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WHY IS EUROPE ENGAGED IN AN INTERDEPENDENCE WAR, AND HOW CAN IT BE STOPPED?¹

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Abstract

There is large evidence that European countries, the EMU in particular, are engaged in an interdependence war, i.e. non-cooperative policies with huge social and economic costs due to mutual negative externalities. In this regard, the EMU as a supranational institution with the overarching end to generate and distribute collective benefits from integration and policy coordination seems off the mark. We present a policy game between two interdependent countries showing that the causes and consequences of interdependence wars lie in non-cooperative strategies dictated by the national social preferences over "good" but costly policy choices embedded into the government's policy function. By means of the model we examine what supranational policy regimes may achieve a Pareto improvement. Among the latter, one that we call "Europe", minimises the additive loss function of the two countries. The thrust of our analysis is that the supranational regimes which do not take national preferences into account, dubbed "technocratic regimes", are dominated, so that the single alternative is between Europe and "exit" for the non-cooperative regime. An important result is that Europe is the Pareto-dominant regime only within a limited range of asymmetry between countries' social preferences. The paper concludes with some political-economic implications for the reform of the EMU.

Keywords: European Economic and Monetary Union, policy games, design of supranational institutions

JEL Codes: P15, F55, D78

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1. Introduction

In his fine book *Saving Europe* (2015a), Carlo Bastasin calls the European crisis the "First interdependence war". In a subsequent paper, he writes:

I am not using the word war lightly. [...] The size of the economic crisis, the loss of production measured against the trend, is in the ballpark of a war. It actually amounts to a higher economic cost than all the wars fought by the United States after 9/11, Iraq, and Afghanistan included. But the real reason why I do not want to shy away from using the words conflict or war is that I really believe that the root causes at the origin of the crisis and behind its disappointing management lies in a bellicose concept of politics. Throughout the crisis, national governments have acted as if their states were or had to become self-sufficient, live within their own means, and stand on their own two feet. [This goal] became the cornerstone of crisis management and of the European system of economic governance that later emerged (Bastasin 2015b, pp. 5-6)

As the author further notes, the goal of the self-sufficiency of the nation state has ancestral roots in the "bellicose history" of Europe. It re-emerged from the remote genetic code of the European nations where it was less expected, namely the most advanced frontier of European integration, the European Economic and Monetary Union (EMU). Indeed, one of the pillars of the Treaties ruling the EMU is the doctrine of *exclusive national responsibility* in all economic matters, except monetary policy. In this view, in a context where monetary policy is committed to maintaining price stability, each member country retains full sovereignty only being required to comply with the fiscal rules established by the Treaties, and with the policy recommendations put forward by the European Commission (EC).

The rationale of the ensuing regulatory framework, one of increasing complexity and intricacy, is that the EMU is by no means a simple collection of separate economies, plus the single market built up through the *acquis communautaire* and a common currency. Quite the contrary: economic, financial and monetary integration generates reciprocal externalities which heavily condition the macroeconomic performance of each member. Indeed, one of the keys to the design and governance of supranational institutions is the "internalisation of externalities" in order to improve common welfare. Likewise, incentives, or disincentives to national reforms, their choice and

success cannot be conceived as being independent of the common institutions. (Draghi 2014b).²

Parallely, a peculiar interpretation and implementation of the national responsibility doctrine has materialised according to which the room of manoeuvre and choice of sovereign governments remains such that the performance of each country, whether good or bad, is mostly seen as the result of its own responsibility. In the end, there is no such a thing as "the EMU", which is just the statistical average of what the single countries are doing. If the EMU as a whole performs poorly, it is only because too large a number of members fail to manage their economy successfully and to follow rules and prescriptions faithfully. Consequently, the blame for failures, and the need for reforms, is mostly placed at the level of single countries, whereas the general institutional setup is kept out of discussion.³

While this line of thought is still alive, the idea that the core of the EMU problems lies in its *institutional* original sins has gained ground. In this alternative approach, the "misbehaviour" of some member countries is only part of the story – probably the minor part. The institutional design of the EMU is instead at centre stage. Its original sins have complex political motivations, which have been matter of lively debate ever since its conception. Criticisms have been revived, and to a large extent vindicated, by the crisis (e.g. EC 2013, Baldwin and Giavazzi (eds.) 2015). This "institutional view" has eventually been subscribed to by the top European institutions, as testified by the so-called 'Four Presidents Report' drawing the road 'Towards a Genuine Economic and Monetary Union' (European Council 2012), followed by a new report of the Five Presidents under the authorship of the Commission (Juncker 2015), and by speeches of the President of the European Central Bank (e.g. Draghi 2014a, 2014b, 2015).

