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Searching for the optimal EMU fiscal rule: an ex-post analysis of the SGP reform proposals

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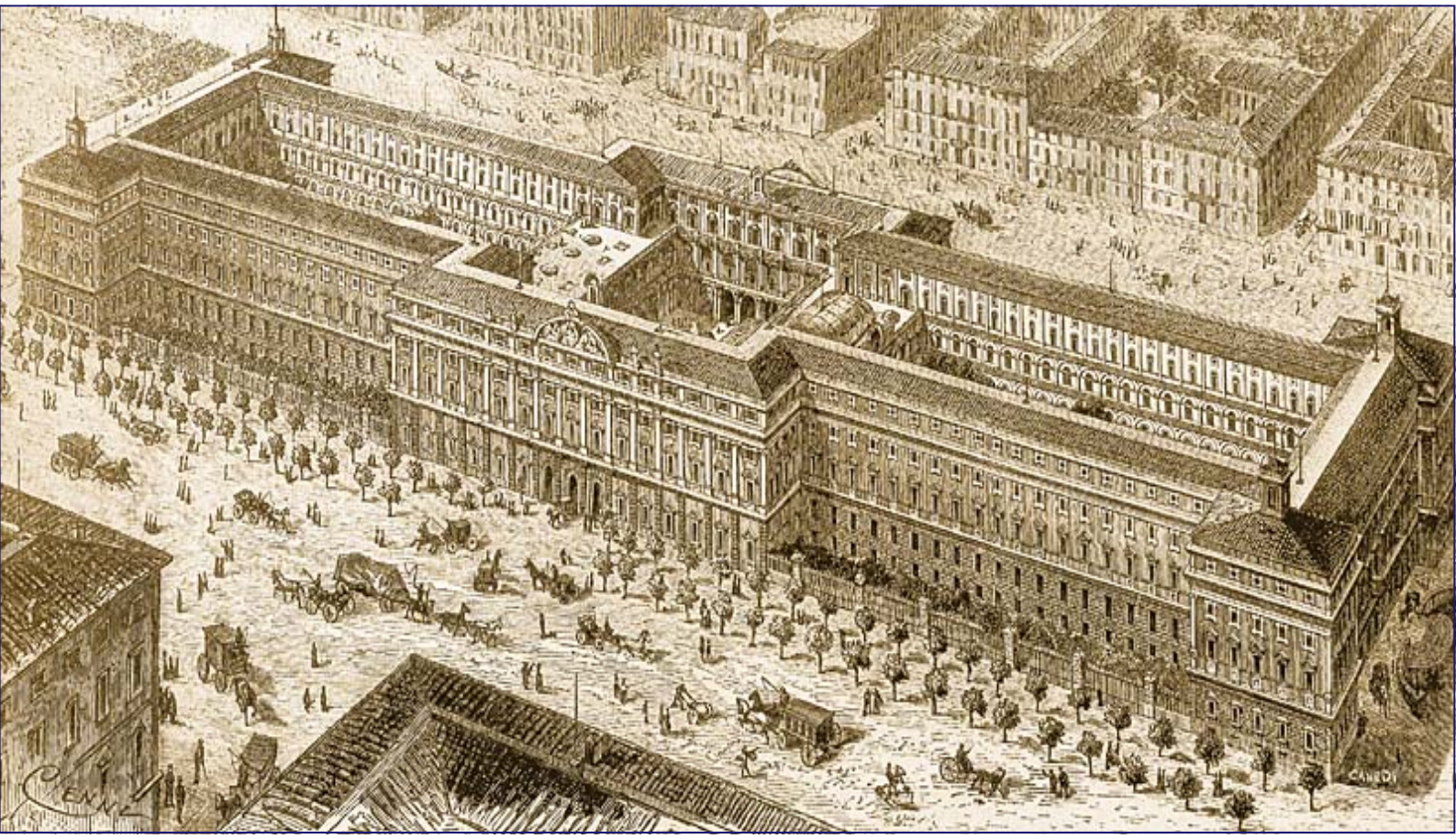

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Searching for the optimal EMU fiscal rule: an ex-post analysis of the SGP reform proposals[1]

Paolo Biraschi(*)

Abstract:

Over last decades the study of fiscal policy rules has attracted a growing attention from researchers and policy-makers. The case of European Monetary Union is a clear example. However, even before its inception, the Stability and Growth Pact has been a source of inspiration for a large number of policy recommendations. The heated political and academic debate intervened after the Ecofin Council's decision on November 2003 and mostly concluded in March 2005 with the Spring European Council's conclusions has revealed the institutional and theoretical weaknesses of EMU rule–based system. This paper provides an ex-post analysis of the Pact by indicating a different qualitative and pragmatic approach to judge the most relevant and known SGP reforms; furthermore, it highlights the direction along which any modification of the Pact would have been successfully implemented and offers useful insights also to test the robustness of the new SGP. After revisiting the main characteristics of a fully effective rule-based framework and taking into account the specificity of EMU economic policy set up, we evaluate in a systematic way, through a multivariate statistical analysis, about 100 proposals for reforming the SGP presented by professional academic and non-academic economists prior to April 2005. Despite these large number of proposals, however, principal component analysis outcomes show that only few reforms could have been effectively considered a real improvement of the previous version of SGP, the others reflecting the traditional dilemma between credibility and effectiveness aspects of budgetary rules.

JEL Classification: H62, E62, C82

Key words: Fiscal rules, Fiscal policy, Stability and Growth Pact, European Union Monetary, Principal Component Analysis.

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CONTENTS

1. INTRODUCTION 5

2. THE DEBATE ON EMU FISCAL RULES 6

2.1 A SURVEY OF THE ACADEMIC LITERATURE: AN ALTERNATIVE VIEW 6
2.2 DESIGNING AN IDEAL FISCAL RULE: THE INSTITUTIONAL APPROACH 6

3. THE STABILITY AND GROWTH PACT VERSUS THE IDEAL FISCAL RULE: LESSONS FROM THE FIRST SIX YEARS OF MONETARY UNION 12

3.1 THEORETICAL TRADE-OFFS UNDERLYING THE STABILITY AND GROWTH PACT 13

4. RANKING SGP REFORM PROPOSALS 15

4.1 A PRINCIPAL COMPONENT ANALYSIS: OUTCOMES AND INTERPRETATION 18
4.2 POLICY CONSIDERATIONS 22

5. CONCLUSION 23

REFERENCES 25

APPENDIX I. THE ASSESSMENT MATRIX 34

APPENDIX II. THE PRINCIPAL COMPONENT ANALYSIS METHODOLOGY 37

Searching for the optimal EMU fiscal rule: An ex post analisyis of the SGP reform proposals

> Just as we can not be sure the announcing a low-calorie diet for a person suffering from obesity will lead that person to eat less, there is no guarantee that governments will be able to control their deficit excess by simply being told to borrow less". (Inman, 1996)

1. Introduction

Over last two decades the study of fiscal policy rules has attracted a growing attention from researchers and policy-makers. To this respect, the recent history of European Monetary Union (EMU) is definitely the most interesting case. At the beginning of the nineties, the economic and monetary constitution embedded in the Maastricht Treaty defined the EMU economic policy framework, which incorporates the main policy goals as well as a number of fundamental principles for good sustainable governance. These include price stability - as primary objective of monetary policy-, the central bank independence and the need of maintaining sound public finances.

The signature of the Maastricht Treaty has reflected the academic view according to which the most appropriate mechanism to eliminate large fiscal imbalances would have been the implementation of permanent (international and national) budgetary rules. Therefore, the explicit provision of deficit and debt thresholds, which had to be fulfilled at the end of convergence period, obliged several EU countries to undertake quantitatively impressive and (mostly) successful fiscal adjustments. Furthermore, in view of the single currency, the European budgetary constraints have been strengthened by the Stability and Growth Pact[2] (SGP or Pact, hereby) which aimed at ensuring member states' commitment to fiscal prudence once they have joined the monetary union[3]. The SGP is one of the strictest commitments put in place by national governments in order to introduce fiscal discipline as a permanent characteristic inside the Euro area.

Even before its launch, however, the SGP has given rise to many criticisms among economists and policy-makers on the fact that a monetary union with a supra-national monetary institution (the European Central Bank) and multiple fiscal authorities had to be governed by an international fiscal rule as a negative form of budgetary co-ordination. Since the spring 2002[4],

[2] The EMU rule-based framework is based on a set of rules contained in the Maastricht Treaty and the Stability and Growth Pact. Such rules require that general government deficit should kept below 3 per cent of GDP and member states set medium-term objective (MTO) of budgetary positions "close to balance or in surplus", in order to guarantee the well functioning of automatic fiscal stabilisers without breaching the ceiling of 3 per cent.

[3] Empirical evidence (for all see Monorchio-Verde, 2002) suggests that, without the imposition of numerical fiscal thresholds, budgetary consolidations undertaken by several EMU countries during the Nineties, would not have been successful.

[4] The sharp deceleration of the business cycle has strongly contributed to deteriorate public finance conditions in several member states. Portugal breached the 3 per cent threshold already in 2001, while Germany and France in 2002. Netherlands joined France and Germany in 2003; the following year Italy, Portugal and Greece also exceed the 3 per cent ceiling. Therefore, at the end of 2004, during a long period of mild recession about half of the euro area members had been compelled to tackle budgetary consolidation without having enough budgetary room of manoeuvre.

the negative fiscal developments of the three largest EMU economies have officially opened an extensive discussion on the usefulness and effectiveness of the Pact provisions.

Later on, the debate on the SGP reform has received a final acceleration in November 2003, when the Ecofin Council decided to freeze the Excessive Deficit Procedure (EDP) sanction mechanism for France and Germany[5]. Representing the highest moment of the Pact crisis, the Council's decision has revealed the institutional and theoretical weaknesses of the EMU rule–based system. As shown by Fisher, Jonung and Larch (2007), since the inception of the Pact, more than 100 reform proposals have been presented by economists, 45 of which between November 2003 and March 2005.

The aim of this paper is twofold: (a) revisiting the main features of an ideal fiscal rule in light of the uniqueness of EMU economic policy framework; (b) on these bases, presenting an ex-post analysis on the SGP reform proposals by evaluating them in a systematic way through a principal component analysis (PCA), which is as useful technique for ranking them according to their degree of "optimality". In perspective, the PCA could also be an appropriate methodology to assess the reformed Pact showing its strengths and weaknesses.

The paper is organized as follows. Section 2 provides a survey of relevant academic literature on EMU fiscal rules. Furthermore, in line with the well-known Inman and Kopits-Symansky's taxonomy, a set of criteria is settled for the evaluation of fiscal rules optimality. Section 3 focuses on how to model these features consistently with the EMU fiscal framework, without neglecting the potential inconsistencies emerging in the implementation of the SGP. According to the features selected above, section 4 compares about 100 reform of the Pact throughout the PCA analysis by providing an ordinal ranking of the proposals and drawing interesting policy conclusions. Although the final ranking of the proposals is based on an arbitrary evaluation by the author, it is important to stress that such an assessment is fully consistent and comparable with similar exercises provided by the previous economic literature on this argument (Verde 2006, Fisher *et al*., 2007). Section 5 concludes.

2. The debate on EMU fiscal rules

2.1 A survey of the academic literature: An alternative view

Economists have approached the issue of optimal fiscal rules moving along several directions. Political economy arguments shown firstly by Buchanan and Wagner (1977) provide however a common theoretical background: "democratically elected (especially coalition) governments have the natural tendency to create permanent deficits, redistributing income from future (mostly unborn) generations to the present ones. Because of their sensitivity to electoral pressures, most of these governments are incapable of correcting the bias without an explicit constraint on fiscal policy variables" (pag. 24).

Later literature (for all see, Grilli, Masciandaro and Tabellini, 1991 and Schuknecht, 2004) has increasingly investigated on specific features of democratic systems that are particularly conducive to excessive deficits, such as individual election systems and the degree of political polarisation, focusing on countries with democratic political systems, where elections and the efforts of political parties competing for winning elections (through expenditure-enhancing or revenue-reducing fiscal measures), are the driving force behind the deficit bias.

In the EMU perspective, the political economy view is even more significant and is based on the following economic rationale: (a) imposing constraints on national fiscal policy in order to

[5] This decision has provoked two main consequences: (a) *de jure et de facto*, a crash between the Council and the European Commission referring to the procedural interpretation of the EDP procedure; (b) has also launched a serious political (not only academic) discussion.

protect the independence of the European Central Bank from political pressure[6]; (b) "tying hands" to national policy–makers in order to neutralise the incentive to expand the public expenditure and preserve a long fiscal sustainability, the so-called free riding issue[7]; (c) preventing the issue of moral hazard inside the EMU; although the provisions of the Maastricht Treaty explicitly exclude the chance of any form of "bail-out clause", the potential costs of a default on a public debt by a member state (especially a large one) could force the ECB to intervene in the monetary market[8].

