetary union in 1999; this has important implications for both the short–term and the longer–term economic growth perspective.

The institutional and political economic analysis in chapter 6 and 7 again reveals several trade–offs. We have therefore argued that the enforcement (and implementation of sanctions) of the Stability and Growth Pact requires on the one hand a strict disciplining structure but on the other hand a reward mechanism instead of negative money sanctions. Hence this mechanism is embedded in our proposal of the so–called 'Vote- and Reputationfunction'. One can imagine this new mechanism like a binding budget consolidation scheme. Hence, we propose a more credible and adequate enforcement mechanism for sanction threats and deal with real incentives for consolidation in good times. Our theoretical findings and the empirical observations from 2002 to 2005 show that there is a gap between fiscal consolidation incentives between bigger and smaller countries. Hence the current fiscal framework works differently between countries with different national fiscal policy rules (von Hagen et al., 2002). To solve the main trade–off and the drawbacks in the current system our reform proposal is a promising alternative without radical changes. Basically the 'Vote- and Reputationfunction' seems to be a new idea that is either overlooked and/or really clever. However the current reform discussion is not open to such a creative proposal because the political will is more for the abolishment of the fiscal framework or a fully flexi-

ble framework.[1] But as shown above, the more flexibility in the fiscal–monetary interaction framework or monetary union, the more free–riding and moral hazard is apparent. Therefore, the primary objective of the SGP is unobtainable. Von Hagen (2004) concludes in a recent empirical assessment of European fiscal policy: "...there is a need for controlling deficits more effectively."

Some readers may find our proposal unrealistic for the EMU as it is today. Even so, we also have the extension of the monetary union to the Middle and Eastern European countries in view. It seems to me that such an enlargement is not too far away. However, the challenges of how to manage a monetary union with more than 12 members is internalized in our reform proposal. Thinking beyond the current framework is necessary to evaluate the success of the monetary union. Hence, our proposal and solution scheme is also a practical mechanism in a bigger monetary union. To avoid the risk of political haggling, the provisions of the EDP and the SGP should be amended to clarify the authority.

Whatever steps are taken in the future, we should focus on the real issues as sustainability and enforceability. The basis for a credible framework is an independent assessment of public finance, in a transparent and accountable manner. Therefore, giving the European Commission greater authority in the current framework could be a step in the right direction. However, it is really unlikely to occur and again it does not necessarily solve the sufficient goals of an efficient and appropriate European Fiscal Framework.

8.2   Out look

> (...) *'The Stability and Growth Pact is a gift of the sky'*
>
> Wim Duisenberg (FAZ, 12. November 2004)

The institutional framework of the European Economic and Monetary Union (EMU) is firmly rooted in monetary as well as fiscal discipline through the Stability and Growth Pact. The creation of EMU not only entails the adoption of

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[1]Cf the current reform of the SGP, decided in the ECOFIN-Council on March 21, 2005.

a single currency but also represents a fundamental change in the overall policy–setting of the participating countries. This new policy regime involves radical changes in the way public and private agents behave.

EMU poses unique challenges for the management of fiscal policy. Most particularly, policy–makers in EMU have to maintain budgetary discipline, ensure cyclical stabilization and step up economic efficiency, as well as achieving an appropriate mix between monetary and fiscal policy.

To face such challenges and ensure a smooth functioning of EMU, member states agreed on a set of institutional arrangements and procedures in the Treaty of Maastricht and in the Stability and Growth Pact, in Amsterdam 1997. The Treaty laid down the fiscal criteria for joining EMU and established the Excessive Deficit Procedure that restrains budget deficits and promote sustainable public debt. The Stability and Growth Pact was implemented to clarify the Treaty provisions and ensure the continuation of fiscal discipline in EMU. However, the recent experience with the enforcement problems in the current SGP induced a new research agenda in economics. The new field was called: European–Macroeconomics or Fiscal–Monetary interaction in a Monetary Union.

The rationale of EMU's fiscal rules can largely be found in the 'fiscal failures' in Europe in the last three decades: a lack of fiscal discipline resulting in persistent deficits and mounting stock of debt; pro–cyclical bias in the conduct of fiscal policy which has accentuated business cycle swings, rather than smoothing them out; and a rising share of the public sector in the economy coupled with steadily increasing tax burden which has hampered efficiency and job creation. Mainly for correcting these failures, the SGP is important per se. It is also a condition for a smooth functioning of EMU. Sound public finances are required to protect the independence of the European Central Bank.

There are many possibilities for further research in this really new and challenging area. From a theoretical perspective there are some promising model extensions as mentioned in the papers in chapter 4 and 5. However, more interdisciplinary approaches such as we have taken up here are also necessary to close the gap between economic evidence and political implications and practicability. Besides this, there are many further promising extensions for future research. The main and most important one is a closer empirical evaluation of the results

and theoretical findings. Today this line of research is very difficult because of the too small data sets and time periods since the beginning of monetary union in 1999.

This thesis analyzes and advances the economics of European fiscal policy and the Stability and Growth Pact as well as fiscal–monetary interaction in the European Monetary Union. Particular attention is devoted to some of the outstanding challenges policy–makers face in EMU and within the SGP, especially the interaction of fiscal authorities trying to discipline and stabilize the output and the relationships between fiscal and monetary authorities.

All in all, this thesis is on the one hand a first attempt and on the other hand a valuable contribution to the ongoing debate on economic and fiscal policy in Europe. This work will help to improve the understanding of the effects, roles, impacts and limitations of fiscal policy — as sustainable public finance — in the European monetary union and all in reference to the "EUROPEAN STABILITY AND GROWTH PACT".

Chapter 9

Summary in German

Die vorgelegte Dissertation[1] befasst sich mit Interaktionskonflikten, welche im Spannungsfeld zwischen zentralisierter Geld– und dezentralisierter Fiskalpolitik in der Europäischen Währungsunion seit dem Jahr 1999 aufgetreten sind. Dabei fokussiert sich die Analyse auf den "Stabilitäts– und Wachstumspakt", der im Jahre 1997 mit dem Vertrag von Amsterdam implementiert wurde. Diese Interaktionsproblematik wird einerseits im Rahmen neuer theoretischer Ansätze untersucht, und zum anderen werden die theoretischen Ergebnisse zur Bewertung und Entwicklung neuer Reformoptionen für den bestehenden "Stabilitäts– und Wachstumspakt" herangezogen.

Die Dissertation bietet somit verschiedene Neuerungen: Erstens wird hier eine Fragestellung untersucht, welche eher nicht zum Mainstream in der ökonomischen Theorie zählt, da die Interaktionsproblematik von Geld–, Fiskalpolitik und Stabilitäts– und Wachstumspakt im europäischen Kontext erst im Verlaufe der letzten Jahre erkannt und aufgegriffen wurde. Zum Zweiten wird der pre-embryonale

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[1] Die Zusammenfassung in deutscher Sprache dient zur Erfüllung der Anforderung gemäß §6 Abs. 6 der Promotionsordnung für die Fakultät Sozial- und Wirtschaftswissenschaften der Universität Bamberg vom 14. Juli 1982, zuletzt geändert durch die "Achte Satzung zur Änderung der Promotionsordnung für die Fakultät Sozial- und Wirtschaftswissenschaften der Universität Bamberg vom 31. Juli 2002".

Modellierungszustand im Rahmen bestehender Interaktionsmodelle erweitert und die Wirkung des "Stabilitäts– und Wachstumspaktes" explizit analysiert. Drittens werden zwei neue Fragestellungen aufgeworfen und die dazugehörigen theoretischen Modelle entwickelt und analysiert. Basierend auf der ökonomischen Analyse wird Viertens eine "neuartige" Reformalternative zur Diskussion gestellt. Dabei werden die bisherigen Implementierungs– und Anreizprobleme minimiert und zudem unberücksichtigte trade–offs im institutionellen Gefüge handhabbar gemacht.

Das Scheitern der präventiven und disziplinierenden Vorschriften und Artikel des aktuellen Stabilitäts– und Wachstumspaktes entfachte eine heftige Reformdiskussion in Wissenschaft und Politik. Die Entscheidungen des ECOFIN–Rates sowie die Klage vor dem EuGH sorgten in den letzten Jahren erheblich für Wirbel und Furore. Aber auch von allerhöchster politischer Seite wurde der Stabilitätspakt unter Beschuss genommen. So sagte der ehemalige EU–Kommissionspräsident Romano Prodi: "Der Pakt ist dumm, wie alle Regeln, die rigide sind." Die daraus hervorgehende Reformdebatte wurde zum Teil sehr kontrovers geführt. Allerdings mangelte es bei dieser Reformdiskussion an fundierten ökonomischen Analysen, die vor allem die "neue" supranationale Interaktionsstruktur mit berücksichtigen. Nicht selten wurden Reformvorschläge entwickelt, die auf der Grundlage eines rein nationalstaatlichen Institutionengefüges basierten. Trotz der nun abgeschlossenen Reform des Stabilitäts– und Wachstumspaktes am 20. März 2005, sind viele Probleme ungelöst oder sogar weiterhin noch nicht hinreichend von der politischen Klasse erkannt.[1] Um so mehr ist es notwendig, mit der vorliegenden Arbeit die Probleme transparent darzustellen und Lösungsvorschläge aufzuzeigen, welche die Stabilität der bestehenden und die bevorstehende Erweiterung der Währungsunion hinreichend berücksichtigen.

Die Arbeit ist wie folgt strukturiert: Nach einer kurzen Einleitung in Kapitel 1 wird der europäische Fiskalrahmen, insbesondere der Stabilitäts– und Wachstumspakt sowie die notwendigen Bestandteile von effizienten Fiskalregeln in Kapi-

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[1]Wie die Verletzung des Stabilitäts– und Wachstumpaktes auch im Jahr 2005 zeigen wird. Dies hat die EU-Kommission in ihrem Frühjahrsgutachten berechnet.

tel 2 dargelegt. Kapitel 3 illustriert die wichtigsten Schwachpunkte und identifiziert zentrale Zerfallsindikatoren im Rahmen einiger historischer Währungsunionen. Die Kapitel 4 und 5, das Herzstück der Arbeit, bestehen aus einer Paperkollektion mit verschieden Modellansätzen. Die letzten beiden Kapitel widmen sich stärker der Reformdiskussion des Stabilitäts– und Wachstumspaktes. In Kapitel 6 werden die wichtigsten Reformoptionen genannt und nach Kriterien evaluiert. Im letzten inhaltlichen Kapitel 7 ist eine neuartige Reformalternative dargestellt, welche zum einen die bestehenden Anreiz- und Implementierungsprobleme behebt, zum anderen die neu aufgefundenen Fehlfunktionen berücksichtigt. Zum Schluss enthält Kapitel 8 eine kurze Zusammenfassung und einen Ausblick der gesamten Arbeit.

Der Aufbau der Arbeit im Einzelnen gliedert sich wie folgt:

Kapitel 1: Die einleitenden Bemerkungen zur Fragestellung und deren Erläuterungen dienen der Motivation und illustrieren die Intuition der vorliegenden Arbeit. Am Ende des Abschnitts wird die detaillierte Struktur der Arbeit aufgezeigt.

Kapitel 2: Zuallererst werden Kriterien für eine effiziente makroökonomische Regel dargestellt. Daran anschließend werden die institutionellen Strukturen des europäischen Fiskalrahmens beschrieben und deren trade–offs kritisch analysiert. Hierbei wird auch auf die bestehende Literatur Bezug genommen.