Focusing specifically on the point of the "internalisation of externalities", however, one finds at least three different kinds of criticisms. The first is that the EMU supranational framework has turned to be too weak, unable

² With specific reference to the EU see the classic Kenen (1995), and also Alesina et al. (2001), (2005), Spolaore (2015), Eyraud et al. (2017). Empirical studies on interdependencies in the EMU are numerous: see e.g. in't Veld (2013), Berti et al. (2013), EC (2014),

³ For an instance of particularly outspoken support for this view see e.g. Sinn (2014). More balanced argumentation can be found in some Commission papers such as Buti and Carnot (2013), Kuenzel and Ruscher (2013).

to constrain "rational and elected policymakers" properly (e.g. Schuknecht et al. 2011, Eyraud et al. 2017). The typical symptoms are seen in the persistence of the deficit bias in fiscal policy, public debt growth, transmission of public finance distress. The second criticism is instead that the rules were designed to control for the negative externalities of fiscal profligacy but not for those of fiscal austerity, which accounts for the deeper and longer recession in the EMU than elsewhere (e.g. De Grauwe 2013, Manasse 2015; in the vast debate on austerity see the contributions collected by Corsetti (ed.) 2012). A related allegation is that the rules failed as substitute for explicit policy coordination⁴. A third, less developed, view is that the EMU as a supranational institution lacks "incentive compatibility" with the *legitimate* role of democratic governments as representatives of social preferences over policies and their outcomes (the notion of incentive compatibility is also introduced by Eyraud et al. 2017; see also Wickens 2016). A role, paradoxically, emphasised by the stress on the exclusive national responsibility, and naturally intertwined with the long-lasting question of the "democratic deficit" of Europe (Bastasin 2015a, Fabbrini 2015).

Reading the relevant literature, two major puzzles emerge. One is that ignoring interdependence in policy implementation triggers economic-political wars over national negative consequences, so that highly integrated countries should seek for supranational arrangements. The other is that the *status quo* of the EMU supranational design instead of preventing interdependence wars may well be conducive to them – at least in certain areas like macroeconomic policies. For as long as externalities are not fully offset, the national responsibility doctrine rests on conflictual foundations, each country's performance being also dependent on other countries' behaviour. In spite of the critical revisions and change in perspective brought about by the crisis, and explicit recommendations to move beyond the original boundaries of the Treaties, progress is still too timid, *if any*. Actually, one may even argue that the strategy of *strengthening* the *existing* regulatory system as a reaction to the crisis has pushed the EMU in the wrong direction.

⁴ The single exception may be seen in the "European Semester", introduced within the 2011-12 anti-crisis reform package, with the explicit aim of "coordinating" national fiscal policies, which however belongs more to the category of moral suasion than to full-fledged institutional mechanisms (Eyraud et al. 2017)

Our aim with this study is to contribute to the debate about the EMU supranational design moving from first foundational principles in a simple two-country game-theoretic framework. The model is stylised and meant to be applicable to different fields. In the first place, in section 2 we wish to analyse why interdependence wars over policy choices and their national consequences may arise between independent sovereign countries, and to characterise the typical non-cooperative (NC) equilibria that may result. Each country is characterised by a socially relevant variable y and a policy instrument x that can fully offset adverse shocks to y – this we call "good" policy. Interdependence consists of each country's y depending on the other's. The key assumption is that x bears a social cost, let it be a degree of policy aversion, so that each government seeks to minimise a welfare loss function defined over y and x .⁵ Thus each government pursues its own optimal trade-off between a limited use of x and the consequent loss over y . We show that NC equilibria, characterised by less than full protection of y in both countries and reciprocal negative spillovers, arise not because of interdependence *per se* but because of the cost of the "good" policy. Pareto improvements over the NC equilibria are possible by means of devices that coordinate the two governments on a larger use of x and lower loss over y .