The academic literature on national and supra-national fiscal rules - as in the case of the SGP - may be grouped in three complementary approaches, each of them provides a different way of determining the "optimal" fiscal rule.

The first one, namely the institutional approach, includes relevant contributions by Poterba (1994, 1996), Inman (1996), Bohn-Inman (1996), Kopits-Craig (1998), Kopits-Symansky (1998), Kopits (2001), Kennedy-Robbins, (2001), Buti et al, (2003), Buiter (2003) and Buiter-Grafe (2004). These authors agree on defining fiscal rules as "a permanent constraint on fiscal policy, expressed in terms of a summary indicator of a fiscal performance, such as the government budget deficit, borrowing debt or a major component thereof–often expressed as a numerical ceiling or target, in proportion of gross domestic product (GDP)[9]" (Kopits-Symansky, 1998). Consequently, policy rules or guidelines, such as fiscal responsibility acts or stability codes are excluded from the analysis as they are not supported by legislation or regulation and do not represent a severe constraint on government's present or future decisions. Therefore, fiscal rules are described as a function of a set of qualitative features, whose compliance makes budgetary constraints credible and fully effective. In this view, ideal fiscal rules are those supported by reputation over the time and fully operational of ensuring the respect of their final goals.

The welfare-coordination approach finds its theoretical roots in the contributions provided by Beetsma-Bovenberg (1995), Artis-Winkler (1998), Beetsma-Uhlig (1998) and Bolt (1998, 1999). It aims at demonstrating that, at international level, fiscal rule optimality is the final outcome of a strategic game between national fiscal authorities and an independent-conservative central bank or alternatively, inside the Ecofin Council, between fiscally disciplined and imprudent member states (Irlenbush *et al*., 2003, Eijffinger-Governatori, 2004) in order to maximize social welfare. Albeit starting from different assumptions, these authors doubt that the provision of the no bail–out clause and the independence of ECB constitutes two satisfactory elements to discourage EMU governments to undertake unsound budgetary policies and expect, sooner or later, an increasing political pressure on ECB in order to accommodate high deficit and debt levels. Therefore, a constraint such as the SGP, is a pivotal device to protect the ECB independence and the stability of the Euro, against the fiscal authorities' inclination towards excessive deficits. Furthermore, while such a negative form of co-ordination is deemed desirable, a positive form of co-ordination could be potentially counterproductive[10]. This occurs

[6] The first period of ECB existence has been a crucial moment to verify the degree of its credibility. In a perfectly integrated capital market, public debt accumulation in a given country may deeply affect long-term interest rates. It may also have an impact on short-term interest rates by provoking the well-known "crowding–out" effect on private investments. Therefore, national fiscal imbalances may cause large negative consequences on the whole monetary union and, however, most of the times political power does not adequately take into account the evidence of these externalities. As a result, debt ratios and the long term interest rate would increase.

[7] In multi-currencies system, this kind of political failure is at least partially hindered by the menace of exchange rate crises, in the case of a fixed but adjustable exchange rate regime or, in the case of a floating (or flexible) exchange rate regime, by the ineffectiveness of expansionary fiscal action. In a monetary union, however, imprudent fiscal conducts by one or more member state would produce the wasteful outcomes in terms of negative spillover effects.

[8] As highlighted by Pisani-Ferry (2002), the consequences of a public debt default would obviously depend on the country's size. It is clear that the financial crisis of larger EMU member would have a more impressive impact than the public debt default of a smaller one. However, even in case of a possible debt default of a small member, the ECB could intervene due the exhibition of a strong signalling effect with serious political repercussions.

[9] Milesi-Ferretti (2000) has proposed an analogous definition with the difference that "permanence" over time is not deemed as an essential attribute of fiscal rules.

[10] Consistently with this interpretation, Chari and Kehoe (1998) identify the capability of the central bank to independently pursue its targets over the time, as the relevant variable for imposing fiscal rules. If monetary policy is not able to commit, the introduction of debt and/or deficit ceilings represents a suitable solution; on the contrary, in case of a

because the attractiveness of participating in EMU grows with its size. By keeping budgetary policies of competence of each member state, the strategic position of each individual fiscal player weakens due to the reduced bargaining power of fiscal authorities in front of the ECB. On the contrary, the institution of a supra-national fiscal authority would balance the power of national government vis-à-vis the ECB with potentially negative on public finance disciple inside the EMU.

In later studies Beetsma and Uhlig (1999) and Beetsma (2000) through the introduction of a formal time-inconsistency two-period model show which effects the lack of the SGP could cause in a monetary union. Assuming that, myopic governments tend to run an excessive deficit if they are aware to be substituted at the beginning of the next period, then the public debt would increase during the second period by constraining monetary policy actions. Due to the spillover effects, debt accumulation in a (large) country could have a detrimental impact for the whole monetary union, compelling the ECB to intervene to avoid a default crisis. Under these conditions, monetary policy runs the risk to be inadequate to pursue the commitment towards price stability; a pact preventing the free riding issue is deemed the best option to maximize social welfare in the EMU. In line with this view, Dixit and Lambertini (2001) and Dixit (2001) highlight to what extent, fiscal institutions may influence monetary commitment by affirming that "fiscal discretion destroys monetary commitment". However, the imposition of budgetary rules is not sufficient in itself to ensure fiscal discipline and maximise social welfare, if monetary authority and fiscal policy makers pursue different goals over time: the former expected to reduce inflation, the latter engaged to economic growth. This means that the outcomes stemming from the optimisation process could be distant from the optimal equilibrium solutions both in terms of inflation and output or unemployment level. Therefore, in addition to fiscal constraints, a convergence on the final targets constitutes a fundamental pre-requirement to achieve the Nash equilibrium.

The third approach includes welfare-microfounded models. The distinguishing element is the microfoundation through the introduction of distortions in the price and/or wage determination process inside the framework of the Dynamic Stochastic General Equilibrium (DSGE models)[11]. Based on New Keynesian paradigm, this approach has been fully developed for the analysis of monetary issues, whereas only more recently it has become to play a relevant role to investigate macroeconomic stabilisation policies, and in particular optimal mix between monetary and fiscal policies. The main aim of these models is to analyse whether national fiscal policies should play an enhanced role in adjusting to macroeconomic shocks within the EMU. Despite some heterogeneity in the starting theoretical setting up, this increasing literature (for all Muscatelli, *et. al.*, 2003, Annichiarico-Giammarioli, 2003, Lambertini, 2005, Kumhof, *et. al.*, 2007) shares the view that the role of the fiscal authority is described by simple automatic stabilising feedback rules. In particular, both the tax rate and government spending normally responds to lagged output and public debt. In addition, to better account for the inertia found in estimated fiscal rules, an autoregressive term is often added. The inclusion of output dated at time t-1 captures the more realistic response of the fiscal policy to the cyclical component of output, while the feedback from public debt guarantees, to some extent, a non-explosive dynamic for this variable. In this context, fiscal rules are determined endogenously through the introduction of a fiscal policy reaction function, whose main components are government spending, income and labour taxes. This implies that optimal fiscal rule[12] instead of

strong central bank, fiscal thresholds could result harmful because they restrain the room for discretionary manoeuvres in responding to asymmetric shocks.

[11] NK-DSGE models are characterized by the following key aspects: (a) the interaction between fiscal and monetary policymakers through demand-side channels; (b) the explicit provision of dynamic or intertemporal dimension of economic agents' behaviour which is absent in the welfare coordination approach, usually implemented inside the Barro-Gordon's static framework; (c) the fact that the economy may be affected by unexpected events, the so called stochastic shocks such as technological changes, changes in consumers' preferences or in raw material prices; (d) inclusion of nominal and real rigidities, through sticky prices and/or wages. In addition, NK-DSGE models introduce monopolistic competition in the labour market, whereas labour has conceived as a differentiated factor entering in a standard CES production function.

[12] Note that in these studies, the notion of optimal fiscal rule does not involve a fiscal rule that maximises a well-defined objective function. What the authors do, at a relatively low cost, is to maintain a given fiscal rules format and then perform a grid-search analysis to pin down the coefficients values that optimize a certain criterion.

being driven by a fixed "one rule fits all" approach could vary across member states, taking into account the nature of the shocks, the budgetary structure and the level of public debt.

2.2 Designing an ideal fiscal rule: The Institutional Approach

According to the institutional approach the major issue is to define the permanent features underlying an optimal fiscal rule both at national and international level. To this respect, Poterba, (1994, 1996), Inman (1996), Bohn-Inman (1996), Schuknecht, 2004 have pointed out the legislative aspects of fiscal rules, while Kopits and Craig (1998), Kopits-Symansky, (1998), Kopits (2001), Kennedy-Robbins, (2001), Buti-Giudice (2002), Buti *et al*, (2003), Buiter, (2003), Buiter-Grafe, (2004) have stressed out the operational ones (see Figure 2.1).

Legislative features include the notion of well specification and enforcement. Well definition moves along three main dimensions: institutional coverage, legal background and method of implementation.

The institutional coverage regards the public finance indicator used as a benchmark and the level of government which it is referred to. Empirical evidences (Poterba, 1996, Inman, 1996, Kopits-Symansky, 1998, Buti *et al*., 2003) show that fiscal indicators could largely vary over countries by entailing the public budget through a general deficit rule - or simply a part of it, such as an expenditure rule - or a debt ceiling or a combination between them (such as in the case of the EMU). Concerning the level of government (central government, general government, public sector) there is a general consensus on the following statement: the larger public finance aggregate, more accurate the estimation of budgetary indicators. The rationale of selecting an appropriate level of government is to enhance transparency of government's actions by reducing the costs of "quasi fiscal activities" of public enterprises and eliminating the so called "off-budget operations".

Legal foundation refers to the juridical roots of a rule-based framework. A national (sub-national) rule should find its origins in the constitution (statutory law), while in the case of supranational budgetary constraint, in an international treaty. A constitutionally grounded rule gives several advantages such as: (a) the difficulty of circumventing by exploiting different methodological and procedural interpretations; (b) the "legislative override provision" that indicates the complexity of abolishing, amending or revoking the rule through a simple majority vote in the Parliament; (c) an higher probability of passing the test of time by preventing fiscal profligacy, due to the severe reputational and economic costs of changing a constitutional rule; (d) the institution of independent and impartial authority whose main task is to monitor the compliance and ensure the enforcement mechanism.

The method of implementation is related to both the "ex-post rather than ex-ante accounting" condition and "no–carry over" provision. The first clause provides that fiscal stance has to be consistent with macroeconomic forecasts at the end of financial year avoiding that changes in government's budgetary interventions during the fiscal year could worsen the public budget targets. Moreover, even requiring the submission and approval of the Parliament, the "ex-ante accounting" neglects the phase of budget execution; therefore, only the "ex-post accounting" provision is considered as sufficient a condition to ensure rule compliance. On the other hand, the "no carry-over" clause establishes that, in case of rule violation, namely breaching established public finance ceilings, fiscal authorities are obliged to revoke the excessive deficit, expenditure or debt within the same fiscal year.

Enforcement mechanism may be defined as the set of procedures aiming at guaranteeing the rule compliance by creating appropriate incentives for policy makers to adhere permanently to the regulation. Three main questions need to be addressed. Firstly, what happens in case of rule violation. Public opinion and financial markets should be aware and constantly monitor the procedure for eliminating fiscal imbalances. The sanctioning process could be articulated in one or several stages and consist in conferring significant financial, judicial or reputational penalties in case of no rule adherence. However, such a mechanism is only a part of the fully effective enforcement procedure: it also has to provide some specific situations in which, even in the

case of no observance, no sanctions should be apply to. These circumstances known as "escape clauses" need to be defined in advance and introduces a fair degree of flexibility. Increasing the economic rationale of a rule-based framework, such clauses allow governments to tackle countercyclical budgetary policies without running the risk of incurring in penalties.

Secondly, who has to monitor the rule compliance, assess and, eventually, punish policy-makers breaching the budgetary ceilings. According to the prevalent literature (Eichengreen-Wysploz, 2002, Fatas *et al*, 2003, Gros *et al*., 2004), the power of surveillance and judgment has to be conferred to an independent and technical authority. If the enforcer were partisan, the compliance mechanism would loose most of its credibility and in case of an international fiscal rule, the risk of collusion between who has to judge ("potential" sinners) and who has to be judged (fiscal sinners) becomes higher and higher.

Thirdly, how costly the amendment procedure should be. A budgetary constraint incorporated into the constitution is likely to be more enforceable by requiring a qualified majority vote to be amended. From a political economy perspective, this commits policy-makers towards fiscal discipline and strengthens the credibility of fiscal rules versus political attempts for preventing the sanctioning mechanism.

Therefore, an adequate enforcement mechanism should be characterised by: an open feature with the provision of a set of limited and transparent escape clauses; the institution of an independent authority; the introduction of significant sanctions, in case of no observance; a costly amendment procedure.