Kapitel 3: Der erste Teil stellt kurz die wichtigsten historischen Währungsunionen dar. Dabei fokussiert sich die Betrachtung auf das Interaktionsproblem von Geld- und Fiskalpolitik. Hierbei werden mittels einer historischen Institutionenanalyse zwei zentrale Ergebnisse erarbeitet: A.) Entscheidend für den Zerfall oder Fortbestand in früheren Währungsunionen war immer der politische Wille. Potentielle Konflikte oder Streitigkeiten führten in einem supranationalen Kontext sehr oft zu einer Erosion und später zum Zerfall der Währungsunionen. B.) In allen historischen Währungsunionen (Lateinische–, Skandinavische– und Österreich–Ungarische Währungsunion) waren Streitigkeiten über die Fiskalpolitik das Zünglein an der Waage und der beste Indikator für deren Zusammenbrechen. Daraus ableitend wird deutlich, wie wichtig ein nachhaltiger Fiskal-

rahmen und Interaktionsinstitutionen für eine stabile Währungsunion sind. Insbesondere zeigt sich diese Problematik auch in der Europäischen Währungsunion.

Kapitel 4: Die beiden folgenden Kapitel widmen sich der ökonomischen Analyse und stellen das Herzstück der vorliegenden Arbeit dar. Jeder Unterabschnitt besteht aus separaten Papers (d.h. Kapitel 4 besteht aus vier verschiedenen Ansätzen). In Abschnitt 4.1 werden die bestehenden Interaktionsmodelle zwischen Geld– und Fiskalpolitik mit dem Stabilitäts– und Wachstumspakt (SWP) erweitert. Dabei zeigt sich, dass es sogar trotz des aktuellen Stabilitäts– und Wachstumspaktes zu einer Akkumulation von Schulden kommen kann. Dieses Ergebnis bestätigt, dass sowohl der Anreizmechanismus als auch der Sanktionsmechanismus im gegenwärtigen Stabilitätspakt ungenügend sind. Des Weiteren folgt, dass das Ziel einer nachhaltigen Fiskalpolitik mit dem bestehenden SWP nur unzureichend abgesichert wird. Der Aufsatz in Abschnitt 4.2 schließt an die kontroverse Nachhaltigkeitsdiskussion in der EWU an und stellt eine neue Definition sowie eine innovative Modellierung von Nachhaltigkeit zur Diskussion. Auf deren Grundlage wird in Abschnitt 4.3 eine "Flexibilisierung" der Nachhaltigkeitsdimension modelltheoretisch diskutiert. Es zeigt sich, wenig überraschend, dass eine Flexibilisierung nur dann "Wohlfahrtsgewinne" ergibt, wenn mehr als notwendig konsolidiert wird und damit eine Art "Hyper-Nachhaltigkeitshaushalt" vorliegt. Im letzten Abschnitt 4.4 wird dann ein vollständig neuer Modellierungsansatz zur Diskussion gestellt. Dabei steht die Beschreibung der institutionellen Interaktionen im Vordergrund, was mit dynamischen Differentialgleichungen formuliert wird. Das Kernresultat ist dabei: Eine unabhängige Geldpolitik im Spannungsfeld zwischen Fiskalpolitik und Stabilitäts– und Wachstumspakt in einer Währungsunion ist enorm limitiert in der Ausübung von Disziplinierungsmaßnahmen gegenüber expansiver oder nicht nachhaltiger Fiskalpolitik. Zusammengenommen bestätigen alle Modellergebnisse die Notwendigkeit eines Fiskalrahmens wie des Stabilitäts– und Wachstumspakts. Allerdings kann auch gezeigt werden, dass der bestehende SWP–Mechanismus nicht hinreichend fundiert funktioniert und einige trade–offs im jetzigen Interaktionsgefüge überhaupt keine Berücksichtigung finden.

Kapitel 5: Das folgende Kapitel befasst sich mit der Frage[1], warum möglicherweise große Länder mehr Probleme mit dem Stabilitäts– und Wachstumspakt haben. Der neu entwickelte Modellansatz liefert dazu eine mögliche theoretische Erklärung. Das theoretische Ergebnis ist erstaunlich robust, da einerseits die aktuellen Entwicklungen in der Europäischen Währungsunion, aber auch in der Afrikanischen Währungsunion identisch mit den theoretischen Vorhersagen sind, andererseits aber auch erste empirische Studien diesen Zusammenhang bestätigen. Das in diesem Kapitel entwickelte Modell, schließt eine wichtige Lücke in der aktuellen Diskussion über die "SWP–Sünderländer" und erklärt theoretisch ein ungelöstes 'stilisiertes Faktum'[2] der empirischen Makroökonomie.

Kapitel 6: Die Kapitel 6 und 7 wenden sich der qualitativen Reformdiskussion zu. Dabei wird in Kapitel 6 zunächst die bestehende Reformdiskussion aufgearbeitet und systematisch kategorisiert. Des Weiteren werden dann die verschiedenen Reformvorschläge anhand eines erweiterten Kriterienkatalogs evaluiert und die Problemfelder kritisch diskutiert. Dabei wird deutlich, dass es keine gute und effiziente Fiskalregel zugleich geben kann. Vielmehr hat jede Regelform Vor- und Nachteile bzw. zwischen den Anforderungskriterien liegen "trade–offs" und "Konflikte". Damit ist klar, dass keine Interaktionsregel in der Europäischen Währungsunion für die Fiskalpolitik einen Anspruch auf Allgemeingültigkeit oder Optimalität erheben kann.

Kapitel 7: In diesem Kapitel wird nach einer 'Law and Economics–Analyse' von Fiskalregeln ein Reformvorschlag für den nun "reformierten" Stabilitäts- und Wachstumspakt dargestellt. Die entwickelte Reformoption versucht zum einen die bestehenden Implementierungsprobleme mit dem Sanktionsmechanismus zu beheben und zum anderen das Ziel einer nachhaltigen Fiskalpolitik stärker zu gewichten. Trotz dieser holistisch anmutenden Ziele, kann im Rahmen meiner Reformoption die Entscheidung weiterhin im ECOFIN–Rat getroffen werden und kommt somit ohne eine Delegation der Kompetenzen aus. Die Idee ist, dass die

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[1]Eine Zusammenfassung in deutscher Sprache der hier dargestellten Forschungsergebnisse wurden von mir in der Vierteljahrszeitschrift für Wirtschaftsforschung 2004, Nr. 4 publiziert.

[2]Negative Beziehung zwischen 'Output Volatilität' und 'government size'(Fatás and Mihov, 2001).

Stimmenanzahl oder Stimmengewichtung von der Fiskalreputation der letzten Jahre abhängig gemacht wird. Damit erreicht man einen besseren 'Link' zwischen zunehmender Entscheidungsmacht bei nachhaltiger Finanzpolitik und leichterer Sanktionsimplementierung bei inhärenten Haushaltsproblemen.

Kapitel 8: Das letzte Kapitel besteht aus einer Zusammenfassung und Schlussbetrachtung, welche mit einem Ausblick über die zukünftigen Entwicklungen dieser noch jungen Forschungsrichtung endet.

Es kann nicht bestritten werden, dass die hier dargestellten Essays zum Teil recht unterschiedliche Modellansätze zum Inhalt haben. Dennoch hebt sich eine Gemeinsamkeit in allen Papers hervor: Zum einen ist jeweils der Fiskalrahmen der "Europäischen Währungsunion", insbesondere der Stabilitäts– und Wachstumspakt, im Fokus. Zum anderen wird dieses Gravitationsfeld eher mittels polit–ökonomischer Modelle analysiert. Zudem sind die Ergebnisse in den verschiedenen Modellansätzen ziemlich robust. So zeigt sich zum Beispiel der trade–off zwischen großen und kleinen Ländern konsistent in drei verschiedenen Modellansätzen. Des Weiteren bestätigen alle Modellanalysen die Notwendigkeit und Reformbedürftigkeit des aktuellen "Stabilitäts– und Wachstumspaktes".

Das Verständnis für die institutionellen Interaktionen in der Europäischen Währungsunion ist nicht nur eine Herausforderung für die zukünftige ökonomische Forschung, sondern auch ein Feld, auf dem theoretisch und empirisch noch so manche Lücke zu schließen ist. Die vorliegende Arbeit soll einen ersten Schritt zur Vervollständigung und Schließung dieser Lücke aufzeigen, da bisherige Untersuchungen zum Teil theoretische Fehleinschätzungen deduzierten, indem sie explizit den Stabilitäts– und Wachstumspakt nicht berücksichtigten.

Darüber hinaus entfachte die prekäre Lage einiger nationaler Finanzhaushalte in den letzten Jahren einerseits eine Diskussion über die Wirksamkeit nationaler Fiskalpolitik und andererseits über das supranationale Korsett des Stabilitäts– und Wachstumspaktes. Jedoch ist diese Symbiose nicht mit der nun geschehenen vollständigen "Flexibilisierung", bestehend aus dem Herausrechnen der Kosten

der Europäischen Politikziele und Internationalen Solidarität, zu lösen. Voraussichtlich wird die nun verabschiedete Reform des Stabilitäts– und Wachstumspaktes eher der falsche Weg für eine erweiterte, beständige und stabile Europäische Währungsunion sein.

Das hier zusammengetragene Material sollte nicht als die letzte Antwort auf die erörterten Fragen verstanden werden. Vielmehr ist dieser Beitrag eine erste Approximation bezüglich neuer Fragestellungen im europäischen Gravitationsfeld und beleuchtet einige Problemfelder und Lücken in der bestehenden Literatur. Des Weiteren ist die interdisziplinäre Verknüpfung von ökonomischer Theorieanalyse und politik–ökonomischer Institutionenbetrachtung ein notwendiger und viel versprechender Ansatz für ein tieferes Verständnis der bestehenden und zukünftigen Interaktionsproblematik. Die weitergehenden Verflechtungen und Verwebungen der nationalen mit der europäischen Ebene werden zunehmend Konflikte bringen und damit supranationale Institutionen zu deren Lösung voraussetzen. Die vorliegende Analyse des Stabilitäts– und Wachstumspaktes kann daher auch als eine erste 'Case–Study' für die bevorstehenden und zukünftigen Interaktionsprobleme in der Europäischen Wirtschafts– und Währungsunion verstanden werden.

Appendix A

Appendix A

A.1 Mathematical Appendix: Section 4.1

A.1.1 Fiscal-Monetary Interaction Model: Technical Appendix

Derivation of normalized output equation

Output of a representative firm in country i $(i = 1, .., n)$ is given by Cobb-Douglas technology (Dixit/Lambertini 2002, Hefeker 2002, Gros and Hefekter (2002), Gros and Hefekter (2003)):

$$Y_i = K_i^{1-\eta} * L_i^{\eta} e^{\xi}, \qquad 0 < \eta < 1 \tag{A.1.1}$$

where L_i is labor and ξ represents a common shock with $E[\xi] = 0.$[1] The capital

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[1]i.e. because of homogeneous assumption a idiosyncratic shock is useless.

stock K is constant and normalized to one. Firms maximize their profits:

$$\Pi = P_t * L_{i,t}^{\eta} e^{\xi}(1 - \tau_{i,t}) - W_{i,t} L_{i,t}, \tag{A.1.2}$$

where $\tau_{i,t}$ is output tax, P_t is price level and W_t is wage rate. Both variables (P_t, W_t) are assumed uniform across the union.