As a second step, in section 3 we examine four supranational regimes (SRs) ranking them according to their ability to realise a Pareto improvement relative to the NC equilibrium. Some of these regimes mimic existing features in the EMU, others are more forward-looking.⁶ Among these, one that we call "Europe" minimises the additive loss function of the two countries. In so doing, we do not wish to study how SRs come into existence, for which a vast long-standing literature exists, but rather how they may be robust for incumbent countries having the "exit" option of the NC regime. We show that the SRs which do not take social preferences into account, dubbed "technocratic regimes", are dominated, so that the single alternative is between "Europe" and exit. Key to this choice is the degree of

⁵ This formalisation, which is standard in political economy models, is also consistent with the so-called "two level games" introduced by Putnam (1988) in the international relations literature. The first level of the game establishes the menu of choices of the government or of the negotiator *vis-à-vis* its domestic constituency. The second level of the game is played by each government *vis-à-vis* the other. Here the result of the first-level game is embedded into the welfare loss function.

⁶ We do not examine a full-fledged federation because this seems out of reach in the present situation of the EMU.

structural asymmetry of the two countries, in particular their relative degree of policy aversion. "Europe" dominates exit only within a limited range of asymmetry, with the *less* policy-averse country opting for exit as the other country exceeds a critical threshold.

It may be argued that our theoretical comparison between SRs and the NC regime ignores other broader factors that may play a role in favour of "remain".⁷ One factor may be that membership in SRs, as is certainly the case with the EMU, encompasses a large number of ends and means so that a negative balance in one field does not necessarily lead to leave. This is in the logic of compensations or side payments in international agreements, and we shall add some considerations in this line⁸. Another factor is the cost of exit, which may be substantial. However, this argument should not be overstated. First, exit costs may indeed be dramatically huge; yet they are largely undeterminable *ex ante*, and hence we do not have a solid basis to plug them into a theoretical model. Second, the Brexit case, and the growing popularity of the exit option in other key EU countries, suggest that the mere threat of exit costs may not be sufficient to reverse the preference for exit. Third, in the long run, the robustness of a SR, especially when "legitimacy" or "ownership" are important elements, cannot only hinge on the prohibitive cost of exit.⁹

The SR ranking that emerges from our study may hopefully provide some guidance in the debate about the EMU institutional reforms, in a historical juncture such that the exit option seems more and more attractive for an increasing number of European peoples, and further steps in the wrong direction may seriously jeopardise the integrity of the Union. Section 4 summarises and concludes.

⁷ See Mongelli (2010) and Cohen (2012) for a discussion of these factors. "Defective but defended, [the euro] will simply endure" (Cohen 2012, p.689)

⁸ Bordo and James (2016) make use of this argument in drawing their road map towards the EMU Fiscal Union.

⁹ "For all its resilience, our union is still incomplete [...] Ultimately, Member States have to be better off inside than they would be outside. The reason for this is as follows: if there are parts of the euro area that are worse off inside the Union, doubts may grow about whether they might ultimately have to leave. And if one country can potentially leave the monetary union, then this creates a replicable precedent for all countries" (Draghi, 2014b, p.2)

2. A simple model of interdependence war

To begin with, we deploy a simple policy-game model of two independent, sovereign countries ($i = 1, 2$) tied by reciprocal spillovers. For convenience, and without loss of generality, let y_i be the *change* in a socially relevant variable determined as follows

$$(1) \quad y_i = a_i x_i + b_i y_j + u_i$$

where the coefficient a measures the effect of the policy instrument x , b the cross-country spillover effect, and u is an exogenous shock. The signs of a and b allow the model to be applied to a number of specific cases.¹⁰ Here we shall consider the case where $(a, b) > 0$, but different cases do not modify the essence of the model. We introduce the notion of x as "good" policy in that it is able to counteract any shock to y . Suppose y is the change in employment, and $u < 0$: then $x > 0$ can counteract the fall in employment. This policy may be "whatever works": e.g. a labour market reform that increases wage flexibility as well as more public investment. We do not discuss policies *per se*: we just assume that one exists with no better (higher a) alternative. Though convenient for expository purposes, it is not necessary that x is the same for both governments.