Regarding functional features, transparency, simplicity, flexibility and consistency play a major role. Transparency should concern the definition, implementation and enforcement procedure of budgetary constraints; furthermore, it includes both the decision making process and execution of public budget. Transparent fiscal rules improve economic agents' expectations on medium-long-term public finance sustainability. The issue of transparency emerges particularly in a monetary union, where the need of establishing an agreed methodology of calculation, common accounting principles[13], plausible macroeconomic forecasts and timely-coordinated reporting activities are key elements to build up a functioning rule-based framework. In other words, transparency would support the comparability of fiscal performances among countries by preventing the incentives for creative accounting[14] and misinterpretations about the size and temporal lags of future fiscal obligations.

Simplicity is generally associated to numerical rather than procedural rules. Simple rules fulfil the government's informational obligation in front of financial markets (rating agencies) which have to assess the quality of national budgetary policies.

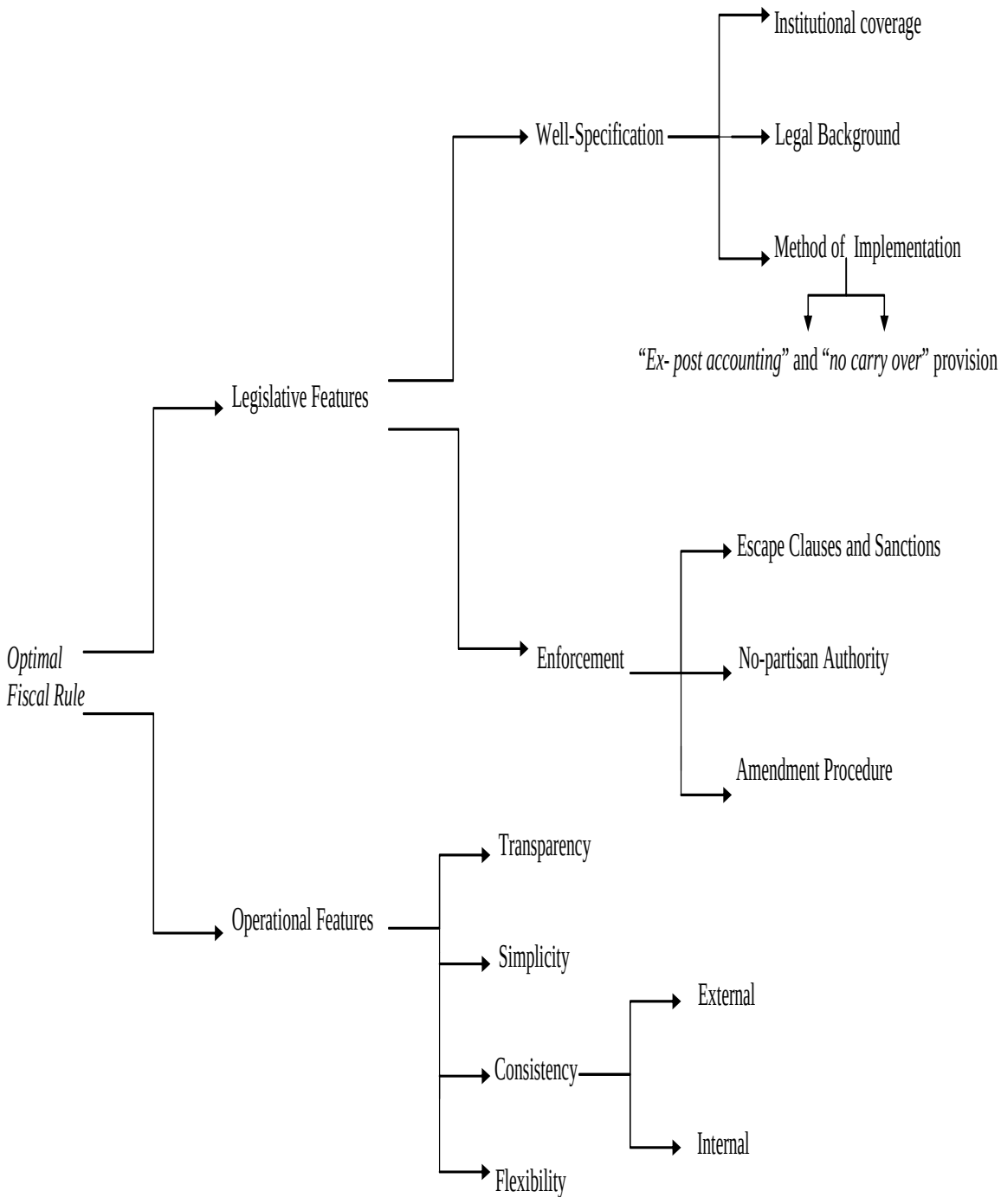
Flexibility is the most argued feature inside the academia. Firstly, flexibility must not be confused with discretionarity because the former moves perfectly within a rule-based system, while the latter should be excluded *a priori*, when diverging from the rule provisions. However, a definition of flexibility explained only in terms of freely functioning of automatic stabilisers should be considered unsatisfactory; assuming short-term output stabilisation as one of main goals of fiscal policy, then rules must be flexile to accommodate exogenous shocks. Therefore, the major question is to find the right balance between guaranteeing appropriate margins of manoeuvre to fiscal authorities when required and ensuring a permanent commitment towards fiscal discipline.

Consistency refers to both the usefulness to achieve and maintain its goals (external consistency) and the economic theory underlying the budgetary framework (internal consistency). Therefore, fiscal rules should support the main fiscal policy target and have a solid economic rationale grounding on reasonable assumptions and consistent theoretical models.

[13] Kopits-Symansky (1998) state that budgetary ceilings should be expressed in accrual rather than cash terms.

[14] Milesi-Ferretti (2003) and von Hagen-Wolff (2004) have introduced the issue of creative accounting inside the fiscal rule debate. Through a theoretical model, Milesi-Ferretti (2003) shows that the amount of creative accounting is a function of reputation costs for the government and economic costs of abandoning the rule. Von Hagen-Wolff (2004) provide empirical evidence supporting the creative accounting issue in the European Union. They point out that the SGP has induced governments to use stock-flow adjustments, a form of creative accounting, in order to obtain lower deficits, particularly in a prolonged period of low growth.

Figure 1. Main features of an "optimal" fiscal rule



3. The Stability and Growth Pact versus the "optimal" fiscal rule: Lessons from the first six years of monetary union

After having discussed the most relevant characteristics linked to the "optimal" fiscal rule, a key question is to investigate how the uniqueness of the EMU policy framework could affect these rule features. This is because from the institutional point of view, the EMU is a single and unprecedented case in the world economic history: a monetary union without a political one. Furthermore, looking at the conduct of the economic policy, monetary policy has been devolved at supra-natural level to the European Central Bank whereas fiscal policy has remained to the competence of national governments. The no optimality of the Euro area and the international dimension of the Pact represent other peculiar aspects which pose additional challenges to academics and policy-makers. In other words, may the taxonomy mentioned above continue to be valid *sic et simpliciter* or does it need to be reinterpreted including further relevant factors?

The fact that the EMU can not be thought as an optimal currency area is confirmed by several empirical evidences: labour factor mobility is low, prices and wages are sticky, above all if compared with US economy, the degree of economic system openness is still unsatisfactory, national sectoral diversification and the degree of homogeneity of productive structures among EMU countries[15] are not fully developed and fiscal federalism instruments, such as stabilisation funds, are basically absent. The ineffectiveness of such automatic mechanisms increases the probability that, in case of asymmetric shocks, budgetary policy still plays a prominent countercyclical role; nonetheless, politically motivated governments could be tempted to restore discretionary interventions by undermining fiscal discipline.

Under these conditions, fiscal rules become an essential requirement for the proper functioning of a monetary union, while, on the other hand, a deeper economic integration could lessen the need of such constraints by making the Pact redundant[16] or even counterproductive[17].

Second of all, the international dimension of EMU fiscal framework affects the optimal rule features, implying to take into account the so-called "legitimacy" or "ownership" of the Pact. In particular, the SGP should not penalise any countries more than others and its benefits should be equally redistributed among member states. This feature has to be interpreted as a measure of political commitment in preserving fiscal sustainability in the medium-long run. A widely shared commitment, embraced over time by a succession of governments (even with different political orientations) and - in an international context - by several sovereign countries is based either on the experiences of a past major financial crisis or inspired by a future challenge or goal, which, in the case of the EMU is to deep further the economic, social and institutional integration. If the SGP legitimacy decreased progressively, then fiscal authorities may attempt to circumvent the rule through a variety of available means by resorting creative accounting schemes or exploiting ambiguities in the institutional coverage of the rule.

Ownership should be modelled in two alternative ways: "one rule fits all" or country specific clauses. In the first case, governments establish a common budgetary ceiling which national budgetary policies have jointly to respect[18]. This option would be consistent both with the credibility aspects of the optimal rule and with the "principle of equally parity treatment"

[15] These two variables assume a relevant role because they may be interpreted as a proxy of the degree of the synchronization of business cycles among EMU countries.

[16] The US experience (Bohn-Inman, 1996) shows that, in absence of a federal budgetary constraint, balanced budget rule) strongly differ state by state both in terms of institutional framework and degree of restrictiveness. The state of Vermont is the only exception as no kind of budget rule is functioning.

[17] Different conclusions are drawn by Cooper and Kempf (2000) who submit the implementation of fiscal rules to the nature of economic shocks. If the degree of shocks correlation is high across countries and the central bank strongly defends price stability, then a budgetary constraint could improve the social welfare. However, in case of prevalence of idiosyncratic shocks, the shift to a fiscally constrained monetary union would be counterproductive: "if a set of policy instruments open to fiscal authorities is sufficiently restricted, then monetary union may not increase welfare" (pag.27).

[18] Such a rule would have implicitly entailed that, at the beginning of the third stage of EMU, member states had been effectively carried out the macroeconomic convergence process by improving the synchronization of business cycles and created more homogeneous public finance conditions.

established in the Maastricht Treaty. Moreover, the implementation of such a constraint is theoretically justified by the no optimality of the Euro-area that could strengthen, inside the Ecofin, the strategic divergences concerning the preference between inflation or unemployment.

The country specific rules imply that the SGP could be reshaped in line with national growth economic performances, inflation rates and different deficit and debt dynamics of each member state. As suggested by a relevant part of the literature (Buiter, 2003, Buiter-Grafe, 2002, Bofinger, 2003), a "country specific approach" would allow to overcome the lack of economic rationale of the SGP by introducing a significant element of flexibility. Nonetheless theoretically well-grounded, country specific medium-term budgetary targets show two critical factors: the inconsistency with the rule credibility and the potential disagreement – inside the Ecofin Council - on the evaluation of any single national economic policy action. Consequently, the increase of uncertainty in the implementation of the preventive and sanctioning arm of the Pact would negatively affect its enforcement mechanism.

In the light of the recent reform of the SGP, a final consideration deserves the interpretation of external consistency related to both the no optimality of the Euro-area and the international dimension of the Pact. Following the European Council Conclusions, the new version of the Pact should involve the recovery of budgetary policy as an instrument for stimulating economic growth. Indeed, the Council points out that "*in making the proposals for a reform of the Stability and Growth Pact, the Council gave due consideration to enhance governance and the national ownership of fiscal framework, to strengthen the economic underpinnings and the effectiveness of the Pact, both in its preventive and corrective arms, to safeguard of public finance in the long run, to promote growth and to avoid imposing excessive burdens on future generations"* (European Council Conclusion, Brussels, 22nd e 23rd March 2005, pag. 23) and "[…] *Also, the instruments for EU economic governance need to be better interlinked in order to enhance the contribution of fiscal policy to economic growth and support progress towards realising the Lisbon strategy"* (European Council Conclusion, Brussels, 22nd e 23rd March 2005, pag. 22).

The Council's statement seems to reflect the rising academic disagreement on the optimal assignment of policy objectives to instruments and the appropriateness of the strategies undertaken by governments to achieve their objectives[19]. The new emphasis on enhancing economic growth could, however, pose a potential conflict with economic rationale of the Pact according to which the main goals of fiscal policy should mainly concern short-run fiscal discipline and/or long-run sustainability of public finances. In particular, it could prefigure a radical change in the theoretical approach followed at the European level[20], the so-called Brussels-Frankfurt consensus, by disclosing a favour for certain degree of active fiscal policy in order to underpin economic growth.

Following this reasoning, in addition to the traditional Inman and Kopits-Symansky's taxonomy, other two specific aspects have been included in the empirical analysis (see par.4.1): the ownership and the twofold interpretation of consistency related both to Lisbon strategy objectives (potential growth-oriented) and long-term sustainability. Therefore, the evaluation of each reform proposal provided in par. 4 has been made according the 9 selected features.

3.1 Theoretical inconsistencies underlying the Stability and Growth Pact

Before proceeding with the empirical investigation it is worthwhile to underline that the introduction of any budgetary constraint meets in practice some important impediments due to the theoretical trade-offs emerging from its main characteristics explained above.