Determine the labor demand, the competitive firm takes price and wage as given. So it results:

$$\frac{\partial \Pi}{\partial L_{i,t}} = 0 \Leftrightarrow P_t * \eta * L_{i,t}^{\eta-1} e^{\xi}(1 - \tau_{i,t}) - W_{i,t} = 0. \tag{A.1.3}$$

The optimal labor demand is:

$$L_{i,t}^* = \left[\frac{P_t * (1 - \tau_{i,t}) * \eta}{W_t} \right]^{\left(\frac{1}{1-\eta} \right)} * e^{\frac{\xi}{1-\eta}}. \tag{A.1.4}$$

Substituting this result into $Y_t = L_{i,t}^{\eta} e^{\xi}$ and log-linearizing it yields:

$$lnY_{i,t} = \underbrace{\frac{\eta}{1-\eta}}_{=:z} \left[lnP_t + ln(1 - \tau_{i,t}) + ln\eta + (\xi) - lnW_t \right] + \underbrace{\frac{\xi}{1-\eta}}_{=:\mu}. \tag{A.1.5}$$

For convenience, I approximate $ln(1-\tau) \approx -\tau$. Because of Trade-union Stackelberg leadership $ln(W)$ is equivalent with $r_t^* + ln(P_t^e)$. This is the claim of the trade union. Then it is:

$$lnY_{i,t} = z[ln(P_t) + (-lnP_{t-1} + lnP_{t+1}) - (r_t^* + ln(P_t^e)) - \tau_{i,t} + ln(\eta)] + \mu$$

$$\Longleftrightarrow \underbrace{lnY_{i,t}}_{=:\hat{y}_{i,t}} = z \left[\underbrace{ln(\frac{P_t}{P_{t-1}})}_{=:\pi_t} - \underbrace{ln(\frac{P_t^e}{P_{t-1}})}_{=:\pi_t^e} - \tau_{i,t} - r_t^* + ln(\eta) \right] + \mu.$$

Finally it results:

$$\hat{y}_{i,t} = z * [\pi_t - \pi_t^e - r_t^* - \tau_{i,t} + ln(\eta)] + \mu. \tag{A.1.6}$$

Solution of infinite-horizon discretionary model

Now we take the present discounted value of (A.1.11) for all t to yield the period-t intertemporal government financing requirement and define the SGP-function. This results in:

$$F_t + \sum_{\xi=t}^{T}(1+\rho)^{-(\xi-t)}\frac{\mu_\xi}{z} = \sum_{\xi=t}^{T}(1+\rho)^{-(\xi-t)}\left[(\bar{y}_t - y_t)\frac{1}{z} + (\bar{x}_t - x_{i,t}) + (\pi_t - \pi_t^e)\right] \quad \text{(A.1.1)}$$

where

$$F_t \equiv (1+\rho)d_{t-1} + G_t \quad \text{(A.1.2)}$$

$$G_t \equiv \sum_{\xi=t}^{T}(1+\rho)^{-(\xi-t)}[K_\xi + 1_\xi^{SGP}] \quad \text{(A.1.3)}$$

Here F_t stands for the deterministic component of the intertemporal government financing requirement.

Optimization of monetary and fiscal policy

The ECB selects π_t so as to minimize ($\pi^* = 0$):

$$L_t^M = \frac{1}{2}\left[\alpha_{\pi,M}\pi_t^2 + [z(\pi_t - \pi_t^e - \tau_t) - \mu_t - \bar{y}_t]^2\right] + \beta E_t[L_{t+1}^M] \quad \text{(A.1.4)}$$

Because $E_t[L_{t+1}^M]$ not depend on π_t, the ECB first-order condition is:

$$\alpha_{\pi,M}\pi_t + z[z(\pi_t - \pi_t^e - \tau_t) - \mu_t - \bar{y}_t] = 0 \quad \text{(A.1.5)}$$

The explicit loss function of the government is defined as above through

$$L_t^F = \frac{1}{2}\sum_{\xi=t}^{\infty}\beta_F^{\xi-t}E_t\left[\alpha_\pi\pi_\xi^2 + (y_{i,\xi} - \bar{y}_{i,\xi})^2 + \alpha_x(x_{i,\xi} - \bar{x}_{xi})^2\right] \quad \text{(A.1.6)}$$

The government select τ_t and d_t so as to minimize the loss function above. Again the first-order conditions and the budget constraints are $(1^{SGP} = 1^S)$:

$$\frac{\partial L_t^F}{\partial \tau_t} = 0 \Longleftrightarrow -z[z(\pi_t - \pi_t^e - \tau_t) - \mu_t - \bar{y}_t] + \alpha_x(x_t - \bar{x}_t) = 0$$

$$\text{(A.1.7)}$$

$$\frac{\partial L_t^F}{\partial d_t} = 0 \Longleftrightarrow \alpha_x(\bar{x}_t - x_t) = \beta \frac{\partial L_{t+1}^F}{\partial d_t} \tag{A.1.8}$$

$$x_t + (1 + \rho)d_{t-1} + 1^S = \tau_t + d_t \tag{A.1.9}$$

and the transversality condition that:

$$\lim_{n \longrightarrow \infty} \left(\frac{1}{1 + \rho}\right)^{\xi - t} d_{\xi+1} = 0 \tag{A.1.10}$$

and the complete budget constraints is:

$$K_t + (1 + \rho)d_{t-1} + 1^S = (\tau + \frac{\bar{y}_t}{z}) + d_t + (\bar{x}_t - x_t) \tag{A.1.11}$$

The complete system of equations is now used to solve the variables. First we solve for given debt policy and thereafter we solve for the debt policy.

Derivation of outcomes for given debt policies

Take the expectations form (A.1.7; A.1.8; A.1.11) yields:

$$\alpha_{\pi,M}\pi_t^e - z^2[\tau_t^e - \frac{\bar{y}_t}{z}] = 0 \tag{A.1.12}$$

$$z^2[\tau_t^e - \frac{\bar{y}_t}{z}] + \alpha_x(x_t^e - \bar{x}_t) = 0 \tag{A.1.13}$$

$$K_t + (1 + \rho)d_{t-1} + 1^S = (\tau^e + \frac{\bar{y}_t}{z}) + d_t^e + (\bar{x}_t - x_t^e) \tag{A.1.14}$$

The solution of the expectation system are the following equations:

$$\pi_t^e = \frac{1/\alpha_{\pi,M}}{P}[K_t + (1+\rho)d_{t-1} - d_t^e + 1^S] \tag{A.1.15}$$

$$(\bar{x}_t - x_t^e) = \frac{1/\alpha_x}{P}[K_t + (1+\rho)d_{t-1} - d_t^e + 1^S] \tag{A.1.16}$$

$$(\bar{y}_t - y_t^e) = \frac{1/z}{P}[K_t + (1+\rho)d_{t-1} - d_t^e + 1^S] \tag{A.1.17}$$

with $P := \frac{1}{z^2} + \frac{1}{\alpha_x}$. Now calculate the difference system $(g^d = g - g^e)$ for the first-order conditions. The results are:

$$\alpha_{\pi,M}\pi_t^d + z[z(\pi_t^d - \tau_t^d) - \mu_t] = 0 \tag{A.1.18}$$

$$-z^2[\pi_t^d - \tau_t^d - \frac{\mu_t}{z}] + \alpha_x x_t^d = 0 \tag{A.1.19}$$

$$0 = \tau^d + d_t^d - x_t^d \tag{A.1.20}$$

The analoge solution procedure as above give me:

$$\pi_t^d = -\left(\frac{1/\alpha_{\pi,M}}{P_M^*}\right)(d_t^d - \frac{\mu_t}{z}) \tag{A.1.21}$$

$$x_t^d = \left(\frac{1/\alpha_x}{P_M^*}\right)(d_t^d - \frac{\mu_t}{z}) \tag{A.1.22}$$

$$y_t^d = \left(\frac{1/z}{P_M^*}\right)(d_t^d - \frac{\mu_t}{z}) \tag{A.1.23}$$

$$\tag{A.1.24}$$

with $P_M^* := \frac{1}{\alpha_x} + \frac{1}{z^2} + \frac{1}{\alpha_{\pi,M}}$. The addition of both components solve the system for a given debt policy. After some calculation it results:

$$\pi_t = \frac{1/\alpha_{\pi,M}}{P}[K_t + (1+\rho)d_{t-1} - d_t^e + 1^S] + \left(\frac{1/\alpha_{\pi,M}}{P_M^*}\right)(\frac{\mu_t}{z} - d_t^d) \tag{A.1.25}$$

$$(\bar{x}_t - x_t) = \frac{1/\alpha_x}{P}[K_t + (1+\rho)d_{t-1} - d_t^e + 1^S] + \left(\frac{1/\alpha_x}{P_M^*}\right)(\frac{\mu_t}{z} - d_t^d) \tag{A.1.26}$$

$$(\bar{y}_t - y_t) = \frac{1/z}{P}[K_t + (1+\rho)d_{t-1} - d_t^e + 1^S] + \left(\frac{1/z}{P_M^*}\right)(\frac{\mu_t}{z} - d_t^d) \tag{A.1.27}$$

Solution of the whole model for public debt

To evaluate $\frac{\partial L_{t+1}^F}{\partial d_t}$ we forward (A.1.25-27) by one period and substitute it in the following equation:

$$\frac{1}{2}E_t\left[\alpha_\pi \pi_{t+1}^2 + (y_{t+1} - \bar{y}_{t+1})^2 + \alpha_x(x_{t+1} - \bar{x}_{t+1})^2\right] \tag{A.1.28}$$

The derivation with respect to d_t of the above expression is:

$$E_t\left[\alpha_\pi \pi_{t+1}(1+\rho)\frac{1/\alpha_{\pi,M}}{P} + (\bar{y}_{t+1} - y_{t+1})(1+\rho)\frac{1/z}{P} + \alpha_x(\bar{x}_{t+1} - x_{t+1})(1+\rho)\frac{1/\alpha_x}{P}\right] \tag{A.1.29}$$

combine with (B.7) and define $\beta^* := \beta(1+\rho)$ is

$$\alpha_x(\bar{x}_t - x_t) = \beta^* E_t\left[\pi_{t+1}\frac{\alpha_\pi/\alpha_{\pi,M}}{P} + (\bar{y}_{t+1} - y_{t+1})\frac{1/z}{P} + (\bar{x}_{t+1} - x_{t+1})\frac{1}{P}\right] \tag{A.1.30}$$

now combine this with (A.1.25-A.1.27) and with $Q_M := \frac{\alpha_\pi}{\alpha_{\pi,M}^2} + \frac{1}{z^2} + \frac{1}{\alpha_x}$ yields:

$$[K_t + (1+\rho)d_{t-1} - d_t^e + 1^S] + \left(\frac{P}{P_M^*}\right)(\frac{\mu_t}{z} - d_t^d) = \beta^*\frac{Q_M}{P}[K_{t+1} + (1+\rho)d_t - d_{t+1}^e + 1^S] \tag{A.1.31}$$

The solution of this equation is calculated in two steps. First take the expectations E_{t-1} from the equation above. The is then

$$[K_t + (1+\rho)d_{t-1} - E_{t-1}[d_t] + 1^S] = \beta^*\frac{Q_M}{P}[K_{t+1} + (1+\rho)d_t - d_{t+1}^e + 1^S] \tag{A.1.32}$$

and solve that term to $E_{t-1}[d_t]$ is:

$$E_{t-1}[d_t] = \frac{[K_t + (1+\rho)d_{t-1} + 1^S] - \beta^*\frac{Q_M}{P}[K_{t+1} - E_{t-1}[d_{t+1}] + 1^S]}{1 + \beta^*(1+\rho)\frac{Q_M}{P}} \tag{A.1.33}$$