After a shock, the effects on y in each country are

$$(2) \quad y_i = (u_i + a_i x_i + b_i(u_j + a_j x_j))k$$

with a critical role played by interdependence. In fact, $b \neq 0$ implies that each country's y depends on

- the domestic and the foreign shock
- the domestic and the foreign policy response
- the common "multiplier" $k = (1 - b_1 b_2)^{-1}$, which measures the extent of the reciprocal spillovers: the larger are the coefficients b , the larger is k . The standard condition $b_1 b_2 < 1$ is assumed.

Note that, in this system, there exists a pair (x_1^*, x_2^*) such that y_1, y_2 are totally protected from u_1, u_2 . The solution for $(y_1, y_2) = 0$ is

$$(3) \quad x_1^* = -u_1/a_1, \quad x_2^* = -u_2/a_2$$

with the following important features in addition to full protection:

¹⁰ Interdependence can also be modelled by means of direct spillover effects of the policy instrument. This choice may be appropriate in further specific cases; it modifies the algebra but not the essence of the problem under examination.

- each government activates x only if, and to the extent that, the national economy is hit by the shock
- if both governments choose their respective x^* , each is set independently of the other (no spillover effect to be taken into account).

What is the problem then? We now introduce the assumption that the two governments faithfully reflect national social preferences, which include protection from shocks to y but also a cost in the use of policy x . This generates a trade-off between protecting y and activating x . Accordingly, governments decide their policy by minimising the standard welfare loss function:

$$(4) \quad L_i = -0.5(y_i^2 + c_i x_i^2)$$

where c measures the loss due to $x \neq 0$ *relative* to the loss due to $y \neq 0$ (i.e. the latter is normalised to 1). Let us call c the degree of policy aversion of the country.¹¹ Upon minimisation of its loss function, each government decides its optimal activation of x , given by:

$$(5) \quad x_i^c = -(u_i + b_i(u_j + a_j x_j^c))\beta_i, \quad \beta_i = (a_i + c_i/a_i k^2)^{-1}$$

where x^c denotes the c -constrained choice of x . Equation (5) is the optimal reaction function of the government, which includes the domestic shock, the foreign shock and the other government's choice of x . The simultaneous solution of the equations (5) of each government yields the NC (Nash) policy equilibrium, that we denote with (x^{N_1}, x^{N_2}) . We regard this equilibrium, a kind of Hobbesian "state of nature", as the reservation option for each government, such that no other arrangement is feasible if inferior to this.

A diagrammatic numerical example may be useful also for further uses. Let us assume full symmetry as the benchmark case: $a_1 = a_2 = 1$, $b_1 = b_2 = 0.25$, $u_1 = u_2 = -1$, $c_1 = c_2 = 1$. The two governments' reaction functions are:

$$(6) \quad x_1^c = 0.66 - 0.13x_2^c, \quad x_2^c = 0.66 - 0.13x_1^c$$

These are the straight lines in Figure 1. The curves are the iso-loss levels traced by the two optimal policies responses for a given shock: two points on the same curve correspond to the same loss. The equilibrium values are therefore

$$(7) \quad x^{N_1} = x^{N_2} = 0.59, \quad y^{N_1} = y^{N_2} = -0.55, \quad L^{N_1} = L^{N_2} = -0.323$$

¹¹ As to alternatives to x , the menu of "good" policies may not be so large as one might like or hope. Also, it would be naive to think that costless policies exist. Typically any policy choice has costly side effects that should be taken into account by the government (from this point of view, c can capture side effects on other non-explicated variables)

For each government, in the space (x_i, y_i) of Figure 2, x^N lies at the tangency between the target-variable function (2) and the loss function (4). In general $|x_i^c| < |x_i^*|$ and $y_i \neq 0$.