As highlighted in par.2.2, economic theory suggests a number of desirable properties for fiscal rules. The problem is that a budgetary constraint designed to exhibit one of these

[19] To this regard, Fisher, Jonung and Larch (2007) find out that, among the proposals of reforming the Pact, five and potentially divergent fiscal policy goals come out: cyclical output stabilisation, budgetary discipline, long-run sustainability, optimal mix fiscal-monetary policy, economic growth.

[20] The old SGP was clearly set up on new classical macroeconomics paradigm, including the policy prescription of no-Keynesian effects of fiscal policy ad the tax-smoothing principle. Therefore, economic growth ha been assigned to supply-side policies, such as structural reforms, whereas government's interventions stimulating aggregate demand were deemed potentially destabilising.

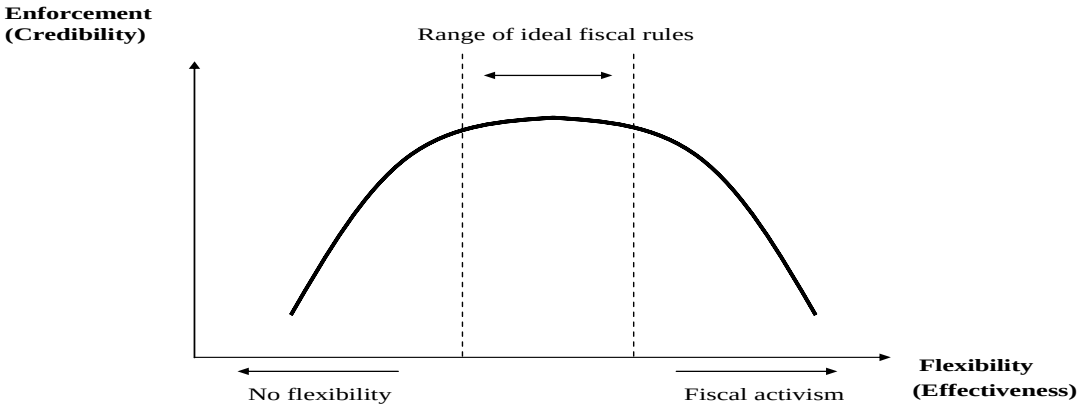
properties will often exhibit less of another. This shows a typical trade-off between what is theoretically right and what is operationally feasible in the real context. Academics tend to be in favour of the former, while policy-makers point out the latter.

These dilemmas become even sharper in a monetary union, such as the Euro area governed by the SGP. In principle, the implementation of supra-national budgetary rules has an implicit cost represented by reduced margin of intervention in terms of discretionary fiscal policies, involving that the best response to given shocks could be incompatible with the rule provisions; in the meanwhile, such a constraint brings several benefits in terms of acquisition or strengthening of credibility through a higher confidence of financial markets, households, and firms inside a stable and predictable economic policy scenario. Furthermore, a "discipline effect" could occur by reducing interest rates on public debt and assuring long-run sustainability in public finances.

The attempt of finding an appropriate balance between credibility and effectiveness features of fiscal rules represents, therefore, a difficult task for economists and policy-makers. A credible fiscal rule enhances government's fiscal discipline, but, at the same time, could lead to an excessive rigidity in managing budgetary policy. On the other hand, an excess of flexibility could be misinterpreted by financial markets in terms of fiscal activism that is incompatible with a permanent rule-based framework.

This is shown in the Figure 2 below, where a no linear relationship between enforcement and flexibility (a proxy of credibility and effectiveness respectively) emerges clearly through a concave (reversed U-shaped) curve. Whereas credibility can be expressed as linear function of well specification, transparency, simplicity, enforcement mechanism, internal consistency and ownership, this assumption does not hold in case of flexibility. When budgetary rules are too rigid, then fiscal authorities will attempt not to implement them; when too flexible, governments will exploit the chance of overriding fiscal thresholds without incurring in the enforcement mechanism and being punished.

Figure 2. Theoretical drawbacks underlying the SGP: A stylised view.



This is revealed in the first and third area of the Figure 2[21]. In the first one, the curve increases at decreasing rate involving that the current degree of flexibility is unsatisfactory[22]: fiscal rules does not provides any escape clause or, even worst, these are unrealistic or inappropriate, by making highly plausible that policy makers would tend not to implement the rule, if necessary. In the third area, instead, the decreasing curve implies that flexibility is becoming higher and higher so that the constraint is not biding. Thus, if escape clauses are deemed as profitable loopholes, then policy makers could use them to justify the excessive deficit bias without being penalised.

The middle area where the curve tends to be flat, defines the set of optimal fiscal rules: a satisfactory degree of reputation is guaranteed by the functioning of clear and simple escape clauses whose enforcement should start automatically without any political interventions. In line with analysis the following conclusions can be intuitively drawn:

a) the inconsistency between enforcement and flexibility can be reduced, but not completely removed;

b) there is not a single optimal fiscal rule but different classes potentially complying with the features mentioned above. To this respect, the implementation of the enforcement mechanism could play a prominent role in ensuring the "optimality" of budgetary constraints: escape clauses should be modelled to counterbalance the negative impact of exogenous idiosyncratic shocks. Therefore, the provision of a limited number and depoliticised escape clauses could be an appropriate solution[23].

4. Ranking SGP reform proposals

This section provides an empirical analysis on the SGP reform proposals by assessing if their implementation would have positively affected the mix between credibility and effectiveness, which has to be interpreted as proxy of the degree of optimality of the European fiscal framework. Therefore, the main aim is to rank the SGP reform proposals in a systematic way by using an adequate statistic technique, which is the principal component analysis (PCA) and to evaluate whether some modifications advanced by the economic literature have, at least partially, taken into account by policy-makers in building up the new version of the Pact.

Before proceeding with our analysis, it appears worthwhile to show which criteria have been applied for selecting the SGP reform proposals and to give some explanation about. In line with Fisher, Jonung and Larch (2007), the number of proposals included in the sample must respond to the following conditions:

(a) Proposals must have been presented before the end of March 2005 that is considered as the cut–off date. Therefore, the investigation period covers almost 10 years. In this way, even if selected papers do not (of course) cover the entire population of investigations on the Pact alternatives and modifications, it displays a large variety concerning both the typology of advanced reforms and applied methodologies, by identifying a significant and representative part of researches provided by the literature. Furthermore, the choice of adopting the end of March 2005 as cut off date, notwithstanding excluding some of the most recent papers on this topic, underlines that European Council's resolution represents a turning point in the history of the EMU fiscal framework by giving rise to the new version of the Pact. The heated institutional

[21] Obviously, operating in this way, we are explaining a movement along the curve for a given value of any other variable affecting credibility; if these features should change, we would expect an up or down shift of the curve.

[22] In this case, the reputation of governments would be strengthened by introducing some mechanism ensuring an higher degree of flexibility.

[23] In the case of the Pact, empirical literature (Buti-van den Noord, 2003, Buti *et al*, 2003, Verde, 2004) has highlighted several modification granting a certain degree of flexibility: the estimation of fiscal indicators in terms of structural or cyclically adjusted balance rather than in nominal values; a greater emphasis on budgetary targets defined over a medium–term horizon; a stricter link between the debt and deficit evolution, the redefinition of exceptional circumstances.

debate and the strong resistance of several member states to change the Pact appears to corroborate the conviction that only researches existing before this date, could have affected, to some extent, the SGP dispute among policy-makers[24].

(b) Only proposals written in English have been included in our sample without any distinction between academic and no academic economists (mainly made up by professional economists working in private or public economic institutions). It follows that proposals advanced by policy-makers have been excluded *a priori* from our sample. The choice of excluding such reforms stems from the politicians' distortions in running excessive deficits that could produce sub-optimal outcomes in terms of EMU fiscal framework optimality. Moreover, the decision of ruling out no English written articles, which could be interpreted as a limitation of the analysis, has been based on the assumption that the most interesting foreign language papers would have been translated sooner or later in English. Thus, this potential caveat would have been eliminated or, at least, reduced.

(c) Finally, the selection procedure does not consider as a relevant (and discriminatory) variable the publication of the reform proposals. Unpublished articles, working papers, reports and manuscripts are taken into account as well as published researches.

Following these criteria, 100 SGP proposals have been collected in the sample. However, 7 out of 100 reforms have been mapped out as they do not aim at providing any alternative or modification of the Pact. We refer, in particular, to those in favour of financial market discipline or a pure fiscal federalism mechanism, which move out from a rule-based system.

Inside the grouped investigations (93), it is straightforward to demonstrate that many papers can be included in the same class of proposal (debt rule, golden rule, inflation targeting, expenditure rule, soft law approach, intertemporal budget rule or inside the delegation approach, Fiscal Sustainability Council or Fiscal policy Committees and so on) by sharing several common aspects vis-à-vis both the theoretical and empirical analysis and policy conclusions. Each paper, however, exhibits some distinctive features, differentiating itself from the whole population. One major explanation has to be found in the fact that several economists have provided more than one theoretical contribution over years often combining procedural and numerical rules, or a rules based with a delegation approach and even radically changing their conclusions on how to the reform the Pact.

Next procedural step is to assess each proposal according to the main features selected in the previous section. The evaluation procedure is based on a multi-stage approach. Firstly, the old version of the Pact has been chosen as benchmark for the evaluation of each reform proposals; it has been assessed associating to the nine corresponding features a value between 0 and 4 where 0=nil, 1=low, 2=medium, 3=high and 4=maximum. Secondly, due the strong heterogeneity of the reforms, the proposals have been split up in more homogeneous subcategories. Therefore, proposals referring to the golden rule have been grouped together, so as those in favour of a debt rule, structural reforms, procedural reforms, institutional changes, expenditure rules and so on (see Table 2). In order to obtain a consistent ordinal ranking, then, we have compared the previous Pact with the standard modification of each selected subgroup - as for example the traditional version of debt rule or expenditure rule versus the old SGP- giving the chance to use ½ or ¼ point in order to judge each reform feature. Thirdly, proposals belonging to each subcategory have been evaluated accordingly to the score obtained to the corresponding main reform proposals, as for example the modified version of the golden rule proposed by Blanchard and Giavazzi has been compared with the traditional golden rule).

In so doing, it is possible to build a consistent assessment matrix (see Appendix I), that represents the starting point of our interpretative analysis, giving a useful dataset which the PCA can be applied to. Moreover, due to large number of investigations, the implementation of this multivariate statistical analysis represents a powerful and direct instrument for escaping from a purely descriptive (and maybe tiresome) analysis. Although the internal ranking remains of course objectionable, it has to be underlined that the score assigned to each variable is consistent with the objective evaluations emerged in the first section of the paper, by permitting

[24]Actually, after the Ecofin Council's conclusion on March 2005 the number of new proposals has fallen down sharply.

to classify each proposals according to an ordinal rank[25]. Therefore, in line with main literature (see Fisher *et al.* 2007, Verde, 2006), deriving an assessments matrix in which the SGP reform proposals are ranked, constitutes a necessary preliminary requirement in order to run the principal component analysis.

Table 1. An overview of the SGP reform proposals

Reform proposals approach	number of proposals for each subcategories of proposals (in parentheses)
1. New rules (60)	Debt rule (12) Golden rule (10) Structural reforms (5) Inflation targeting (4) Expenditure rule (3) Intertemporal budget rule (3) Soft law approach (3) Procedural modifications (3) Improving the quality of forecasts and applying pressure during good times (3) Implementation and enforcement of complementary rules both at national and EU level (2) Strengthening economic policy coordination (2) Supply-side approach (promotion of wage flexibility) (1) Deficit rule (1) Redefinition of "exceptional circumstances clause" (1) Fiscal federalism and stabilisation fund (2) Budgetary targets reflecting national savings differences (1) Tax smoothing principle (1) Trade with deficit permits (1) Improving multilateral surveillance (1) Lower structural budget balance (1)
2. New institutional frameworks (11)	Independent forecasting and monitoring agencies (3) Fiscal sustainability council and fiscal policy committee at EU level (3) New role for the Commission and the Council (1) European government accountable to European citizens (1) More power to EU Commission (removing discretion of the Council) (2) European banking supervisory body (1)
3. New rules and institutions (18)	This is a combination of the two previous categories
4. Internal adjustments (4)	Stress on the cyclically adjusted budget balance (1) Early warnings in good times and rainy day funds (1) More no-partisans enforcements at the EU level (1) Improving national budgetary process conducive to fiscal discipline (1)

Source: Elaboration from Fisher, Jonung, Larch, (2007)

[25] Poterba (1990, 1994), Alt and Lowry (1994), Bayoumi and Eichengreen (1995) have adopted a similar technique in order to evaluate the impact of fiscal rule on budgetary performances of US states. This technique is based on the introduction of an index called "ACIR stringency index" which measures the degree of tightness and robustness of balanced budget rule in each US state. The index can assume values between 0 and 10 where 0 is the minimum and 10 the maximum. The ACIR index sets an increasing point consistently with a scale of more stringent qualitative requirements, which budgetary rules should satisfy. For example, rules requiring the governor's approval for the budget get 1 point; rules involving the legislature to pass a budget 2 points, while rules allowing states to carry a deficit into the next fiscal year, 4 points. Furthermore, rules that does not allow states to carry a deficit into next fiscal year, receive 6 point in the case of two year budget and 8 points in the case of an annual budget. Finally, in the case of statutory provision, rules obtain just 1 more point, while, in the case of constitutional law, rule requiring a qualified majority vote to be amended by the parliament, will obtain 2 extra points. The index is then defined by the number of points corresponding to the satisfied requirements.