In the second step we calculate the difference (A.1.31)-(A.1.32), hence

$$\frac{P}{P_M^*}(\frac{\mu_t}{z} - d_t^d) = \beta^* \frac{Q_M}{P}(E_{t-1}[d_{t+1}] - E_t[d_{t+1}]) + \beta^*(1+\rho)\frac{Q_M}{P}d_t^d \qquad (A.1.34)$$

isolating d_t^d is

$$d_t^d = \left[\frac{1}{1 + \beta^*(1+\rho)\frac{P_M^*}{P}\frac{Q_M}{P}}\right]\frac{\mu_t}{z} + \left[\frac{\beta^*\frac{P_M^*}{P}\frac{Q_M}{P}}{1 + \beta^*(1+\rho)\frac{P_M^*}{P}\frac{Q_M}{P}}\right](E_{t-1}[d_{t+1}] - E_t[d_{t+1}])$$

$$(A.1.35)$$

To find an explicit solution for d_t^d, we use (A.1.33) forwarded by ξ periods. After substraction from the expectation a period before, we obtain:

$$E_t[d_{t+\xi}] - E_{t-1}[d_{t+\xi}] = \frac{(1+\rho)(E_t[d_{t+\xi-1}] - E_{t-1}[d_{t+\xi-1}]) + \beta * \frac{Q_M}{P}(E_t[d_{t+\xi+1}] - E_{t-1}t[d_{t+\xi+1}])}{1 + \beta^*(1+\rho)\frac{Q_M}{P}}$$

$$(A.1.36)$$

The solution for this is found with the following trick. Define $E_t[d_{t+\xi+1}] - E_{t-1}[d_{t+\xi+1}] = \hbar E_t[d_{t+\xi}] - E_{t-1}[d_{t+\xi}]$, $\forall \xi \geq 1$. Substitute this in the equation above and write the result in respect to $\hbar$ yields:

$$\beta^* \frac{Q_M}{P}\hbar^2 - [1 + \beta^*(1+\rho)\frac{Q_M}{P}]\hbar + (1+\rho) = 0 \qquad (A.1.37)$$

to solve this quadratic equation yields the to solutions: $\hbar = (1+\rho)$ which is impossible because of the transversality condition and $\hbar^* = \frac{1}{\beta^*\frac{Q_M}{P}}$. Using that solution in the equation above, we can it rewrite as,

$$E_t[d_{t+1}] - E_{t-1}[d_{t+1}] = \frac{1}{\beta^*\frac{Q_M}{P}}d_t^d \qquad (A.1.38)$$

Setting this result in (A.1.35) yields finally the result for d_t^d as:

$$d_t^d = \left[\frac{1}{1 + \frac{P^*}{P}[\beta^*(1+\rho)\frac{Q_M}{P} - 1]}\right]\frac{\mu_t}{z} \qquad (A.1.39)$$

Derivation of an explicit solution for $E_{t-1}[d_t]$

From (A.1.17) and forwarded by ξ the following both equations results,

$$(\overline{y_{t+\xi}} - E_{t-1}y_{t+\xi}) = \frac{1/z}{P}[K_{t+\xi} + (1+\rho)E_{t-1}d_{t+\xi-1} - E_{t-1}d_{t+\xi} + 1^S_{t+\xi}]$$

(A.1.40)

$$(\overline{y_{t+\xi+1}} - E_{t-1}y_{t+\xi} + 1) = \frac{1/z}{P}[K_{t+\xi+1} + (1+\rho)E_{t-1}d_{t+\xi} - E_{t-1}d_{t+\xi+1} + 1^S_{t+\xi+1}]$$

(A.1.41)

See that with the use of (A.1.31) forwarded for $E_{t-1}d_{t+\xi}$ are

$$[\mathrm{K}_{t+\xi} + (1+\rho)E_{t-1}d_{t+\xi-1} - E_{t-1}d_{t+\xi} + 1^S_{t+\xi}]$$
$$= \beta^* \frac{Q_M}{P}\left[\frac{(1+\rho)[K_{t+\xi}+(1+\rho)E_{t-1}d_{t+\xi-1}+1^S_{t+\xi}]+[K_{t+\xi+1}-E_{t-1}d_{t+\xi+1}+1^S_{t+\xi+1}]}{1+\beta^*(1+\rho)\frac{Q_M}{P}}\right]$$

similar is

$$\mathrm{K}_{t+\xi+1} + (1+\rho)E_{t-1}d_{t+\xi} - E_{t-1}d_{t+\xi+1} + 1^S_{t+\xi+1}]$$
$$= \left[\frac{(1+\rho)[K_{t+\xi}+(1+\rho)E_{t-1}d_{t+\xi-1}+1^S_{t+\xi}]+[K_{t+\xi+1}-E_{t-1}d_{t+\xi+1}+1^S_{t+\xi+1}]}{1+\beta^*(1+\rho)\frac{Q_M}{P}}\right]$$

Hence it result the following relationship for 'y':

$$(\overline{y_{t+\xi+1}} - E_{t-1}y_{t+\xi} + 1) = \frac{1}{\beta^*\frac{Q_M}{P}}(\overline{y_{t+\xi}} - E_{t-1}y_{t+\xi})$$

(A.1.42)

and

$$(\overline{x_{t+\xi+1}} - E_{t-1}x_{t+\xi} + 1) = \frac{1}{\beta^*\frac{Q_M}{P}}(\overline{x_{t+\xi}} - E_{t-1}x_{t+\xi})$$

(A.1.43)

Combining now these two results with the intertemporal budget requirement yields:

$$F_t = \sum_{\xi=0}^{\infty}(1+\rho)^{-(\xi)}\left[(\bar{y}_{t+\xi} - E_{t-1}y_{t+\xi})\frac{1}{z} + (\bar{x}_{t+\xi} - E_{t-1}x_{t+\xi})\right]$$

(A.1.44)

$$F_t = \sum_{\xi=0}^{\infty}\left(\frac{1}{\beta^*(1+\rho)\frac{Q_M}{P}}\right)^{(\xi)}\left[(\bar{y}_t - E_{t-1}y_t)\frac{1}{z} + (\bar{x}_t - E_{t-1}x_t)\right]$$

(A.1.45)

with an explicit definition of the sum the last equation is

$$\left[(\bar{y}_t - E_{t-1}y_t)\frac{1}{z} + (\bar{x}_t - E_{t-1}x_t)\right] = \left[\frac{\beta^*(1+\rho)\frac{Q_M}{P} - 1}{\beta^*(1+\rho)\frac{Q_M}{P}}\right]F_t \tag{A.1.46}$$

Hence,

$$(\bar{y}_t - E_{t-1}y_t)\frac{1}{z} = \frac{1/z^2}{P}\left[\frac{\beta^*(1+\rho)\frac{Q_M}{P} - 1}{\beta^*(1+\rho)\frac{Q_M}{P}}\right]F_t \tag{A.1.47}$$

$$(\bar{g}_t - E_{t-1}g_t)\frac{1}{z} = \frac{1/\alpha_x}{P}\left[\frac{\beta^*(1+\rho)\frac{Q_M}{P} - 1}{\beta^*(1+\rho)\frac{Q_M}{P}}\right]F_t \tag{A.1.48}$$

with $\zeta_1 := \left[\frac{\beta^*(1+\rho)\frac{Q_M}{P} - 1}{\beta^*(1+\rho)\frac{Q_M}{P}}\right]F_t$ defined.

Computation of $E_{t-1}d_t$. From (A.1.2) with (A.1.46) is:

$$K_t + (1+\rho)d_{t-1} - E_{t-1}d - t + 1^S = \zeta_1[(1+\rho)d_{t-1} + G_t] \tag{A.1.49}$$

isolating $E_{t-1}d_t$ yields:

$$E_{t-1}d_t = \frac{1}{\beta^*(Q_M/P)}d_{t-1} + K_t + 1_t^S - \zeta_1\sum_{\xi=t}^{\infty}(1+\rho)^{-(\xi-t)}(K_\xi + 1_\xi^S) \tag{A.1.50}$$

$$= \frac{1}{\beta^*(Q_M/P)}d_{t-1} + \frac{(G_t - G_{t+1}) + [1 - \beta^*(Q_M/P)]G_{t+1}}{\beta^*(1+\rho)(Q_M/P)} \tag{A.1.51}$$

Final outcomes

$$\pi_t = \left[\frac{1/\alpha_{\pi,M}}{P}\right]\zeta_1 F_t + \left[\frac{1/\alpha_{\pi,M}}{P_M^*}\right]\zeta_2\left(\frac{\mu_t}{z}\right) \tag{A.1.52}$$

$$\bar{y}_t - y_t = \left[\frac{1/z}{P}\right]\zeta_1 F_t + \left[\frac{1/z}{P_M^*}\right]\zeta_2\left(\frac{\mu_t}{z}\right) \tag{A.1.53}$$

$$\bar{x}_t - x_t = \left[\frac{1/\alpha_x}{P}\right]\zeta_1 F_t + \left[\frac{1/\alpha_x}{P_M^*}\right]\zeta_2\left(\frac{\mu_t}{z}\right) \tag{A.1.54}$$

and

$$d_t = \frac{1}{\beta^* \frac{Q_M}{P}} d_{t-1} + \frac{(G_t - G_{t+1}) + [1 - \beta^*(Q_M/P)]G_{t+1}}{\beta^*(1+\rho)(Q_M/P)} + \zeta_3 \left(\frac{\mu}{z}\right) \qquad \text{(A.1.55)}$$

with

$$\zeta_2 := \frac{(\frac{P_M^*}{P})[\beta^*(1+\rho)\frac{Q_M}{P} - 1]}{1 + (\frac{P_M^*}{P})[\beta^*(1+\rho)\frac{Q_M}{P} - 1]}$$

and

$$\zeta_3 := \frac{1}{(\frac{P_M^*}{P})[\beta^*(1+\rho)\frac{Q_M}{P} - 1]}. \qquad \text{(A.1.56)}$$

Explicit debt optimization in the two-period model

In this appendix we present the solution of a two period model of monetary-fiscal interaction with the SGP. The assumptions and definitions are given.