[Figure 1]

[Figure 2]

The key factor in the reaction functions is β , which depends on the cost of x and the degree of interdependence k . Note that β decreases with c (i.e. the more costly is x , the less it is used), and it increases with k (i.e. the stronger the reciprocal spillovers, the more the governments should use x). This latter feature sheds light onto one reason why governments dislike interdependence: it forces them to adopt costly policies more intensively. However, the problem is not interdependence *per se*, but the cost of policies: if $c = 0$, then $\beta = a$, the unconstrained solution x^* would be feasible, and governments could safely ignore interdependence.

Another important result is that, with $(a, b) > 0$, x^c in one country is decreasing with respect to x^c in the other, i.e. they are substitutes. This is a clue of where the interdependence war may originate: the cost of policies adds another reciprocal negative externality. In fact, the higher is c (the lower x^c) for one government, the more the other government should use its own x . Conversely, each government would like a more intensive use of x by the other.

The NC policy regime entails the following effects on y in each country

$$(8) \quad \begin{aligned} y_1^N &= \delta_{11}u_1 + \delta_{12}u_2 \\ y_2^N &= \delta_{21}u_1 + \delta_{22}u_2 \end{aligned}$$

where the parameters δ are positive combinations of a, b, c . Therefore,

- y^N in each country is less than protected from *both* the domestic *and* the foreign shock
- all $|\delta|$ in each country increase with c_1 and c_2 , i.e. the higher the cost of x for *both* governments, the greater the exposure of each country's y to domestic and foreign shocks.

If on the one hand the outcomes (8) for y in each country represent the socially optimal trade-off against the cost of using x , the exposure of y to foreign shocks may be another seed of the interdependence war. For instance, after inspecting δ_{11} , government 1 might note that if $c_2 = 0$, then $\delta_{11} = 0$, and hence claim that its country is hurt by the unwillingness of the foreign government to make full use of the "good" policy. Government 2 may claim likewise. The point is that each δ also depends on the domestic c being

nonzero. So an equally valid claim is that each government exposes its country to foreign shocks because it is unwilling to make full use of the "good" policy.

Finally, the welfare losses for the two countries have the general form:

$$(9) \quad L^N_1 = -\eta_{11}u^2_1 - \eta_{12}u^2_2 + \eta_{13}u_1u_2$$

$$L^N_2 = -\eta_{21}u^2_1 - \eta_{22}u^2_2 + \eta_{23}u_1u_2$$

where the parameters η are positive combinations of a , b , c . Again, welfare losses are proportional to domestic as well as foreign shocks. The paradox is that interdependence *becomes* a matter of conflict because "good" policies are costly, not the other way round. Each country would be better-off if *the other* made full use of the "good" policy

It is worth stressing that these results do not depend on asymmetries across countries. Identical countries undergoing symmetric shocks would simply generate the same (x^N, y^N) pair (see the previous numerical example).

Among the sources of asymmetry, much of the literature is concerned with asymmetric shocks; yet structural asymmetries are more relevant in our context. Let us first focus on the degree of interdependence and allow one country to be more dependent than the other, i.e. with a greater b , all other parameters being equal. It can be shown that, in the normal range $b \in [0, 1]$, *ceteris paribus*,

- $\partial x^N_i / \partial b_i > \partial x^N_j / \partial b_i > 0$: greater asymmetric dependence of one country increases the optimal NC policy of both governments, though more intensively in the more dependent country.
- $\partial y^N_i / \partial b_i < 0$, $\partial y^N_j / \partial b_i > 0$: protection is reduced in the more dependent country but not in the other.
- $\partial L^N_i / \partial b_i < \partial L^N_j / \partial b_i < 0$: welfare losses increase in both countries, again more intensively in the more dependent country.

Overall, greater interdependence deteriorates the policy trade-off for all countries, but relatively more so for the more dependent country.