4.1 A principal component analysis: outcomes and interpretation

Principal component analysis (PCA) is a multivariate statistical technique traditionally implemented in many fields of social sciences in order to transform a large set of correlated variables into a smaller set of uncorrelated ones, labelled principal components, which are able to explain most of the variation (variance) in the original set of variables. In particular, this methodology, particularly useful when many variables included in the analysis, could appear, at least partially, overlapped so that their reduction can facilitate theoretical interpretation and policy conclusions. Moreover, PCA implementation allows reducing the dimensionality of large data sets by finding signals in noisy data.

As first step, let us consider the Assessment Matrix[26] $X_{94,9}$ which includes 94 observations - of which the first 93 are the number of SGP reform proposals while the last data describes the old version of the Pact – classified according to the nine fiscal rule features. Our investigation aims at reducing these selected characteristics without loosing any important share of statistical information in the observed variables. From the geometric point of view, the assessment matrix $X_{94,9}$ can be shown as 94 points in the vector space S_9. With the application of the PCA, therefore, it is possible to draw all these 94 points in a parallel subspace, say, Sq with q<9 where q is the new (reduced) dimension such as the clouds of the original 97 observations of S_9 could be deformed as less as possible. Consequently we need to find the dimension of sub space q such that the quality of original data could be mostly saved.

By applying the methodology illustrated in the Appendix II and consistently with the principal components analysis literature (Joliffe, 1972), it is possible to obtain the principal components, by associating eigenvalues (derived by the covariance matrix and ordered in a decreasing way) to the corresponding eigenvectors, such that the cumulated variance explained by first i^{th} eigenvalues results at least equal to 70 per cent of the variance of the original data set. As a result, each principal component can be expressed as a linear combination of the initial variables with coefficients equal to the components of the characteristic vector associated to the corresponding eigenvalues in a decreasing order.

Consequently, the maximum number of principal components which could be theoretically extracted from our analysis is equal to the number of the selected fiscal rule characteristics. However, due to the significant correlation between these variables, it is shown that first two principal components by themselves capture most of the variation of original data set (more than 77 per cent). The first principal component accounts for the largest proportion of variance in the original set of data (64 per cent), while the second principal component describes the largest proportion of variation which is not accounted for by the first principal component (more than 12 per cent). This is a very encouraging result that allows to form the so called feature vector, which is a matrix of vectors composed by the first two eigenvectors (or principal components) and involving a reduced loss of information (lower than 23 per cent).

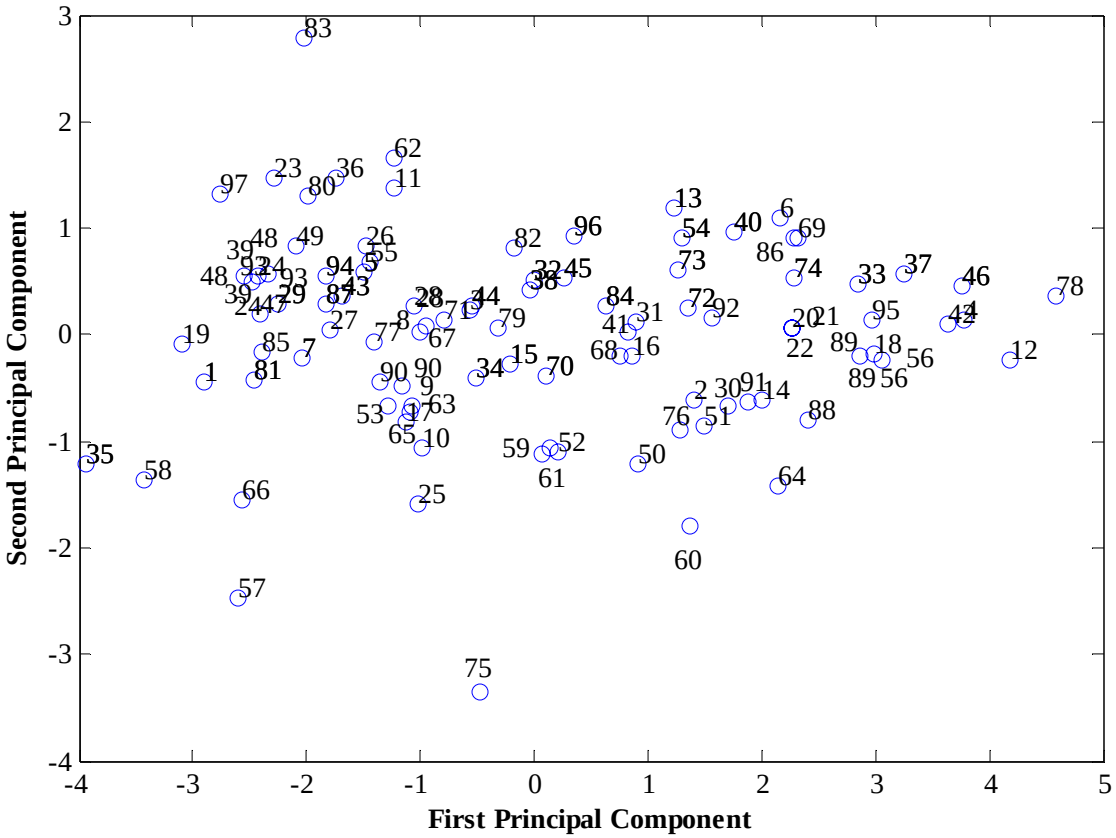
Table 2. The feature vector

eig1	-0,2474	-0,11522	-0,40292	-0,37892	-0,4286	-0,2965	0,35493	-0,3457	0,32014
eig2	0,13126	0,47786	0,22947	0,11144	0,12702	0,33172	0,58558	-0,0516	0,46649

Therefore, thank to PCA transformation, the dimension of the original vector space has been lessened from S_9 to S_2, deriving a new adjusted set of data (see Step 4 in the Appendix II) and giving the chance to provide a satisfactory representation of the SGP reform proposals through the traditional Cartesian axes. Figure 1 shows the position of each proposal of reforming the Pact after having run the principal component analysis.

[26] See Appendix I for a detailed description of the Assessment Matrix.

Figure 3. SGP reform proposals according to PCA



In order to interpret properly the adjusted data in Figure 3, we need to consider the old version of the SGP as benchmark by transferring the origins of axes in the point whose coordinates corresponds to the previous Pact (see Figure 4). A further step is to calculate the circle of correlations, which measures the correlation between the fiscal rule features and the selected principal components. This is an extremely useful indicator on how to interpret the axes according our first two principal components.

Table 3. The circle of correlations

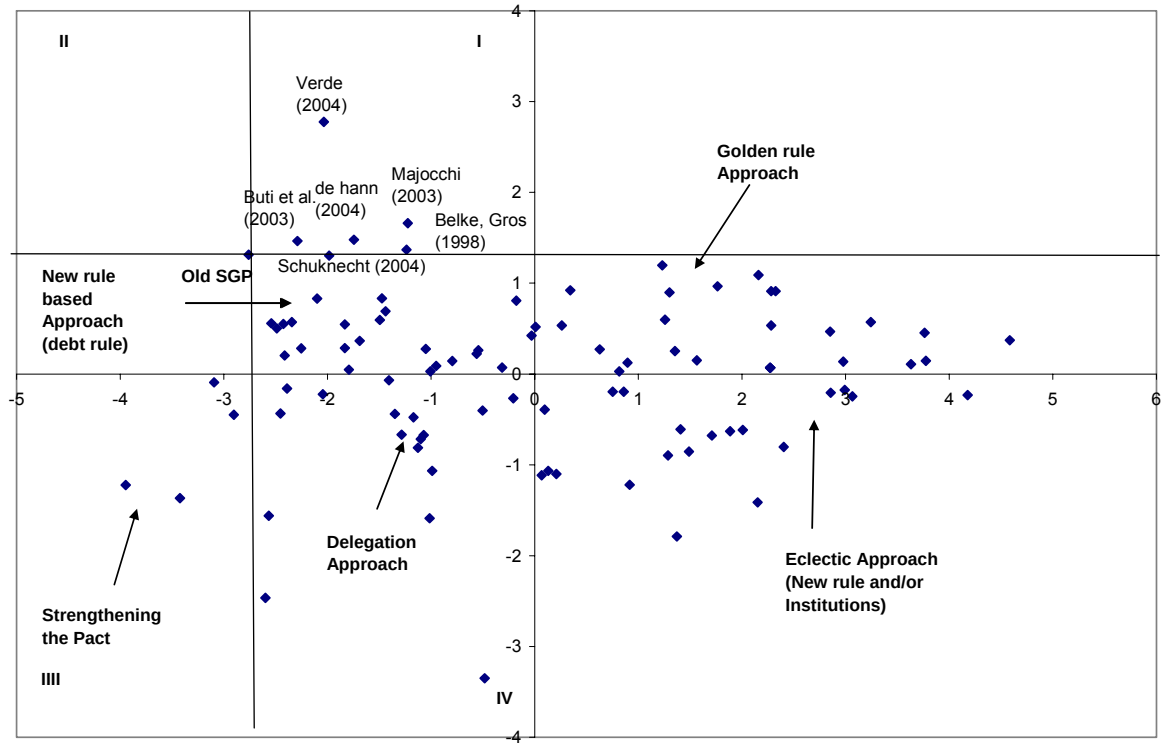
	Correlations between initial variables and principal components	
Fiscal rule features	*First Principal Component*	*Second Principal Component*
Well definition	-0,69573	0,16541
Onwership	-0,33023	0,61367
Transparency	-0,88306	0,22533
Simplicity	-0,89186	0,11752
Internal Consistency	-0,90346	0,11997
Enforcement	-0,66534	0,33348
Flexibility	0,72384	0,53508
Consistency with the objective in terms of long term sustainability	-0,82431	-0,055101
Consistency with the Lisbon targets (potential growth)	0,73059	0,47699

The X-axis representing the first principal component is strongly related to the effectiveness characteristics of fiscal rule (above all flexibility and consistency with Lisbon targets) and inversely related to the credibility aspects. Indeed, there is an almost linear negative relationship with transparency, simplicity, internal consistency and consistency with long term sustainability, while the correlation with flexibility and Lisbon strategy targets is positive and statistically significant. In other words, the first principal component tends to reflect the traditional trade-off emerging in the fiscal rule literature between enforcement (or transparency/simplicity) and flexibility.

Considering the second principal component (Y-axis), ownership appears to play the most significant role followed, to lesser extent, by flexibility. In particular, with the exception of long term sustainability, fiscal rule features exhibit the same (positive) sign of correlation, although the second component shows lower values of relationship with the credibility aspects of budgetary constraints. Therefore, the second principal component could be interpreted as a proxy of effective implementation (success) of SGP reform proposals, a sort of synthetic indicator able of measuring the global performance of each of them.

More in particular, the first two principal components may be seen as sensitive measures able at summarising the originally chosen fiscal rule features without a significant loss of information. The first component shows that the movement along the X-axis (from the left to right-hand) identifies more flexible (but less transparent, simple and enforceable) fiscal rules, whereas a movement along the Y-axis (from the top to the bottom-hand) indicates decreasing values in terms of overall performance of SGP reform proposals.

Figure 4. Ranking the SGP proposals according to the old Pact



Furthermore, once taken as benchmark the old version of the Pact, four different regions have been identified by giving the change to make a comparative analysis and assess properly which proposed modification would have constituted an effective improvement of the EMU fiscal framework in comparison with the previous *"status quo"*.

Each region contains a certain number of observations, except the second one. This region combines increasing values of ownership with the declining degree of flexibility. The fact that no proposals are included reveals that any improvement in term of global performance of the Pact can not disregard an adequate margin of manoeuvre for national fiscal authorities. Furthermore, it follows that the rigidity of the old Pact has been perceived as the more important weakness by the majority of the academic literature.

The third region contains few SGP reforms (only 4), which aim at strengthening the Pact. The weight of the transparency, simplicity, enforcement procedure and internal consistency prevails on that of being in favour of short-term stabilisation and economic growth. By comparing these modifications with the old Pact, the trade-off between credibility and effectiveness would be reinforced instead of being reduced. Consequently, being not supported by the legitimacy at international level, these modifications, if put into practice, would represent a sub-optimal solution.