Backward solution from $t = 2$ is:

$$\frac{\partial L^M}{\partial \pi_2} = 0 \iff \alpha_{\pi,M}\pi_2 + z^2[\pi_2 - \pi_2^e - \tau_{i,2} - \frac{\mu}{z} - \frac{y_2}{z}] = 0 \qquad \text{(A.1.1)}$$

and

$$\frac{\partial L^F}{\partial \tau_2} = 0 \iff -z^2[\pi_2 - \pi_2^e - \tau_{i,2} - \frac{\mu}{z} - \frac{y_2}{z}] + \alpha_{x,s}(x_{i,2} - \bar{x}_2) = 0 \qquad \text{(A.1.2)}$$

and

$$\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1} - \bar{D}) = (\tau_{i,2} + \frac{\bar{y}_2}{z}) + \kappa\pi_2 + \frac{\phi^R}{n-1}\sum_{j=1,i\neq j}^{n}(d_{j,1} - \bar{D}) + (\bar{x}_2 - x_{i,2}) \qquad \text{(A.1.3)}$$

Now take the expectations form the three equation above. This result in:

$$\alpha_{\pi,M}\pi_2^e + z^2[-\tau_{i,2}^e - \frac{y_2}{z}] = 0 \qquad \text{(A.1.4)}$$

$$-z^2[-\tau_{i,2}^e - \frac{y_2}{z}] + \alpha_{x,s}(x_{i,2}^e - \bar{x_2}) = 0 \tag{A.1.5}$$

The solution of equation system above is:

$$\kappa\pi_2^e = \frac{\kappa/\alpha_{\pi,M}}{S}[\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1} - \bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1} - \bar{D})] \tag{A.1.7}$$

with $S := \frac{1}{\alpha_{x,s}} + \frac{1}{z^2} + \frac{\kappa}{\alpha_{\pi,M}}$ and

$$(\bar{x_2} - x_{i,2}^e) = \frac{1/\alpha_{x,s}}{S}[\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1} - \bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1} - \bar{D})] \tag{A.1.8}$$

and

$$(\bar{y_{i,2}} - y_{i,2}) = \frac{1/z}{S}[\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1} - \bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1} - \bar{D})]. \tag{A.1.9}$$

Set this results in the loss function we find the second-period deterministic function for the monetary and fiscal authority:

$$L_2^{MD} = \frac{S^*}{2S^2}\left[\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1} - \bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1} - \bar{D})\right]^2 \tag{A.1.10}$$

$$L_2^{FD} = \frac{P}{2S^2}\left[\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1} - \bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1} - \bar{D})\right]^2 \tag{A.1.11}$$

with $S^* := \frac{1}{\alpha_{\pi,M}} + \frac{1}{z^2}$ and $P := \frac{\alpha_{\pi,S}}{\alpha_{\pi,M}} + \frac{1}{z^2} + \frac{1}{\alpha_{x,s}}$.

The solution of the system is derived in two steps. In the first step, we calculate the deterministic components of the policy instruments (i.e the expected values). While in

a second step, we calculate the stochastic components of the policy instruments.The next step is to solve the differences of the equation system. This yields the following equations:

$$\alpha_{\pi,M}\pi_2^d + z^2[\pi_2^d - \tau_2^d - \frac{\mu_2}{z}] = 0 \tag{A.1.12}$$

$$-z^2[\pi_2^d - \tau_{i,2}^d - \frac{\mu_2}{z}] + \alpha_{x,s}x_{i,2}^d = 0 \tag{A.1.13}$$

$$\tau_{i,2}^d + \kappa\pi_2^d - x_{i,2}^d = 0 \tag{A.1.14}$$

The solution of that system yields:

$$\pi_2^d = \frac{1/\alpha_{\pi,M}}{S + \frac{1}{\alpha_{\pi,M}}}\left(\frac{\mu_2}{z}\right) \tag{A.1.15}$$

$$x_{i,2}^d = -\frac{1/\alpha_{x,s}}{(S + \frac{1}{\alpha_{\pi,M}})}\left(\frac{\mu_2}{z}\right) \tag{A.1.16}$$

$$y_{i,2}^d = -\frac{1/z}{(S + \frac{1}{\alpha_{\pi,M}})}\left(\frac{\mu_2}{z}\right) \tag{A.1.17}$$

Now substitute the solution values in the loss function. Thus results are:

$$L_2^{MS} = \frac{S^*}{2(S + \frac{1}{\alpha_{\pi,M}})}\left(\frac{\sigma_{\mu_2}^2}{z^2}\right) \tag{A.1.18}$$

$$L_2^{FS} = \frac{S^* + \frac{1}{\alpha_{x,s}}}{2(S + \frac{1}{\alpha_{\pi,M}})}\left(\frac{\sigma_{\mu_2}^2}{z^2}\right) \tag{A.1.19}$$

The next step is now to solve the model in period one. The loss functions in period one are:

$$L_1^M = \frac{1}{2}\left[\alpha_{\pi,M}\pi_1^2 + [z(\pi_1 - \pi_1^e - \tau_1) - \mu - \bar{y}_1]^2\right] + \lambda_s\left(L_2^{MD} + L_2^{MS}\right) \tag{A.1.20}$$

$$L_1^F = \frac{1}{2}\left[\alpha_{\pi,M}\pi_1^2 + [z(\pi_1 - \pi_1^e - \tau_1) - \mu - \bar{y}_1]^2 + \alpha_{x,s}(x_1 - \bar{x}_1)^2\right] + \lambda_s\left(L_2^{FD} + L_2^{FS}\right) \tag{A.1.21}$$

Optimize these two functions results in:

$$\frac{\partial L_1^M}{\partial \pi_1} = 0 \Longleftrightarrow \alpha_{\pi,M}\pi_1 + z^2[\pi_1 - \pi_1^e - \tau_1 - \frac{\mu}{z} - \frac{\bar{y}_1}{z}] = 0 \tag{A.1.22}$$

$$\frac{\partial L_1^F}{\partial \tau_{i,1}} = 0 \Longleftrightarrow -z^2[\pi_1 - \pi_1^e - \tau_1 - \frac{\mu}{z} - \frac{\bar{y}_1}{z}] + \alpha_{x,s}(x_1 - \bar{x}_1) = 0 \tag{A.1.23}$$

$$\frac{\partial L_1^F}{\partial d_{i,1}} = 0 \Longleftrightarrow \alpha_{x,s}(\bar{x}_1 - x_1) = \lambda_{FU}[(1+\rho) + \phi^L] \tag{A.1.24}$$

$$\left(\bar{K}_2 + (1+\rho)d_{i,1} + \phi^L(d_{i,1} - \bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1} - \bar{D}) \right) \tag{A.1.25}$$

with $\lambda_{FU} := \lambda_F \frac{P}{S^2}$ and the budget constraint in period one

$$\bar{K}_1 = (\tau_{i,1} + \frac{\bar{y}_1}{z}) + \kappa\pi_1 + d_{i,1} + (\bar{x}_1 - x_{i,1}) + (\phi^L - \phi^R)\bar{D} \tag{A.1.26}$$

The same procedure as in period one solve that system. In Step 1 we take the expectations from the four equations above and solve it to the key variables. This is:

$$\alpha_{\pi,M}\pi_1^e + z^e[-\tau_1^e - \frac{\bar{y}_1}{z}] = 0 \tag{A.1.27}$$

$$-z^e[-\tau_1^e - \frac{\bar{y}_1}{z}] + \alpha_{x,s}(x_1^e - \bar{x}_1) = 0 \tag{A.1.28}$$

$$\alpha_{x,s}(\bar{x}_1 - x_1^e) = \lambda_{FU}[(1+\rho) + \phi^L]* \tag{A.1.29}$$

$$* \left(\bar{K}_2 + (1+\rho)d_{i,1}^e + \phi^L(d_{i,1}^e - \bar{D}) - \frac{\phi^R}{n-1}\sum(d_{j,1} - \bar{D}) \right) \tag{A.1.30}$$

$$\bar{K}_1 = (\tau_{i,1}^e + \frac{\bar{y}_1}{z}) + \kappa\pi_1^e + d_{i,1}^e + (\bar{x}_1 - x_{i,1}^e) + (\phi^L - \phi^R)\bar{D} \tag{A.1.31}$$

The solution is

$$\kappa\pi^e = \frac{\kappa/\alpha_{\pi,M}}{S}[\bar{K}_1 - (\phi^L - \phi^R)\bar{D} - d^e_{i,1}] \tag{A.1.32}$$

$$(\bar{x}_1 - x^e_1) = \frac{1/\alpha_{x,s}}{S}[\bar{K}_1 - (\phi^L - \phi^R)\bar{D} - d^e_{i,1}] \tag{A.1.33}$$

$$(y^e_1 - \bar{y}_1) = -\frac{1/z}{S}[\bar{K}_1 - (\phi^L - \phi^R)\bar{D} - d^e_{i,1}] \tag{A.1.34}$$

$$d^e_{i,1} = \left[\frac{1}{1 + u(1 + \rho + \phi^L)}\right](\bar{K}_1 - u\bar{K}_2 - (1-u)(\phi^L - \phi^R)\bar{D} + u\frac{\phi^R}{n-1}\sum(d_{j,1})) \tag{A.1.35}$$

with $u := \lambda\frac{P}{S}$. Now take the difference of the system and solve it. That yields

$$\alpha_{\pi,M}\pi^d_1 + z^2[\pi^d_1 - \tau^d_1 - \frac{\mu_1}{z}] = 0 \tag{A.1.36}$$

$$\alpha_{x,s}x^d_1 - z^2[\pi^d_1 - \tau^d_1 - \frac{\mu_1}{z}] = 0 \tag{A.1.37}$$

$$-\alpha_{x,s}x^d_1 = \lambda_{FU}[1 + \rho + \phi^L]^2 d^d_{i,1} \tag{A.1.38}$$

$$\tau^d_{i,1} + \kappa\pi^d_1 + d^d_{i,1} - x^d_1 \qquad = 0 \tag{A.1.39}$$

The solution is:

$$\pi^d_1 = \frac{1/\alpha_{\pi,M}}{\frac{1}{\alpha_{\pi,M}} - S(\frac{1}{u(1+\rho+\phi^L)})}\left(\frac{\mu_1}{z}\right) \tag{A.1.40}$$

$$x^d_1 = \frac{1/\alpha_{x,s}}{\frac{1}{\alpha_{\pi,M}} - S(\frac{1}{u(1+\rho+\phi^L)})}\left(\frac{\mu_1}{z}\right) \tag{A.1.41}$$

From (A.1.37) results τ^d_1 and from (A.1.38) d^d_1. The combination with the expectations are the results in period 2.

Proofs

Result (i)

Part (a) follows directly from,

$$\frac{\partial d_{i,1}}{\partial \lambda^*} = \frac{-[1+\rho][\bar{K}_2](1+\lambda^*[1+\rho]^2) - (\bar{K}_1 - \lambda^*[1+\rho]\left[\bar{K}_2 - \bar{D}\right])[1+\rho]^2}{[1+\lambda^*[1+\rho+\phi^L]^2]^2} < 0.$$
(A.1.42)

with the assumption that $d_{i,1} > 0$. Part (c) results in,

$$\frac{\partial d_{i,1}}{\partial \rho} = \frac{-\lambda^*[\bar{K}_2](1+\lambda^*[1+\rho]^2) - (\bar{K}_1 - \lambda^*[1+\rho]\left[\bar{K}_2 - \bar{D}\right])2\lambda^*[1+\rho]}{[1+\lambda^*[1+\rho+\phi^L]^2]^2} < 0.$$
(A.1.43)

Proof of Proposition 3

If $d_i = d_j$, then

$$d_{i,1}\left[1+\lambda^*[1+\rho+\phi^L][1+\rho+(\phi^L-\phi^R)]\right] = \bar{K}_1 - (\phi^L-\phi^R) - \lambda^*[1+\rho+\phi^L][K_2 - (\phi^L - \bar{\phi}^R)\bar{D}] \quad \text{(A.1.44)}$$

For derivation of the results in part (a) and (b) in Proposition 3 to ϕ^L and ϕ^R notice that only the numerator is important for the sign. Thus a use the following mark $\propto$ to indicate that the sign of both sides are identical.

Part (a):

$$\frac{\partial d_{i,1}}{\partial \phi^L} \propto (1 - [\lambda^*(\bar{K}_2 - (\phi^L - \phi^R)\bar{D}) + \lambda^*[1 + \rho + \phi^L](-\bar{D})])[[1 + \lambda^*[1 + \rho + \phi^L]^2]^2] -$$

$$(A.1.45)$$

$$[\bar{K}_1 - (\phi^L - \phi^R) - \lambda^*[1 + \rho + \phi^L][K_2 - (\phi^L - \phi^R)\bar{D}]][\lambda^*[1 + \rho + (\bar{\phi}^L - \phi^R)] + \lambda^*[1 + \rho + \phi^L]] < 0$$

$$(A.1.46)$$

with $\phi^L = \frac{\phi^R}{2}$ and $d_1 > 0$.