Another important source of asymmetry lies in social preferences. Now let c be larger in one country than in the other. Then, *ceteris paribus*,

- $\partial x^N_i / \partial c_i < 0$, $\partial x^N_j / \partial c_i > 0$: greater policy aversion in one country reduces its x^N but induces the other to raise its own
- $\partial y^N_i / \partial c_i < \partial y^N_j / \partial c_i < 0$: protection is reduced in both countries, but more so in the more policy averse one

- $\partial L^N_i / \partial c_i < \partial L^N_j / \partial c_i < 0$: welfare losses are increased in both countries, again more so in the more policy averse

Overall, like dependence, asymmetric policy aversion widens negative externalities and worsens the policy trade-off for both countries, though more intensively for the more policy averse country.

3. How can it be stopped? Exploring supranational regimes

The next step in our analysis is the question: can governments agree on a better choice of policies? Preliminarily we should clarify what "better" means. Strictly speaking, by definition of NC equilibrium, no improvement seems possible *for the given social preferences*. The fact that each country would be better-off at $y = 0$ is countervailed by the fact that each country would be worse-off upon activating the policy x^* . Hence improvement here can only mean the Paretian criterion identifying some *different combination of x and y* which makes each country better-off. This notion can be formalised in the diagram *à la* Edgeworth in the (x_1, x_2) space: of Figure 1. The NC equilibrium $N \equiv (x^N_1, x^N_2)$ is Pareto dominated by all combinations of x_1 and x_2 that belong to the north-east grey "lens". For all these combinations belong to iso-loss curves corresponding to smaller losses for both 1 and 2. The set of Pareto undominated combinations is the set of points in which the iso-loss curves are tangent. These are the points that belong to the hyperbolic curve, or contract curve. The part of the curve that passes through the grey area is the core of this economy, that is the set of Pareto efficient combinations that are also Pareto improvements over the NC equilibrium.

If the game is played repeatedly, with no transaction costs or other "frictions", the folk-theorem ensures that all the points in the core can be achieved as subgame perfect equilibria of the game. Note that in this area no government will ever choose x^* , but *both governments are willing to use x more intensively* so that they get closer to x^* . Which combinations of x would result, however, is not determined a priori. In our symmetric case, the result is¹²

$$(10) \quad x^B_1 = x^B_2 = 0.64, y^B_1 = y^B_2 = -0.48, L^B_1 = L^B_2 = -0.318$$

¹² The point on the contract curve where $x_1 = x_2$.

It is easily verified that this solution can be provided by the Nash Bargaining mechanism, which minimises the joint loss function

$$LB = (L^{B_1} - L^{N_1})(L^{B_2} - L^{N_2})$$

In the given conditions, no other Pareto improvement is possible, nor is any other policy assignment. This result can be interpreted as the best possible achievement of the bargaining between two sovereign governments. However, this a *theoretical* result in the sense that there exist a number of notorious obstacles that may prevent this achievement.¹³ First, the operational implementation of the game repetition in the folk-theorem sense requires a set of conditions (from no transaction costs to "memory", from "patience" to consistency) that may easily be violated in international relations with changing governments over time. Second, once the agreement is reached, the problem of compliance arises, such that further specific conditions should be met in order for governments not to breach the agreement. For these reasons, we leave direct sovereign bargaining as a theoretical option on the background, and we move on to explore possible policy regimes at the supranational level as an alternative to the NC regime.

The long-standing, vast theoretical and political literature underpinning the existence and creation of SRs, and in particular the commitment towards "ever closer union" by EU members, focuses on the ability of these regimes to overcome the critical limits of the NC ones that we have seen above, namely reciprocal negative externalities that may stick countries in Pareto inferior situations, as well as various transaction costs and obstacles that may prevent the achievement of superior policy choices by way of direct sovereign bargaining.

The aim of our analysis is not the reason why SRs are created, but how they can promote "good" policy choices and prevent exits. As a matter of fact, we know from the first principles recalled above that, if the sovereign bargaining solution existed, no other solution would Pareto-dominate it. Hence no SR would ever come into existence in the first place. If two countries subscribe to a SR, they signal that the option of the sovereign bargaining is not feasible. However, the exit option from the SR to the NC regime is always possible.

¹³ Eichengreen (2011), Bayoumi (2014), and Frankel (2015) discuss these issues in historical perspective.