Most of the proposals of our sample (86 out of 96) are included in the fourth region, which combine an increasing degree of flexibility with lower values of legitimacy (the corresponding third area of the Figure2). For this reason, these modifications can not involve a real improvement of the Pact, because in EMU context, a rising flexibility could be seen as a hidden form of fiscal discretionarity. More in particularly, four different clusters of reforms can be distinguished:

(a) the new-rule based approach, which includes for example, debt rule (for all see, Montanino, 2003, Herzog, 2003, Saraceno and Monperrus-Veroni, 2004), tax smoothing principle (Buti and van de Noord, 2004), the quality of forecasts and application of pressure

during good times (Buti and Pench, 2004, Gros, Mayer, Ubide, 2004), placed in proximity of the old Pact. Indeed, although these reforms strengthen the theoretical foundations of the Pact, the different level of public debt/GDP ratio among member states tends to prevent the introduction of such a rule.

(b) The delegation approach, containing modifications regarding respectively the institution of new budgetary authorities operating at EU level such as a fiscal policy committee (Eichengreen, 2003, Wyplosz, 2005, Marinheiro, 2005), independent fiscal watchdog (Gros, 2004) or an European government accountable to EU citizens (Collignon, 2003) and at national level, national fiscal agencies or independent forecasting and monitoring agencies. Proposals planning a more appropriate allocation of competences and clearer roles between the Commission and the Council (Wren Lewis, 2002, 2004) should be included inside this group. In spite of a fair degree of flexibility, is characterised by unsatisfactory values of ownership due to member states' resistances to transfer a significant part of their fiscal sovereignty to a supranational authority.

(c) "Golden rule" approach, placed along the X-axis more distant respect to our benchmark above all in terms of effectiveness. This confirms that higher degree of flexibility could seriously threat the enforcement procedure by reducing the global performance of the rule.

(d) The new rule-based and institutional (or eclectic) approach corresponds to a combination of the two previous categories involving several proposals advanced by Eichengreen (2003), Fatas *et al*, 2004 and Pisany–Ferry and Coureé (2003) with the constitution of a Fiscal Sustainability or Debt Sustainability Council, Savona-Viviani (2003), Brunetta-Tria, (2003), Herzog (2003) Begg and Schelke (2004). It displays the largest distance to the previous SGP version by also counting "country-specific" rules. This outcome can be justified by the fact that policy-marker's budgetary margin of manoeuvre would significantly increase by making the rule no binding anymore. In this case, it would become extremely tricky to differentiate between the anti-cyclical fiscal interventions and discretionary fiscal policies.

As a consequence, the most interesting outcomes of the analysis stem from proposals located in the first region, where a better rule performance is guaranteed by higher degrees of ownership and flexibility. PCA shows that only 6 suggested modifications would have been able to improve the European fiscal framework functioning. These proposals regards: (a) the provision of stabilisation fund managed by the Commission (Belke-Gros, 1998); (b) hardening the multilateral surveillance of the Pact (de Haan, Berger, Jansen, 2003); (c) the introduction of internal adjustments (Buti, Eijffinger, Franco, 2003); (d) soft law approach involving prevention, self enforcement, effective political process and transparency (Schuknecht, 2004); (f) the constitution of an European (adequately financed) stabilisation fund which could be used to counteract exogenous shocks hitting the whole European economy (Majocchi, 2003); (e) and, finally, the re-definition of "exceptional circumstances clause" (Verde, 2004).

The greater legitimacy stems from the exclusion of any modification of the Treaty which has met the disapproval of the majority of smaller and fiscally virtuous member states; in addition, due to the extremely long and politically sensitive process of amending the Treaty, the credibility of the rule-based framework would have fallen rapidly. In contrast, a more satisfactory degree of flexibility would have been guaranteed by the functioning of new set of more effective and practicable escape clauses.

Each of these reform proposals could be defined as Pareto improvement because, compared to the old Pact, the relationship between credibility and effectiveness tends to be positive. Avoiding any radical modification, such reforms would have been more easily implemented by all member states. Consequently, such changes would have advantaged the budgetary position of many EMU countries without penalising fiscally disciplined member states.

4.2 Policy considerations

Despite of the large variation in the original dataset of SGP reform proposals, our qualitative analysis would disclose some important patterns on which Pact reforms could be involved an effective improvement respect to the previous *status quo***.** Given the PCA outcomes, the

following policy consideration can be drawn. Firstly, the best performing reform proposals seems to be those shifting from the simple dilemma "keeping or abolishing (and replacing) the Pact" to the more interesting issue on how to improve the rule-based system through some effective corrections. Once established the relevance of the SGP as indispensable tool in order to ensure the soundness of fiscal position in each member state, the main issue is whether the institutional design of the current one provided the appropriate incentives such that national authorities might have realised the adequate mix between short-run budgetary stabilisation, long-term sustainability and economic growth.

Secondly, moving from national to international (EMU) context, the feature of ownership becomes the main driver for evaluating the SGP reforms. However, this seems to be neglected by most of the examined proposals. In fact, the majority of the academic contributions tend to reflect more appropriately the well-known dilemma between enforcement and flexibility (the third and the fourth regions in Fig.4) rather than the legitimacy of the Pact. According to our ranking, therefore, even more enforceable and transparent proposals when characterised by low degree of ownership indicate a sub optimal answer, if implemented.

Third, notwithstanding the increase of rule economic rationale, theoretically well-grounded proposals not always corresponds to an effective improvement of a degree of optimality of the European fiscal framework. Country specific approaches, such as the intertemporal budget rule suggested by Buiter and Grafe (2004) which consider past and expected patterns of macroeconomic variables, could not match the demand for increasing margins of fiscal stabilisation required by most member states;

Finally, a negative relationship between the degree of optimality of SGP reform proposals and the relative distance respect to the old Pact clearly emerges. It means that the more distant is the proposals from the benchmark (the old Pact), the more unlikely would have been the implementation of such reform. For that reason, delegation approach and golden rule reforms should have been excluded as feasible innovations. Furthermore, the same explanation should be valid for the most radical modifications of the Pact, included in the so-called eclectic approach, which could have involved for, the fiscally disciplined countries, the risk of a latent return of fiscal laxism inside the monetary union. As a consequence the best ranked proposals are those introducing a set of adjustments that does not lead automatically to a Treaty modification.

5. Conclusion

This paper provides an ex-post analysis of the most significant SGP reforms and aims at indicating an alternative multistage qualitative approach to assess them. Our way of proceeding could show a practicable technique in order to find those proposals achieving the right balance between increasing degrees of flexibility and improved economic rationale; therefore, our contribution stresses out the main direction along which any modification of the Pact would have been moved to be successfully put into practice. At the same time, our approach whose main weaknesses is given by the subjective score assigned to each proposals, could be used to provide some useful insight to test the robustness of the new version of the Pact. Evaluating the robustness of the reformed Pact could be particularly interesting also in the light of the recent economic developments; indeed, whereas last two year have been characterised by an higher than expected economic growth in the EU by easing the improvement of the overall budgetary situation in most member states, the ongoing financial turmoil, the slowdown in the US economy and continued high oil and commodity prices - which has led to a hump in inflation in recent months- could sharpened downside risks and undermine fiscal discipline inside the EU by putting under pressure the new Pact. If the past (the mild recession in which the three largest European countries have been involved in 2002-2005) has to be considered as a good guide for

the future, the robustness of the reformed SGP should not be ensured *a priori* and still need to be tested.

In this respect both technical and procedural changes incorporated in the new SGP seem to be, at least in theory, in line with most of the outcomes stemming from our analysis. In particular, the strengthening of the preventive arm of the Pact through a stronger link between deficit and debt dynamics, the introduction of structural reforms as critical variable in the Council's evaluations, a new emphasis on the quality of public expenditure and the redefinition of exceptional circumstances related to the Excessive Deficit Procedure match broadly with 4 out of 6 modifications proposed by the literature. On the other hand, the establishment of stabilisation fund has been excluded from the new Pact provisions, confirming the reluctance of certain member states, notably the biggest countries, to increase the Community budgetary resources.

However, the concept of "other relevant factors" explicitly provided by the new SGP, country by country differentiation of the medium term objectives (MTO) and the lack of a common agreed methodology for evaluating the structural reform impact, could potentially introduce elements of excessive flexibility by threatening the global performance of the reformed Pact.

Although it seems early to assess appropriately the new version of the Pact, an interesting paradox could eventually occur: while the old Pact has been judged too rigid and therefore has been interpreted in such a way not to be correctly implemented, the new SGP provisions could be timely applied since the large set of "escape clauses" would make highly implausible the activation of the Excessive Deficit Procedure.

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Appendix I. The Assessment Matrix

Each Pact reform has been evaluated following the general criteria proposed by the economic literature on the institutional approach of fiscal rule explored in the first section once taken in to account the specificity of the EMU fiscal framework. In terms of transparency, simplicity, well-definition and ownership proposals keeping numerical rules receive higher grades than those in favour of procedural rules. Numerical rules defined in nominal terms should be considered a better option than those focused on structural ones because of the methodological uncertainty in calculating the potential GDP, output gap and, finally, the cyclical component of public budget deficit. Furthermore, fiscal constraints expressed as ratio between public expenditure and GDP should be judged more favourably than those referring to debt and overall actual deficit.

As regards internal consistency, each reform has been assessed according to its compatibility with the theoretical background of the EMU fiscal framework, by assigning higher grades to those in line with the neoclassical approach embedded in the Maastricht Treaty. On the other side of the scale, proposals reflecting a more Keynesian view of fiscal policy have obtained lower points. Concerning the appraisal of ownership, reforms involving a new rule based system or institutional changes, which may consist in the allocation or reassignment of competences from the national to the EMU level, - as in the case of delegation approach -, get a lower grade in comparison with those recommending internal adjustments[27]. This is because the former involves the Treaty modification and consequently, a unanimous favourable vote taken by the European Council.

Flexibility has been interpreted as short term output stabilisation. To this respect, all reforms related to the golden rule approach[28] has been assigned a better position, while proposals aiming at strengthening the Pact via numerical and/or procedural provisions get the lower grade. As to the twofold meaning of external consistency (long term sustainability and achievement of Lisbon strategy targets), the best ranking has been given to reforms introducing a country specific rules and/or structural reforms, while “one rule firs all” approaches have been evaluated less favourably.

Let us give a practical example by comparing the old Pact chosen as our benchmark with the traditional golden rule (Creel, 2003) and the modified golden rule as proposed by Blanchard -Giavazzi (2003). Following the procedure described the in par.4, once evaluated the old Pact according the prevalent economic literature, the second step is to compare it with the traditional golden rule. Having in mind the characteristics and potential weaknesses of the golden rule[29], we assess that in terms of credibility aspects (transparency, simplicity, well-definition and ownership, internal consistency and long-run sustainability) the old SGP deserves higher grades whereas in terms of effectiveness aspects the traditional golden rules prevails. As a final step we compare the traditional golden rule with the one proposed by Blanchard and Giavazzi whose main difference has to be found in the exclusion of net (instead of gross) investment spending from deficit calculations. According our view such a proposal deserves lower grades in terms of well-definition, transparency, simplicity, ownership, internal consistency and long run sustainability given the uncertainty of calculating the public investment depreciation, whereas it allows higher margins of flexibility. This way of proceeding allows to model a consistent ordinal ranking of all SGP reform proposals.

[27] Due to the natural reluctance of national member states to transfer part of their fiscal competences at the EU level, radical modifications would not find a general consensus among member states.

[28] The traditional definition of golden rule states that, over the cycle, government borrowing should not exceed gross government capital formation; hence, current spending should be financed by current receipts.

[29] Albeit more flexible than rules defined as share of general government deficit or current expenditure, such reform proposals could run the risk to harm the enforcement mechanism through the use of creative accounting incentives. So, they will deserve a higher grade as regards flexibility and a lower one for enforcement, transparency and simplicity than the numerical rules, such as the old Pact. Furthermore, given the interpretation of external consistency, golden rule proposals would of course be preferable in terms of economic growth, but they could be potentially in conflict with the long run sustainability target, above all in those countries whose debt to GDP ratio is around or already above 60 per cent.