Part (b):

$$\frac{\partial d_{i,1}}{\partial \phi^R} \propto \left[1 + \lambda^*[1 + \rho + \phi^L][1 + \rho + (\phi^L - \phi^R)] \right] + \tag{A.1.47}$$

$$[\bar{K}_1 - (\phi^L - \phi^R) - \lambda^*[1 + \rho + \phi^L][K_2 - (\phi^L - \phi^R)\bar{D}]]\bar{\lambda}^*[1 + \rho + \phi^L] > 0$$

$$(A.1.48)$$

Part (c):

$$\frac{\partial d_{i,1}}{\partial \bar{D}} = -\frac{\lambda^*[1 + \rho + \phi^L](\phi^R - \phi^L)}{1 + \lambda^*[1 + \rho + \phi^L][1 + \rho + (\phi^L - \phi^R)]} \begin{pmatrix} > \\ \leq \end{pmatrix} 0, \qquad if \begin{pmatrix} \phi^L > \phi^R \\ \phi^R > \phi^L \end{pmatrix} \blacksquare$$

$$(A.1.49)$$

A.2 Mathematical Appendix for 4.2 and 4.3

A.2.1 Sustainability Model within the SGP: Technical Appendix

Definition of Sustainability: Model Approach

Now we are ready to define the problem formally:

$$\max_u \int_0^\infty ln[u(t)]e^{-\delta t} dt \tag{A.2.1}$$

$$s.t. \quad \dot{d} = r*d\left(1 - \frac{d}{k}\right) - u \qquad r > 0, k > 0 \tag{A.2.2}$$

$$d_{t=0} = d_0 \tag{A.2.3}$$

The parameter 'r' can interpreted as debt growth, 'k' represent the whole financial budget revenues (on GDP) and 'δ' is a discount rate. Additionally we assume that $r > \delta > 0$ which is normal for that problems. The functional form of the budget constraint (A.2.2) is the typical modelling approach in resource economics.[1] Moreover we transfer the 'Maximum Sustainable Yield' (MSY) concept here for debt $d^* < d_{MSY} = k/2$. To solve this problem we use a 'Hamilton function'. From optimal control theory — a first-order necessary condition — is known as the *maximum principle* or *pontryagin principle*. Denoted by H, the Hamiltonian is defined as

$$\tilde{H} = ln[u] + \lambda(t)\left[rd\left(1 - \frac{d}{k}\right) - u\right] \tag{A.2.4}$$

---

[1] $F(d) = rd\left(1 - \frac{d}{k}\right).$

For the problem 4.17 and with the Hamiltonian defined $(\tilde{H} = He^{rt})$ in (A.2.4) the maximum principle conditions are

$$\frac{\partial \tilde{H}}{\partial u} = \frac{1}{u} - \lambda = 0 \tag{A.2.5}$$

$$\dot{\lambda} - \delta\lambda = -\frac{\partial \tilde{H}}{\partial d} = -\lambda r \left[1 - \frac{2d}{k}\right] \tag{A.2.6}$$

$$\dot{d} = \frac{\partial \tilde{H}}{\partial \lambda} = rd\left(1 - \frac{d}{k}\right) - u \tag{A.2.7}$$

First, after the derivation of the first-order condition equation (A.2.5) yields:

$$\dot{\mu} = -\frac{1}{u^2}\dot{u} \tag{A.2.8}$$

this in connection with the second first-order condition is:

$$\dot{\mu} = \delta\mu - \mu r \left[1 - \frac{2d}{k}\right] = -\frac{1}{u^2}\dot{u} \tag{A.2.9}$$

Isolation $\dot{u}$ yields the condition below:

$$\dot{d} = rd\left(1 - \frac{d}{k}\right) - u \tag{A.2.10}$$

$$\dot{u} = -u\left(\delta - r\left[1 - \frac{2d}{k}\right]\right) \tag{A.2.11}$$

The solution of this differential equation system result in the optimal debt path d^* and the optimal consolidation path u^*. The results are $(\dot{u} = \dot{d} = 0)$:

$$d^* = \frac{k(r - \delta)}{2r} \tag{A.2.12}$$

$$u^* = \frac{k}{2}(r^2 - \delta^2) \tag{A.2.13}$$

Because of the transversality condition (TC) $\lim_{t\to\infty} \lambda(t) \to 0$; we can proof that the path are stable with an unique equilibrium. Because: $\tilde{H} = He^{rt} \Rightarrow H = e^{-rt}ln(u) + \lambda[rd(1 - \frac{d}{k}) - u] \to 0$, because of the TC.

Derivation of the CCB function

The general CCB function is

$$U_{CCB} = \lambda\left(-\frac{\pi^2}{2\phi}\right) + (1-\lambda)\frac{1}{n}\sum_{i=1}^{n}\left[1-(1+\pi^e-\pi)b_{1i}-\psi(d_{2i}-\bar{d}_{2i})+\frac{\psi}{n-1}\sum_{j=1,j}^{n}(d_{2j}-\bar{d}_{2j})\right]$$
(A.2.1)

The following transformation yields,

$$\text{U}_{CCB} = (1-\lambda)\left(\frac{-\pi^2}{2\phi\frac{(1-\lambda)}{\lambda}}\right) + \frac{1}{n}\sum_{i=1}^{n}\left[1-(1+\pi^e-\pi)b_{1i}-\psi(d_{2i}-\bar{d}_{2i})+\frac{\psi}{n-1}\sum_{j=1,j}^{n}(d_{2j}-\bar{d}_{2j})\right] \text{(A.2.2)}$$

Making the sum explicit and with $\alpha := \frac{\phi(1-\lambda)}{\lambda} \geq 0$ result in:

$$U_{CCB} = (1-\lambda)\left(-\frac{\pi^2}{2\alpha}\right) + \left[1-(1+\pi^e-\pi)\tilde{b}_{1i}\right] + \frac{1}{n}\sum_{i=1}^{n}\left[-\psi(d_{2i}-\bar{d}_{2i})+\frac{\psi}{n-1}\sum_{j=1,j}^{n}(d_{2j}-\bar{d}_{2j})\right]$$
(A.2.3)

and then

$$U_{CCB} = (1-\lambda)\left(-\frac{\pi^2}{2\alpha}\right) + \left[1-(1+\pi^e-\pi)\tilde{b}_{1i}\right]$$
$$+ \left(\left[-\psi(d_{2i}^a-\bar{d}_{2i}^a)-\frac{\psi}{n-1}(d_{2i}^a-\bar{d}_{2i}^a)\right] + \frac{1}{n}\sum_{i=1}^{n}\left[\frac{\psi}{n-1}\sum_{j=1,j}^{n}(d_{2j}-\bar{d}_{2j})\right]\right) \quad \text{(A.2.4)}$$

and this yield

$$U_{CCB} = (1-\lambda)\left(-\frac{\pi^2}{2\alpha}\right) + \left[1 - (1+\pi^e - \pi)\tilde{b}_{1i}\right]$$
$$+ \left(\left[-\frac{n\psi}{n-1}(d_{2i}^a - \bar{d}_{2i}^a)\right] + \frac{1}{n}\sum_{i=1}^{n}\left[\frac{n\psi}{n-1}(d_{2j}^a - \bar{d}_{2j}^a)\right]\right) \quad \text{(A.2.5)}$$

Now it is trivial to see that the last term is zero and only the first term stay. So it result the final form:

$$\text{U}_{CCB} = -\frac{\pi^2}{2\alpha} + 1 - (1+\pi^e-\pi)\tilde{b}_1, \qquad \alpha := \frac{(1-\lambda)\phi}{\lambda} \geq 0. \text{(A.2.6)}$$

Solution of the Nash equilibrium

Applying the specifications in the text, we get,

$$(e_i - \frac{k}{2}) = [1 + \psi(1-\delta)](\xi - (\xi-1)E[f_1i]), \qquad \forall i \quad \text{(A.2.1)}$$

and

$$(1-p)\xi - (\xi-1)E[f_{i,t}] = -p(\xi-1)E[f_{2,t}] + \underbrace{\mu}_{:=\frac{\alpha^2}{\phi n(1-\psi)}} E[\tilde{b}], \qquad \forall i \quad \text{(A.2.2)}$$

We consider a Bayesian Nash equilibrium in which each government's strategy will be a function of ϵ_i. In general is the solution also a function of its estimates about the other countries shocks and preferences, and estimates about other governments estimates about $\epsilon_j \forall j$. But to solve this n-player game in that general fashion would become intractable. So we following also the approach from Beetsma and Jensen (2003)

that the governments strategy depends only on the realization of ϵ_i, but not on the other shocks.

Therefore, we assume the following set of equilibrium strategies:

$$b_{1i} = B - B_\epsilon \epsilon_i \tag{A.2.3}$$

$$e_i = D - D_\epsilon \epsilon_i. \tag{A.2.4}$$

The equal set for the cross-country average debt and consolidation effort will be given by,

$$\tilde{b}_1 = B - B_\epsilon \tilde{\epsilon}_i \tag{A.2.5}$$

$$\tilde{e}_i = D - D_\epsilon \tilde{\epsilon}_i. \tag{A.2.6}$$

After subside the four strategies in the equation (4.40), the realizations of public consumption are:

$$
\begin{aligned}
f_{1i} = 1 + \tilde{\epsilon} + (D - D_\epsilon \epsilon_i) + 2(D - D_\epsilon \tilde{\epsilon}_i + (B - B_\epsilon \tilde{\epsilon}_i) \\
+ \left(\frac{n}{n-1} \psi - 1 \right) \left[[B_\epsilon \epsilon_i - B_\epsilon \tilde{\epsilon}] + [D_\epsilon \epsilon_i - D_\epsilon \tilde{\epsilon}] \right] \\
+ \left(\frac{n}{n-1} \psi \delta - 1 \right) \left[(\tilde{\epsilon} - \epsilon_i) + [D_\epsilon \epsilon_i - D_\epsilon \tilde{\epsilon}] \right] \quad \text{(A.2.7)}
\end{aligned}
$$

Similar for f_{2i} yields:

$$f_{2i} = 1 - (B - B_\epsilon \tilde{\epsilon} - \left(1 - \frac{n}{n-1} \psi \right) (B_\epsilon \tilde{\epsilon} - B_\epsilon \epsilon_i)$$

$$\tag{A.2.8}$$

In the next step we calculate the expectations of (A.2.7) and (A.2.8). We need these expressions to solve the strategies above for its coefficients. From (A.2.7) follows:

$$E[f_{1i}] = 1 + \frac{1 - 2D_\epsilon - B_\epsilon}{n} \epsilon_i + D - D_\epsilon \epsilon_i + 2D + \left(\frac{n}{n-1} \psi - 1 \right) \left(\left[\frac{n-1}{n} \right] B_\epsilon \epsilon_i + \right.$$
$$\left. \left[\frac{n-1}{n} \right] D_\epsilon \epsilon_i + \left(\frac{n}{n-1} \psi \delta - 1 \right) \left(\left[\frac{n-1}{n} \right] D_\epsilon \epsilon_i - \left[\frac{n-1}{n} \right] \epsilon_i \right) \quad \text{(A.2.9)}$$

and thus after some calculation

$$E[f_{1i}] = 1 + 3D + B + [(1 - \psi\delta) - (1 - \psi)B_\epsilon - [2 - \psi(1+\delta)D_\epsilon]\epsilon_i. \quad \text{(A.2.10)}$$