In our model, by SR we mean a system consisting of the two countries and a supranational entity (variably) entitled to enact a policy assignment (x_1, x_2) for each country according to an objective defined in its entitlement.

We shall examine four SRs, some of which stylise existing institutions of the EMU, others are more forward-looking. However, by purpose we shall remain below the level of a complete federal union since presently this seems out of reach for the European countries. As said above, critical in this kind of comparative analysis of regimes is that an outside option is always available. That is, each SR not only should be compared with the others, but also with the alternative of no SR. This will be the NC regime. To begin with, each SR will be compared with the latter, whereas an overall comparison of regimes will be presented at the end of this section. Regime ranking will be organised according to the Pareto criterion: in order to be "sustainable" by governments' voluntary and unanimous agreement a regime R should not be Pareto inferior to any other option R' – formally, for all i $R \succ_i R' \Leftrightarrow L_i^R \geq L_i^{R'}$. Results obviously depend on the whole set of parameters and shocks; yet, in order to keep the treatment manageable we will only focus on the role of the two which appear the most critical in the conflicts over the choice of policy regime, the degree of interdependence (b) and of policy aversion (c), for given and equal policy effectiveness (a) and shocks (u)

3.1. Decentralised technocracy

To begin with, we examine *Technocratic Regimes*. In a Technocratic Regime (TR), each government subscribes to a treaty that confers upon a supranational entity (a technocratic agency (TA)) the entitlement to enforce the use of "good" policies independently of the social preferences of the single countries about such policies. Independently may mean that the TA operates under its own loss function which, generally, does not coincide with the one of the government(s) – so is the case in the standard literature on independent central banking. We consider two types of TRs: the first is *decentralised*, the second is *centralised*.

In the decentralised TR, the TA exerts the powers defined above in the form of policy prescriptions, while policy decisions are left to the responsibility of each government. More specifically, the TA is endowed with the power to prescribe the best policy response of each government conditional on the observed shock, to monitor its implementation, and

eventually sanction non compliance. An obvious reference is the fiscal regulatory framework of the members of the EMU and the role of the European Commission therein.¹⁴

As to the TA's loss function we assume that it has zero "good" policy aversion. Therefore, the TA always prescribes the policy assignment (x^*_1, x^*_2) . This may appear a rather extreme version of independence; however it helps emphasise the role of the TA as the supranational institution committed to overcoming the reciprocal negative externalities generated by policy aversion.¹⁵ Anyway, what follows qualitatively applies for any TA's degree of policy aversion lower than (c_1, c_2) . A particular assumption about the TA's policy loss aversion will be introduced below in our third regime.

In order to assess the decentralised TR, it should first be noted that no government ever prefers (x^*_1, x^*_2) to the NC equilibrium (x^{N_1}, x^{N_2}) . In fact, consider the optimal response function (5) of government i , and suppose it believes that government j will comply with the TA's prescription, i.e. $x^*_j = -u_j/a_j$. Then, i 's optimal response is $x_i^c = -u_i\beta_i < x^*_i$ which makes x^*_j suboptimal. Knowing this, no government will ever comply.¹⁶ Any different *ex-ante* commitment by governments has no value *ex-post*. The best the TA can do is to sanction non-compliance with the "good" policy x^* , which is indeed present in the EMU regulations. A way to introduce this sanction is to extend the governments' loss function with the additional cost $p(x - x^*)^2$,

¹⁴ For instance Wyplosz (2013) puts forward the arguments in favour of this kind of regime.

¹⁵ As a matter of fact, regarding for instance the EZ Stability and Growth Pact, we have often heard the warning that the Commission's prescriptions should not be "politicised", but should integrally and faithfully follow from the application of the rules. The intervened modifications of the rules allowing for consideration of the cyclical position of the economy, exceptional circumstances, etc., concern the way in which the shock and its impact on the economy are evaluated (i.e. the magnitude of x^*), while they do not allow for any political evaluation of the policy implementation. Indeed, after the 2003 episode of the majoritarian rejection by Finance Ministers of the Commission's recommendation to open the Excessive Deficit Procedure against Germany and France, the reverse majority mechanism has been introduced in order to limit the governments' power to veto the Commission's prescriptions.