Authors	Main features in the EMU context								
	Credibility						Effecttivennes		
	Well definition	*Onwership*	*Transparency*	*Simplicity*	*Internal Consistency*	*Enforcement*	*Flexibility*	*debt sust.*	*Lisbon Strategy*
Alesina, A.	3	1	3	3	3,25	1,25	1	3,5	1
Allsopp, W. and M. Artis	1,5	0,5	1	0,5	2	0,5	2,5	2	2
Annet, A. Decressin, J. and M. Deppler	1,5	0,5	2,5	2,5	2	2	2,5	2	1,5
Arestis, P., McCauley, P. and M.Sawyer	1	0	1	1	0	0	4	0,5	3
Barysch, K.	2	1,5	2,5	2	2,5	2,5	2	3	1,5
Beetsma, R. and X. Debrun	1,5	1,5	1,5	1,25	1,5	0	3	1,5	4
Beetsma, R. and X. Debrun	3	1	2,5	2,5	2,5	2,5	1	2	1
Begg, I. and W. Schelkle	2	0,5	2	2	2,5	2,5	2	2,5	1,5
Begg, I. and W. Shelckle	1,5	0	2,5	1,5	2,5	2,5	2	3	1
Begg, I., Hodson, D. and I. Maher	1,5	0	2,5	1	2,5	2,5	1	2	1
Belke, A and D. Gros	2	1,5	2,5	2,5	3	2	3	3	2
Bibow, J.	1	0	0,5	0,5	0	0	4	0	2,5
Blanchard, O. and F.Giavazzi	1,5	1,5	1,5	1,5	1,5	1,5	3,5	1,75	2,5
Bofinger, P. (Septemper 2003)	1	0,5	1	1	0,5	1	2,5	1,5	2
Bofinger, P. (Janaury 2003)	2	1,5	1,5	1,5	2	1,5	2	2	1
Bofinger, P.and E.Mayer	1,75	1	1,25	1,25	1,75	1	2,25	1,75	2
Brück, T. and R. Zwiener	3	0,75	1,5	1,5	3	0,75	1	3,5	2
Brunetta, R. and G. Tria	1,5	0	1	1	0	0,5	3,5	1	2,5
Brunilla, A.	3	2	3	2,75	3,5	1,5	1	3	0,5
Buiter , W. H. and C. Grafe	2	0,5	0,5	0,5	1	0,5	4	2,5	2
Buiter, W.H. (2003)	2	0,5	0,5	0,5	1	0,5	4	2,5	2
Buiter,W. H.	2	0,5	0,5	0,5	1	0,5	4	2,5	2
Buti, Eijffinger, Franco	3	2,5	3	2,5	3	2,5	2	2,5	1,5
Buti, M. and L. Pench	2,5	1,5	3	3	3	2	2	3	1
Buti, M. and P. Van den Noord (2004)	1,5	0,5	1,5	1,5	3,5	0,5	1	3	1
Buti, M. and P. Van den Noord (2004)	3	2	2	2	3	2	2,5	2,5	1
Calmfors, L.	3	0,25	2,5	2,25	2,5	2,25	2	3,5	1,5
Calmfors, L. (2003)	3	0,75	2	2	2	2,5	2,5	2,5	1
Calmfors, L. and G.Corsetti (2003)	2,5	0	3	2,75	2,5	3	2	3,5	1,5
Canzonzeri, B. M. and T. D Diba (2000)	1	0	1	1	1,5	0,25	3,5	2,5	1,5
Casella, P.	2	1	1,5	1,5	1	1,5	3,25	1,5	1
Collignon, S. (2003)	1	0	2	2	1	4	2,5	2	2
Creel, J.	1	0,5	0,5	0,5	1,25	1,25	3,5	1	3
De Grauwe, P.	2	1	2	2	2	0,75	2	3	1,5
de Haan, J., Berger H. and D.J. Jansen	3	0,25	3	3	3,5	3	0	3	0
de Haan, J., Berger, H. and D.J. Jansen	2,75	2,75	2,5	2,25	2,5	2,5	2,25	2,75	1,5
de Sousa	1	0,5	1	0,5	0,5	0,25	3,5	2	4
Deroose, S. and Langedijk, S.	2	1	1,5	1,5	2,5	2	2	2	2,5
Deroose, S. and Langedijk, S. (2005)	3	2	2,5	2,5	3	2,5	1,5	3	1
Eichengreen, B. (2004)	2	1	1,5	0,5	1,5	1	3,5	2	3
Eichengreen, B. (2003)	2	0,5	1,5	1	1,5	2	2	1,5	2,5
Enderlein, H.	2,5	0	0,5	0,5	0	0,25	3,75	0,5	3
Fatás, A., Hagen von J., Hughes Hallett, A., Siebert, A. and R. Strauch	2,5	0,5	2,5	2	2,5	2,5	2	4	2
Fitoussi, J.P.	2,5	1,5	2	2	2	1,5	2,5	2	1
Feldestein (2005)	1,5	2	1,5	1,5	1,5	2	2,5	2	1,5

Authors	Main features in the EMU context								
	Credibility						Effecttivennes		
	Well definition	*Onwership*	*Transparency*	*Simplicity*	*Internal Consistency*	*Enforcement*	*Flexibility*	*debt sust.*	*Lisbon Strategy*
Fogel, K. G. and S. C. Saxena	0,5	0,5	0,5	0,5	0	1	4	1	3
Gros, D. (2004)	2,5	1,5	3	2,5	3	2	1,5	3	1
Gros (2003)	3,25	1,25	3	2,75	3	2	2	3	1
Gros, D., Mayer T. and A. Ubide (2004)	2	1,5	3	2,5	3	2,5	2	3	1,5
Hefeker, C.	2,5	0,25	1	1	1	0,5	2	2,5	1,5
Hein, E. and A.Truger	1,5	0	1	1	1,5	0,5	2,5	2	2
Herzog, B. (2004, June)	2,5	0,25	0,5	0,5	2,5	1,5	2	2,5	1
Herzog, B. (2004, July)	3	0,5	1	1	2,5	3,5	1	2,5	1
HM Treasury	2,5	1,5	1,25	1,25	1	1,5	3	1,5	2,5
Hodson, D. and I. Maher	2	2	2,5	2,5	2,5	2	1,5	2,5	2
Horn, G.A. (2004)	1	0,25	0,5	0	1	0,5	3,5	1,5	2,5
Inman, R.	3	0	3	3	2,5	0	0	3	0
Irlenbush, B., Wildburger, U. L.,Shûltze, J. and M. Sutter	3	0	3	3	2	3,5	0	3	0
Lehment, H. (2002)	2	2	1	1	2	0,5	1	2	1
Lindbeck, A. and D. Niepelt	1	0,25	0,5	0,5	1	1,5	1	1,5	1,5
Lossani, Natale, Tirelli (2001)	1	0,5	1,5	1,5	2	1	2	2,50	1
Majocchi, A.	2,5	1,5	2,25	2,25	3	2,5	3,25	3	2
Marinheiro, C. J. F.	2	0	3	2	2	1,25	2	3	1
Mathieu, C.and H.Sterdyniak	2	0	1	1	0	0	2	1,5	2
Mills,P. and A. Quinet	3	1	1,5	2	3	0,75	1,25	2,5	1,5
Montanino, A. (2004)	3	0,25	2,5	2,5	3	1	1	3,5	0
Mortensen, J.	2	1,25	2	2	2,5	1,5	2,5	3	1
Muscatelli, V. A., Natale, P. and P.Tirelli	2,5	0,5	1	1	1,5	2	2,5	1,5	1,5
Padoan-Rodriguez (2004)	2	1,5	0,5	0,5	1	1	3,5	2	3
Pisani-Ferry, J. (2002)	2	0,5	1,5	1,5	1,5	1,5	2	3	2
Pisani-Ferry, J. and B. Coeuré	3	0,75	3	1,5	2	1,5	2,5	2	1
Price Waterhouse Coopers	2,5	0,75	1,5	1,5	1	1	3	1	2
Razin, A. and E.Sadka	2	1,25	1,25	1,25	1,25	1,5	2,75	1,5	2,5
Rosa, J.J.	1,5	1	1	1	1	1	3	1	3
Rostowski (2004)	1	0	1	3	1	0	0	2,5	0
Salvemini, M. T.	1	2	0,75	0,75	1,25	1	3.25	1	2,75
Saraceno, F. and P. Monperrus-Veroni	3	1	2,5	2,25	2,5	1	2,25	3	1
Savona, P. and C. Viviani	0,75	0,25	0	0,5	0	0,5	4	0	3,5
Schelkle, W.	1,5	1,5	2	2	2	1,5	2	2	1,5
Schuknecht, L.	2	2,5	3	2,5	2,5	2,5	2,5	3	1
Uhlig, H.	2,5	0,25	3	2,5	2,5	2	2	2,5	0
Verde, A.	2,25	1,5	1,75	1,75	2,5	1,5	2,75	2,25	2
Verde, A.	3	2,75	3,25	3,25	3	2,5	3	2,5	2,5
Visaggio, M.	2	1,5	1,5	1	2	1	2,5	2	2
von Hagen, J.	2	0,5	3	3	2,5	2,75	1	3	1,5
Warin, T.(2004)	2,5	1	1	1	1	1	3	0,75	3,5
Warin, T. (2005)	3	1,5	2,5	2,5	2,5	2,25	2	2	0,5
Weale, M.	1,75	0,75	0,5	0,5	0	0,75	2,75	1,5	1,5
Wenzel, Lackenbauer, Brosamle (2004)	0,5	1,25	0	0	0,5	1,5	3	1,5	2
Willett, T.	1,5	1,5	2,75	2,25	2,5	1	2	2,5	0,25
Wren-Lewis, S. (2003)	0,75	0,5	0,5	0,5	1,5	1	3,25	2	1,25
Wren-Lewis, S.	1,5	0,5	2,5	1,5	1	0,5	3,5	0,5	1,5
Wyplosz, C. (2002)	2,5	1,5	3	2,5	2,5	2,5	2	3,5	1
Wyplosz, C. (2005)	2,5	1,25	3	2,5	2,5	2	2	3	1,5
Xenaki, A.	1,5	0,5	0,5	0,5	1	0,5	3,5	1	2,75
Zimmermann; K.F.	2,5	0,75	2,5	1,5	2	1,5	2,5	1,5	3
Old SGP	3	1,75	3	3,25	3,75	2	2	3,25	2

Appendix II. The principal component analysis methodology

Principal component analysis (PCA) is considered one of the most valuable results from applied linear algebra. This decomposition technique is a simple, non-parametric method of extracting relevant information from confusing or large data sets in multiple dimensions. With minimal additional effort PCA provides a roadmap for how to reduce a complex data set to a lower dimension to reveal the sometimes hidden, simplified structure that often underlie it by performing a covariance analysis between factors.

Step 1: Calculating covariance matrix of Assessment Matrix

Principal components analysis is a covariance analysis between different factors. Covariance is always measured between two factors. When more than 2 factors are involved, covariance values can be placed into a matrix, which is the assessment matrix $X_{97,9}$.

As preliminary step, we need to subtract the mean from each of data dimension. The mean subtracted is the average of across each of 9 dimensions. This produces a data set whose mean is equal to zero. Now it is possible to obtain the covariance matrix.

Table 1. Variance Covariance Matrix

0,51722	0,14844	0,39912	0,36925	0,43929	0,26364	-0,28331	0,32996	-0,26601
0,14844	0,49797	0,20731	0,19992	0,27854	0,16769	-0,03458	0,1055	-0,00035
0,39912	0,20731	0,85167	0,71052	0,6772	0,49989	-0,44165	0,51446	-0,43794
0,36925	0,19992	0,71052	0,73843	0,61146	0,42294	-0,48264	0,48613	-0,44604
0,43929	0,27854	0,6772	0,61146	0,92065	0,47254	-0,55875	0,64126	-0,4789
0,26364	0,16769	0,49989	0,42294	0,47254	0,81261	-0,31318	0,35143	-0,28341
-0,28331	-0,03458	-0,44165	-0,48264	-0,55875	-0,31318	0,98361	-0,44324	0,56972
0,32996	0,1055	0,51446	0,48613	0,64126	0,35143	-0,44324	0,71957	-0,44945
-0,26601	-0,00035	-0,43794	-0,44604	-0,4789	-0,28341	0,56972	-0,44945	0,78552

Step 2: Calculate the eigenvectors and eigenvalues of the covariance matrix

Since the covariance matrix is square, we can calculate the eigenvalues and eigenvectors for $X_{97,9}$. These are rather important, as they tell us useful information about our data. By using iterative procedure, Matlab displays the following outcomes[30]:

	λ_1	λ_2	λ_3	λ_4	λ_5	λ_6
Eigenvalues	4,0909	0,82126	0,4696	0,39047	0,32722	0,27032

Eigenvalues can be thought of as quantitative assessment of how much a component represents the data. The higher the eigenvalues of a component, the more representative it is of the data. Eigenvalues can also be representative of the level of explained variance as a percentage of total variance of the original sample. The percent of variance explained is dependent on how well all the components summarize the data. In theory, the sum of all components explains 100% variability in the data.

[30] It is useful to stress that the command "EVA" provided in Matlab allows to calculate the first six most important eigenvalues.

Table 2. Eigenvectors

eig1	eig2	eig3	eig4	eig5	eig6
-0,24738	0,13126	-0,22778	0,088175	-0,041557	-0,52516
-0,11522	0,47786	-0,35926	-0,5646	0,01788	0,46169
-0,40292	0,22947	0,025537	0,26245	0,47326	-0,057134
-0,37892	0,11144	-0,049572	0,14068	0,50589	-0,002584
-0,42859	0,12702	-0,2685	-0,079062	-0,36266	-0,025192
-0,29653	0,33172	0,84033	-0,15722	-0,23228	0,013606
0,35493	0,58558	-0,041112	0,62654	-0,10384	0,28198
-0,34571	-0,051577	-0,17959	0,33221	-0,56654	-0,005023
0,32014	0,46649	-0,061297	-0,22559	-0,028642	-0,65377

Eigenvectors can be thought of as "preferential directions" of a data set, or in other words, main patterns in the data. The obtained eigenvectors are the principal components expressed as linear combinations of the original variables whose weights are determined by characteristic vectors of the covariance matrix of original variables[31]. Furthermore, they are unit eigenvectors, uncorrelated with the previous components and orthogonal to the previous basis vectors.