Similarly, from equation (A.2.8) we calculate:

$$E[f_{2i}] = 1 - B + \frac{n-1}{n} \epsilon_i + \frac{1}{n} B_\epsilon \epsilon_i - \left(\frac{n}{n-1} \psi - 1 \right) \left(\frac{n-1}{n} B_\epsilon \epsilon_i + \frac{n-1}{n} D_\epsilon \epsilon_i \right)$$
$$\text{(A.2.11)}$$

and after some calculation,

$$E[f_{2i}] = 1 - B + (1 - \psi)B_\epsilon \epsilon_i \quad \text{(A.2.12)}$$

Finally, we need the government i's expectation of average debt. From (A.2.8) we find:

$$E[\tilde{b}] = B - B_\epsilon \frac{1}{n} \epsilon_i. \quad \text{(A.2.13)}$$

Explicit first-order conditions

Now insert the expressions for $E[f_{1i}], E[f_{2i}]$ and $E[\tilde{b_1}]$ into the first-order conditions (A.2.1) and (A.2.2). This yields:

$$(1-p)\xi - (\xi-1)\left(1 + 3D + B + ([[(1-\psi\delta) - (1-\psi)B_\epsilon - [2 - \psi(1+\delta)D_\epsilon]\epsilon_i\right) =$$
$$= -p(\xi-1)\left(1 - B + (1-\psi)B_\epsilon\right) + \mu(B - B_\epsilon\frac{1}{n}\epsilon_i) \quad \text{(A.2.14)}$$

and

$$D - D_\epsilon\epsilon_i - \frac{k}{2} = \xi[1 + \psi(1-\delta)] - [1 + \psi(1-\delta)](\xi-1)*$$
$$* \left(1 + 3D + B + [(1-\psi\delta) - (1-\psi)B_\epsilon - [2 - \psi(1+\delta)D_\epsilon]\epsilon_i\right) \quad \text{(A.2.15)}$$

Step 1: Solution for shock coefficients

When (A.2.14) and (A.2.15) must hold of all values ϵ_i, we have that the following must hold:

$$-(\xi-1)\left((1-\psi\delta) - (1-\psi)B_\epsilon - [2 - \psi(1+\delta)]D_\epsilon\right) = -p(\xi-1)[(1-\psi)B_\epsilon - \mu B_\epsilon\frac{1}{n}$$
$$\text{(A.2.16)}$$

$$D_\epsilon = [1 + \psi(1-\delta)](\xi-1)\left(1 - \psi\delta) - (1-\psi)B_\epsilon - [2 - \psi(1+\delta)]D_\epsilon\right)$$
$$\text{(A.2.17)}$$

Now change (A.2.17) so that:

$$\frac{D_\epsilon}{(\xi-1)(1+\psi - \psi\delta)} = \left(1 - \psi\delta) - (1-\psi)B_\epsilon - [2 - \psi(1+\delta)]D_\epsilon\right) \quad \text{(A.2.18)}$$

From substitution (A.2.18) in (A.2.15) results:

$$-\frac{D_\epsilon}{(1+\psi-\psi\delta)} = B_\epsilon[-p(\xi-1)(1-\psi)-\frac{\mu}{n} \tag{A.2.19}$$

$$D_\epsilon = B_\epsilon(1+\psi-\psi\delta)[p(\xi-1)(1-\psi)+\frac{\mu}{n}] \tag{A.2.20}$$

Notice that up to now we define $\Theta := (1+\psi-\psi\delta)[p(\xi-1)(1-\psi)+\frac{\mu}{n}]$. This is only to simplify the following calculation. Next we substitute (A.2.20) back in (A.2.16). That yields,

$$-(\xi-1)(1-\psi\delta)+(\xi-1)(1-\psi)B_\epsilon+(\xi-1)[2-\psi(1+\delta)]\Theta B_\epsilon = -B_\epsilon[p(\xi-1)(1-\psi)+\frac{\mu}{n}], \tag{A.2.21}$$

isolating this term to B_ϵ is:

$$B_\epsilon = \frac{(\xi-1)(1-\psi\delta)}{(\xi-1)(1-\psi)+(\xi-1)[2-\psi(1+\delta)]\Theta+[p(\xi-1)(1-\psi)+\frac{\mu}{n}]} > 0. \tag{A.2.22}$$

Combined with (A.2.20), we recover the expression for D_ϵ:

$$D_\epsilon = \frac{(\xi-1)(1-\psi\delta)*(1+\psi-\psi\delta)[p(\xi-1)(1-\psi)+\frac{\mu}{n}]}{(\xi-1)(1-\psi)+(\xi-1)[2-\psi(1+\delta)]\Theta+[p(\xi-1)(1-\psi)+\frac{\mu}{n}]} > 0. \tag{A.2.23}$$

Step 2: Solution for average consolidation and debt

Now with B_ϵ and D_ϵ given by (A.2.22) and (A.2.23), respectively, (A.2.15) and (A.2.17) reduce to

$$(1-p)\xi-(\xi-1)\left(1+3D+B\right) = -p(\xi-1)(1-B)+\mu B \tag{A.2.24}$$

and

$$D - \frac{k}{2} = \xi[1 + \psi(1 - \delta)] - [1 + \psi(1 - \delta)](\xi - 1) * \left(1 + 3D + B\right) \qquad \text{(A.2.25)}$$

From this two conditions above we compute the solution for B and D. Thus it follows from (A.2.24),

$$D\left[1 + 3(\xi - 1)[1 + \psi - \psi\delta]\right] = \frac{k}{2} + \xi[1 + \psi - \psi\delta] - (\xi - 1)[1 + \psi - \psi\delta](1 + B), \quad \text{(A.2.26)}$$

isolating now this term to 'D' result in:

$$D = \frac{\frac{k}{2} + [1 + \psi - \psi\delta](1 + B)}{1 + 3(\xi - 1)[1 + \psi - \psi\delta]}. \qquad \text{(A.2.27)}$$

The sign from D depends crucial from the sign of 'B' which is no calculated. But before we define $X := 1 + 3(\xi - 1)[1 + \psi - \psi\delta] > 0$, for simplifying the further calculation. From backward substitution of D from (A.2.27) into (A.2.24) identify 'B':

$$(1 - p)\xi - (\xi - 1)\left(1 + 3\frac{k}{2X} + 3\frac{[1 + \psi - \psi\delta]}{X}(1 + B) + B\right) = -p(\xi - 1) + B[p(\xi - 1) + \mu].$$
$$\text{(A.2.28)}$$

Isolating the B part yields:

$$B\left[\mu + p(\xi - 1) + (\xi - 1) + 3(\xi - 1)\frac{[1 + \psi - \psi\delta]}{X}\right] = (1 - p)\xi - (\xi - 1)\left(1 + 3\frac{1}{X}\left[\frac{k}{2} + [1 + \psi - \psi\delta]\right]\right) + p(\xi - 1)$$
$$\text{(A.2.29)}$$

and thereby

$$B = \frac{(1 - p)\xi - (\xi - 1)\left(1 + 3\frac{1}{X}\left[\frac{k}{2} + [1 + \psi - \psi\delta]\right]\right) + p(\xi - 1)}{\left[\mu + p(\xi - 1) + (\xi - 1) + 3(\xi - 1)\frac{[1 + \psi - \psi\delta]}{X}\right]} \qquad \text{(A.2.30)}$$

Inserting this value of B back into (A.2.27) then provides the solution for D:

$$D = \frac{\frac{k}{2} + [1 + \psi - \psi\delta]\left(1 + \frac{(1-p)\xi - (\xi-1)\left(1 + 3\frac{1}{X}\left[\frac{k}{2} + [1 + \psi - \psi\delta]\right]\right) + p(\xi-1)}{\left[\mu + p(\xi-1) + (\xi-1) + 3(\xi-1)\frac{[1+\psi-\psi\delta]}{X}\right]}\right)}{1 + 3(\xi-1)[1 + \psi - \psi\delta]}. \qquad (A.2.31)$$

Finally using (A.2.31), (A.2.30), (A.2.7) and (A.2.22), we obtain

$$f_{i1} = 1 + \tilde{\epsilon} + e_i + 2\tilde{e} + \tilde{b} + \left(\frac{n}{n-1}\psi - 1\right)\left[B_\epsilon(\epsilon_i - \tilde{\epsilon}) + D_\epsilon(\epsilon_i - \tilde{\epsilon})\right] + \left(\frac{n}{n-1}\psi\delta - 1\right)$$

$$\left[(D_\epsilon - 1)(\epsilon_i - \tilde{\epsilon})\right]$$

$$f_{i1} = 1 + \tilde{\epsilon} + e_i + 2\tilde{e} + \tilde{b} + F_{1\epsilon}(\epsilon_i - \tilde{\epsilon})$$

$$(A.2.32)$$

with $F_{i\epsilon} = \left(\frac{n}{n-1}\psi - 1\right)\left[B_\epsilon + D_\epsilon\right] + \left(\frac{n}{n-1}\psi\delta - 1\right)\left[(D_\epsilon - 1)\right] \geq 0$ and similar for $'f'_{i2}$

$$f_{2i} = 1 - \tilde{b}_1 - \left(1 - \frac{n}{n-1}\psi\right)\left[-B_\epsilon(\epsilon_i - \tilde{\epsilon})\right]$$

$$(A.2.33)$$

$$f_{2i} = 1 - \tilde{b}_1 + F_{2\epsilon}(\epsilon_i - \tilde{\epsilon})$$

with $F_{2\epsilon} = \left(1 - \frac{n}{n-1}\psi\right)[B_\epsilon]$. Notice that it is trivial seen, if $(\psi, \delta) = (\frac{n}{n-1}, 1)$, then $F_{1\epsilon} = F_{2\epsilon} = 0$.