Step 3: Choosing components and forming a feature vector

In general, once eigenvectors are found from the covariance matrix, the next step is to order them by eigenvalue, from highest to lowest. Furthermore, the calculation of the explained variance of each eigenvalues is a key element for choosing the principal components and forming the so called "feature vector".

Table 3. Explained variance

Eigenvalues λ_i	Explained Variance of each eigenvalues (%)	Cumulated Variance (%)
4,0909	64,224	64,224
0,82126	12,893	77,117
0,4696	7,372	84,489
0,39047	6,13	90,619
0,32722	5,137	95,756
0,27032	4,244	100

As Table 3 shows, our first 3 eigenvalues λ_i explain about 85 per cent of the total linear variance of the sample. The percentages are calculated by quoting each eigenvalues for the trace of the covariance matrix and by multiplying for 100 In other words, the proportion of variation attributed to a particular principal component is obtained by dividing the associated characteristic root by the sum of all the characteristic roots.

This represents a very good result because moving from S_9 to S_3, no more than 15 per cent of the total information is lost. Even if we take the first two eigenvalues the result is still fully satisfactory: less than 23 per cent of information is lost. Furthermore, this is consistent with the evidences found by the theoretical and empirical literature (Joliffe, 1972).

[31] For that reason, it can be argued that PCA resolves the problem of arbitrary choice of weighting scheme.

Consistently with these results, we are able to form the feature vector (Table 4), which is just a fancy name for a matrix of vectors, by taking the first two principal components with a reduced loss of informations[32].

Table 4. The feature vector

eig1	eig2
-0,24738	0,13126
-0,11522	0,47786
-0,40292	0,22947
-0,37892	0,11144
-0,42859	0,12702
-0,29653	0,33172
0,35493	0,58558
-0,34571	-0,05158
0,32014	0,46649

Step 4: Deriving the new data set

Once we have chosen the components (the first two eigenvectors) and formed a feature vector, we simply take the transpose of the vector and multiply it on the left of the original data set, transposed.

Final Data = Row Feature Vector X Row Data Adjust

where *Row Feature Vector* is the matrix with the eigenvectors in the columns transposed so that the eigenvectors are now in the rows, with the most significant eigenvector at the top, and *Row Data Adjust* is the mean-adjusted data transposed. In so doing, *Final Data* is the final data set, with data items (coordinates) in columns, and SGP reform proposals along rows. It gives the original data solely in terms of the chosen principal components.

The coordinates of the adjusted data in a new reduced sub space S_2 are included in Table 5 and illustrated according to the increasing order of first coordinate.

Figure 1 (the one reproduce in the par. 4.1) gives the graphical representation of 97 observations consistent with the two selected principal component of the 96 (plus the old SGP).

[32] In fact, it turns out that the eigenvector related to the highest eigenvalue is the principle component of the data set, as the most significant relationship between the data dimensions. This gives us the components in order of significance. Now we can decide to ignore the components of lesser significance by losing some information, but if the eigenvalues are small, not so much is lost.

Figure 1. The two main principal components

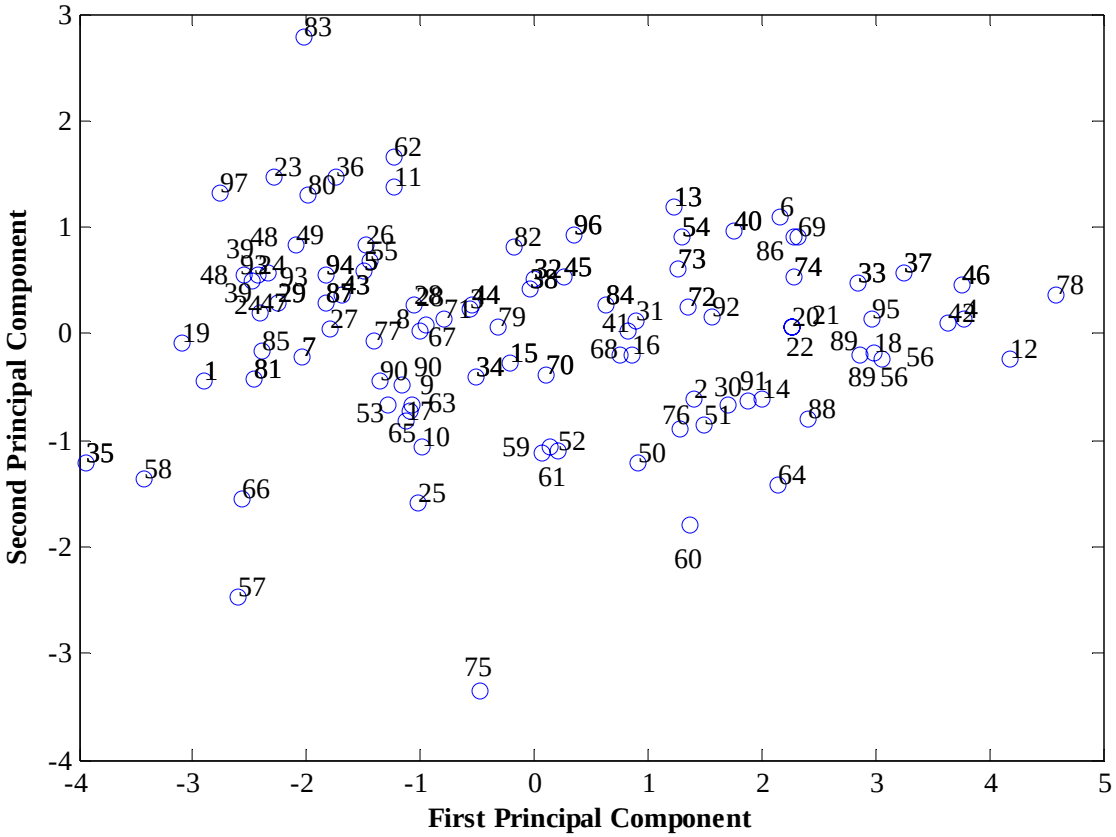

Table 5. The coordinates of adjusted data

Authors	Number associated to each proposals	X-axis	Y-axis
de Haan, J., Berger H. and D.J. Jansen	35	-3,9464	-1,2222
Irlenbush, B., Wildburger, U. L.,Shültze, J. and M. Sutter	58	-3,423	-1,3663
Brunilla, A.	19	-3,0935	-0,09252
Alesina, A.	1	-2,9045	-0,44974
Old SGP	97	-2,7609	1,3138
Inman, R.	57	-2,5994	-2,4638
Montanino, A. (2004)	66	-2,5661	-1,5598
Deroose, S. and Langedijk, S. (2005)	39	-2,542	0,55913
Gros (2003)	48	-2,4879	0,50308
Uhlig, H.	81	-2,4537	-0,43348
Buti, M. and L. Pench	24	-2,4259	0,55195
Gros, D. (2004)	47	-2,4139	0,20344
von Hagen, J.	85	-2,39	-0,15859
Wyplosz, C. (2002)	93	-2,3433	0,57279
Buti, Eijffinger, Franco	23	-2,2907	1,4646
Calmfors, L. and G.Corsetti (2003)	29	-2,2534	0,28298
Gros, D., Mayer T. and A. Ubide (2004)	49	-2,101	0,82971
Beetsma, R. and X. Debrun	7	-2,0443	-0,22345
Verde, A.	83	-2,034	2,7771
Schuknecht, L.	80	-1,9845	1,3036
Wyplosz, C. (2005)	94	-1,8333	0,54651
Warin, T. (2005)	87	-1,8329	0,28488
Calmfors, L.	27	-1,7926	0,04883
de Haan, J., Berger, H. and D.J. Jansen	36	-1,7449	1,4787
Fatás, A., Hagen von J., Hughes Hallett, A., Siebert, A. and R. Strauch	43	-1,6899	0,36519
Barysch, K.	5	-1,4957	0,59575
Buti, M. and P. Van den Noord (2004)	26	-1,4751	0,83419
Hodson, D. and I. Maher	55	-1,4391	0,69078
Saraceno, F. and P. Monperrus-Veroni	77	-1,4068	-0,06848
Willett, T.	90	-1,35	-0,43956
Herzog, B. (2004, July)	53	-1,2833	-0,66781
Belke, A and D. Gros	11	-1,2362	1,3679
Majocchi, A.	62	-1,224	1,6606
Begg, I. and W. Shelckle	9	-1,1698	-0,47564
Brück, T. and R. Zwiener	17	-1,1274	-0,81168
Marinheiro, C. J. F.	63	-1,0995	-0,71771
Mills,P. and A. Quinet	65	-1,0713	-0,67178
Calmfors, L. (2003)	28	-1,0507	0,27571
Buti, M. and P. Van den Noord (2004)	25	-1,015	-1,5882
Begg, I. and W. Schelkle	8	-1,0062	0,02894
Begg, I., Hodson, D. and I. Maher	10	-0,9896	-1,0654
Mortensen, J.	67	-0,95156	0,08938
Pisani-Ferry, J. and B. Coeuré	71	-0,79478	0,14353
Annet, A. Decressin, J. and M. Deppler	3	-0,56055	0,22298
Fitoussi, J.P.	44	-0,54404	0,26254
De Grauwe, P.	34	-0,50345	-0,40193
Rostowski (2004)	75	-0,48307	-3,35
Schelkle, W.	79	-0,31405	0,07173

Authors	Number associated to each proposals	X-axis	Y-axis
Bofinger, P. (Janaury 2003)	15	-0,2069	-0,2663
Verde, A.	82	-0,17859	0,808
Langedijk, S.	38	-0,03164	0,42384
Collignon, S. (2003)	32	0,00726	0,51762
Lehment, H. (2002)	59	0,06801	-1,1152
Pisani-Ferry, J. (2002)	70	0,09704	-0,3928
Lossani, Natale, Tirelli (2001)	61	0,13111	-1,0671
Herzog, B. (2004, June)	52	0,2081	-1,1012
Feldestein (2005)	45	0,26275	0,53535
Zimmermann K.F.	96	0,34351	0,92194
Visaggio, M.	84	0,62843	0,27137
Muscatelli, V. A., Natale, P. and P.Tirelli	68	0,75196	-0,1948
Eichengreen, B. (2003)	41	0,81688	0,02797
Bofinger, P.and E.Mayer	16	0,85873	-0,1951
Casella, P.	31	0,89582	0,12548
Hefeker, C.	50	0,91669	-1,2198
Blanchard, O. and F.Giavazzi	13	1,2301	1,1955
Razin, A. and E.Sadka	73	1,2581	0,59842
Salvemini, M. T.	76	1,2856	-0,8953
HM Treasury	54	1,3015	0,89816
Price Waterhouse Coopers	72	1,3535	0,25168
Lindbeck, A. and D. Niepelt	60	1,3729	-1,7894
Allsopp, W. and M. Artis	2	1,4065	-0,6084
Hein, E. and A.Truger	51	1,489	-0,8552
Wren-Lewis, S.	92	1,5653	0,14989
Canzonzeri, B. M. and T. D Diba (2000)	30	1,7088	-0,6772
Eichengreen, B. (2004)	40	1,7649	0,96529
Wren-Lewis, S. (2003)	91	1,8856	-0,63
Bofinger, P. (Septemper 2003)	14	2,0082	-0,6172
Mathieu, C.and H.Sterdyniak	64	2,1518	-1,4129
Beetsma, R. and X. Debrun	6	2,1588	1,0899
Buiter , W. H. and C. Grafe	20	2,2724	0,06803
Buiter, W.H. (2003)	21	2,2724	0,06803
Buiter,W. H.	22	2,2724	0,06803
Warin, T.(2004)	86	2,2822	0,91333
Rosa, J.J.	74	2,2831	0,53592
Padoan-Rodriguez (2004)	69	2,3245	0,91124
Weale, M.	88	2,4019	-0,8031
Creel, J.	33	2,8515	0,46838
Wenzel, Lackenbauer, Brosamle (2004)	89	2,8565	-0,2067
Xenaki, A.	95	2,9773	0,13685
Brunetta, R. and G. Tria	18	2,9926	-0,1753
Horn, G.A. (2004)	56	3,0664	-0,2464
de Sousa	37	3,2425	0,57105
Enderlein, H.	42	3,6319	0,10804
Fogel, K. G. and S. C. Saxena	46	3,7625	0,45384
Arestis, P., McCauley, P. and M.Sawyer	4	3,7749	0,14507
Bibow, J.	12	4,1786	-0,2329
Savona, P. and C. Viviani	78	4,585	0,37142

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