Derivation of the results

(a) Simple derivation of $'B_\epsilon'$ and $'D'$ shows the result. First look at the term $'B_\epsilon'$:

$$B_\epsilon = \frac{(\xi-1)(1-\psi\delta)}{(\xi-1)(1-\psi) + (\xi-1)[2 - \psi(1+\delta)]\Theta + [p(\xi-1)(1-\psi) + \frac{\mu}{n}]} \qquad (A.2.34)$$

The sign of the derivation of 'B_ϵ' depends only from the numerator because the denominator is always positive in a quadratic form. The symbol $\propto$ indicate that the right-hand side has the same sign as the left hand side. Thus we analyze now only the numerator of the derivation.:

$$\frac{\partial B_\epsilon}{\partial \delta} \propto \tag{A.2.35}$$

$$-\psi(\xi-1)(\xi-1)(1-\psi)+(\xi-1)[2-\psi(1+\delta)]\Theta+[p(\xi-1)(1-\psi)+\frac{\mu}{n}]-(\xi-1)(1-\psi\delta)(-\psi(\xi-1))\Theta \tag{A.2.36}$$

$$= \Theta(\xi-1)(1-\psi\delta) - [(\xi-1)(1-\psi) + (\xi-1)[(1-\psi\delta) + (1-\psi)] + p(\xi-1)(1-\psi) + \frac{\mu}{n}]$$

$$= (\Theta-1)(\xi-1)(1-\psi\delta) - 2(\xi-1)(1-\psi) - p(\xi-1)(1-\psi) - \frac{\mu}{n} < 0 \tag{A.2.37}$$

because we know that $1 > \Theta > 0$. Now the same procedure for 'D_ϵ'. It follows trivial,

$$\frac{\partial D_\epsilon}{\partial \delta} \propto \frac{\partial B_\epsilon}{\partial \delta}\Theta + B_\epsilon(-\psi)[p(\xi-1)(1-\psi) + \frac{\mu}{n}] < 0 \tag{A.2.38}$$

(b) In that result we find out what are the effect of a change by the 'MSY' values. Furthermore we take the derivative from 'D' and 'B' to 'k'. The results are:

$$\frac{\partial D}{\partial k} = \frac{\frac{1}{2}}{\left[(\xi-1)(1-\psi) + (\xi-1)[2-\psi(1+\delta)]\Theta + [p(\xi-1)(1-\psi) + \frac{\mu}{n}]\right]^2} > 0$$

$$\frac{\partial B}{\partial k} = \frac{-3(\xi-1)\frac{1}{2X}\left((\xi-1)(1-\psi) + (\xi-1)[2-\psi(1+\delta)]\Theta + [p(\xi-1)(1-\psi) + \frac{\mu}{n}]\right)}{\left((\xi-1)(1-\psi) + (\xi-1)[2-\psi(1+\delta)]\Theta + [p(\xi-1)(1-\psi) + \frac{\mu}{n}]\right)^2} < 0 \tag{A.2.39}$$

Proposition 6

Government i's equilibrium expected utility as a function of the stability pact parameters is given by:

$$V_{Fi}(\psi, \delta) \equiv E\left[-\frac{1}{2}(e_i - k)^2 + u(f_{1i}) + pu(f_{2i}) - \frac{(\alpha \tilde{b_1})^2}{2\psi}\right] \quad \text{(A.2.40)}$$

where u is defined by (4.44) and f_{1i}, f_{2i} are understood to be evaluated for the equilibrium outcomes. Differentiating $V_{Fi}(\psi, \delta)$ with respect to 'k' yields:

$$\frac{\partial V_{Fi}(\psi, \delta)}{\partial \delta} = E\left[\frac{1}{2}(e_i - \frac{k}{2})\frac{\partial D}{\partial k} + u'(f_{1i})\left[3\frac{\partial D}{\partial k} + \frac{\partial B}{\partial k}\right] + pu'(f_{2i})\left[-\frac{\partial B}{\partial k}\right] - \frac{\alpha^2}{\phi}\tilde{b_1}\frac{\partial B}{\partial k}\right]$$
$$\text{(A.2.41)}$$

the sign is exact then negativ if we assume $e_i = \frac{k}{2}$. That imply that if the consolidation effort is equal the MSY level; then a greater threshold value 'k' induce welfare gains. But we define a sustainable equilibrium so that $e_i < \frac{k}{2}$. In that constellation the sign is indefinite (positive or negative). It depends crucial from 'p' the re-election probability and the debt stock 'b'.

Extended solution of the Nash equilibrium

$$f_{1i} = 1 + \tilde{\epsilon} + e_i + 2\tilde{e} + \tilde{b} + \left(\frac{n}{n-1}\psi - 1\right)[(\tilde{b} - b_{i,1}) + (\tilde{e} - e_i)] +$$
$$+ \left(\frac{n}{n-1}\psi\delta - 1\right)[(\tilde{\epsilon} - \epsilon_i) + (\tilde{e} - e_i)] \quad \text{(A.2.1)}$$

$$f_{2i} = 1 + e_i - \tilde{e} - \tilde{b} - \left(\frac{n}{n-1}\psi - 1\right)[(\tilde{b} - b_{i,1}) + (\tilde{e} - e_i)] \quad \text{(A.2.2)}$$

From the few new assumptions above the model framework, these two time-constraints are very different to Beetsma and Jensen (2003).

Model solution

The optimal behavior of the government of country i, in terms of the choice of effort and debt issuance, is characterized by the following necessary and sufficient first-order conditions:

$$\frac{\partial U_F}{\partial e_i} = 0 \iff s'(e_i) = E[u'(f_{1i})[1 + \psi(1 - \delta)] + pu'(f_{2i})[\psi]]$$

$$\iff s'(e_i) = [1 + \psi(1 - \delta)]E[u'(f1i)] + p\psi E[u'(f_{2i})], \qquad \forall i \qquad (A.2.3)$$

$$\frac{\partial U_F}{\partial b_i} = 0 \iff 0 = E[u'(f_{1i})[1 - \psi] + pE[u'(f_{2i})][-(1 - \psi)] - E[\frac{\alpha^2}{\phi}\tilde{b_1}]$$

$$\iff E[u'(f_{1i})[1 - \psi] = pE[u'(f_{2i})](1 - \psi) + E[\frac{\alpha^2}{\phi}\tilde{b_1}], \qquad \forall i \qquad (A.2.4)$$

While condition (A.2.4) correspond to that in the basic model, condition (A.2.3) which guides the optimal consolidation effort level, already hints the new effect. It equates the government's marginal cost of consolidation through effort to the expected marginal gain from period one and two (in terms a lower debt level close to the equilibrium MSY values). The stronger is the response of the reference debt level ($\delta \uparrow$) to the observed state of the economy and the weaker is the 'excessive deficit procedure' ($\psi \downarrow$) and the re-election probability ($p \downarrow$), the smaller is this expected marginal gain. These reactions are crucial new findings for 'sustainable debt policy' within the Stability and

Growth Pact'.[1]

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[1]Cf. This result show that the re-election probability is very important. A reform proposal which define a debt level per law for all different Government is from that perspective desirable but not real implementable because a new government implement their own consolidation level.

A.3 Mathematical Appendix: Section 4.4

A.3.1 Institutional Interaction Model:

Taylor Series approximation

The second-order Taylor Series approximation for the both solutions (Bronstein et al., 1997):

$$x(t) = \frac{\zeta_1}{\zeta_2} + \epsilon * \sin[\omega t], \qquad \wedge \qquad y(t) = \frac{\zeta_3}{\zeta_4} + \delta \cos[\omega t], \tag{A.3.1}$$

can be done for x(t) with,

$$\ln x(t) = \ln\left[\frac{\zeta_1}{\zeta_2} + \epsilon * \sin[\omega t]\right] \approx \ln\left[\frac{\zeta_1}{\zeta_2}\right] + \frac{\zeta_2}{\zeta_1} * \epsilon * \sin[\omega t] - \frac{\epsilon^2 * \sin^2[\omega t]}{2} * \left(\frac{\zeta_2}{\zeta_1}\right)^2 + O(\epsilon^3), \tag{A.3.2}$$

and for y(t),

$$\ln y(t) = \ln\left[\frac{\zeta_3}{\zeta_4} + \delta * \cos[\omega t]\right] \approx \ln\left[\frac{\zeta_3}{\zeta_4}\right] + \frac{\zeta_4}{\zeta_3} * \delta * \sin[\omega t] - \frac{\delta^2 * \cos^2[\omega t]}{2} * \left(\frac{\zeta_2}{\zeta_1}\right)^2 + O(\delta^3). \tag{A.3.3}$$

A.4 Mathematical Appendix: Chapter 5

A.4.1 Why bigger countries have more problems with the SGP: Technical Appendix

Substituting $X + G - T$ into the value of p, and replacing p in equation (5.1), we obtain the loss function:

$$L = \frac{\Lambda}{2a^2}[a + G + X - T]^2 + \frac{1}{2}(T)^2. \tag{A.4.1}$$

Then, the optimal value of taxes is equal to $T^* = \zeta[a + G + X]$ where $\zeta = \Lambda/(a^2 + \Lambda)$. Substituting T^* into equation (A.4.1) yields

$$L = \frac{\Lambda^2}{2a^2}\bigg((1 - \zeta)(a + G + X)\bigg)^2 + \frac{1}{2}(\zeta[a + G + X])^2 \tag{A.4.2}$$

$$L = \bigg[\underbrace{\frac{\Lambda}{a^2 + \Lambda}}_{=:\zeta} * \bigg(\frac{a^2}{a^2 + \Lambda}\bigg) + \zeta^2\bigg]\frac{1}{2}(a + G + X)^2 \tag{A.4.3}$$

this is now

$$E_0 L^* = E_0\bigg(\frac{\zeta}{2}\bigg)[a+G+X]^2 = E_0\bigg(\frac{\zeta}{2}\bigg)[a+G+((1-\psi)Y+(\psi)[E_0[Y]+p\Gamma^S])]^2 \tag{A.4.4}$$

Derivation of the separating equilibrium

Consider a class of *separating equilibrium*. The weak government compares

$$E_0 L^W(W, \psi = 1) \le E_0 L^W(T, \psi \le \psi^S); \tag{A.4.5}$$

that inequality is equivalent to

$$E_0[X - Y(G^H) + Y(G^H)]^2 \leq E_0[X - \psi Y(G^H) + (1 - \psi)\mu + \psi Y(G^L)]^2 \qquad \text{(A.4.6)}$$

$$0 \leq \psi^2(\lambda^2 + \sigma^2) - 2(\alpha\lambda + \sigma^2)\psi + \sigma^2. \qquad \text{(A.4.7)}$$

The 'only' solution is now:

$$\psi \leq \psi^S = \frac{\sigma^2 + \lambda\alpha - \sqrt{\lambda^2\alpha^2 + \sigma^2\lambda(2\alpha - \lambda)}}{\sigma^2 + \alpha^2} \qquad \text{(A.4.8)}$$

where $\alpha := a + G^H + Y(G^H)$, $\lambda := Y(G^H) - Y(G^L)$. A separating equilibrium of the tough government thus exists if and only if the *tough* government is willing to slow the consolidation down to ψ^S. This happens if

$$E_0 L^T(T, \psi^S) \leq E_0 L^T(W, \psi^S < \bar{\psi} \leq 1), \qquad \text{(A.4.9)}$$

$$E_0[a + G^L + (1 - \psi^S)Y + \psi^S E_0 Y]^2 \leq E_0[z + \bar{\psi}\lambda + (1 - \bar{\psi})u]^2 \qquad \text{(A.4.10)}$$

$$E_0[z + (1 - \psi^S)u]^2 \leq E_0[z + \bar{\psi}\lambda + (1 - \bar{\psi})u]^2, \qquad \text{(A.4.11)}$$

and thus the incentive compatibility constraint is satisfied if

$$(1 - \lambda^S)^2\sigma^2 \leq (1 - \bar{\psi})^2\sigma^2 + \bar{\psi}^2\lambda^2 + 2\bar{\psi}\beta\lambda, \qquad \text{(A.4.12)}$$

where $\beta := a + G^L + Y(G^L)$. The necessary condition for equation (A.4.12) also crucially depends on σ^2 and λ.

Derivation of the pooling equilibrium

In a *pooling equilibrium* both governments choose the same Consolidation; i.e., the forward output rate is equal to

$$E_0 Y = [Y(G^L) + (1-q)\lambda]. \tag{A.4.13}$$

A pooling equilibrium exists if and only if ψ^P satisfies the incentive compatibility constraint of the weak government, $E_0 L^W(Pool, \psi^S) \leq E_0 L^W(W, \psi = 1)$. This requires

$$\psi^P = \frac{\sigma^2 - (1-q)\lambda\beta}{\sigma^2 + (1-q)^2\lambda^2} \geq \psi^W := \frac{\sigma^2 + \lambda\alpha q - \sqrt{\lambda^2 q^2 \alpha^2 + \sigma^2 \lambda q(2\alpha - \lambda q)}}{\sigma^2 + \lambda^2 q^2}. \tag{A.4.14}$$

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