¹⁶ Whether in practice governments' non-compliance with commitments, rules, etc. is as systematic as it should be theoretically is an open question. For "optimistic" evidence about compliance in the EU see e.g. Börzel T. A. (2001) and Beache D. (2006).

where p denotes a penalty proportional to $x \neq x^*$. The penalty coefficient should be equal for all countries. Therefore,

$$L^D_i = -0.5(y_i^2 + c_i x_i^2 + p(x_i - x_i^*)^2)$$

Now the government perceives a cost when activating x but also a cost to the extent that $x \neq x^*$. The new optimal choice of x for each government is therefore

$$(11) \quad x_i^c = p\beta'_i x_i^* - (u_i + b_i u_j + b_i a_j x_j^c)\beta''_i \\ \beta'_i = (a_i^2 k^2 + (c_i + p))^{-1}, \quad \beta''_i = (a_i + (c_i + p)/a_i k^2)^{-1}$$

It can be seen that the penalty p is a double-edge knife. On the one hand, it induces the government to get closer to x^* ; on the other, it makes the policy more costly and hence pushes in the opposite direction (β'_i and β''_i are both decreasing in p). In the case of the assumed loss function, the difference $x_i^c - x_i^*$ results to be decreasing in p . However, there is no finite value of p such that $x_i^c = x_i^*$.

The welfare loss itself is sensitive to p . The overall effect results from the composition of better y , higher x and smaller $(x - x^*)$; hence there is no univocal result, which is problematic in consideration of the fact that the penalty cannot be specific to each country. More importantly, this regime embeds a critical trade-off on the dimension of the penalty. On the one hand, the TA may wish to set a large penalty in order to push the governments towards full compliance. On the other, since $L^D_i = L^N_i$ for $p = 0$, it can be shown that, for a given set of structural parameters, increasing the penalty increases the welfare loss monotonically, i.e. $L^D_i < L^N_i$ for any $p > 0$. The other side of the coin is that keeping p sufficiently small of course does not generate a major improvement over the NC equilibrium. In conclusion, as long as governments agree on this regime they prefer paying the penalty than full compliance, and sanctioning non compliance *per se* cannot be seen as the failsafe way to enforce the adoption of the "good" policy on a decentralised basis.¹⁷

3.2. Centralised technocracy

In the centralised TR, each government devolves its sovereignty to the TA, which is now endowed with the power to enact "the best" policy on behalf of the whole entity represented by the countries together. The

¹⁷ The self-defeating effect of penalties on compliance is a well-known paradox first reported by Gneezy and Rustichini (2000).

reference here is to the European Central Bank (ECB) or to an interpretation of the "European Ministry of Finance", envisaged in the Five Presidents Report (Juncker 2015), as an independent non-political agency.¹⁸ This regime may at first glance appear the best one to the extent that the TA has *the power to enact the "good" policy in each country*. However, at closer inspection this is too hasty a conclusion.

The first fundamental question is to what extent each country allows the TA to violate its own social preferences. From this point of view, the centralised TR is no better position than the decentralised one, since we already know for sure that that no country prefers the policy assignment (x^*_1, x^*_2) to the NC equilibrium (x^{N_1}, x^{N_2}) . The argument that the TA, by overcoming non-cooperative behaviour of national governments, can deliver full protection of the variable y for both countries does not take into account that this result *may not be optimal vis-à-vis* the (excessive) activation of policy x according to the national social preferences.

In the second place, the ability of the TA to devise the "good" policy on a differentiated country basis may encounter non trivial problems. One is that the TA may not have the right tools to do this job. It would need detailed information on the structure of each economy and their interactions. Moreover, this information ought to be common knowledge in order to avoid complaints about the fairness of the TA. The experience of the ECB is quite telling in this respect. By statute, the ECB *is not allowed* to pursue *ad hoc* policies on a national basis. Its Asset Purchase Programme launched in 2015, the so-called "quantitative easing", where the country distribution of purchases is crucial, has been carefully designed in order to overcome objections on this ground with the consequence of weakening its chances of success (Saraceno and Tamborini 2015). It is quite likely that, in the case of fiscal policy, or other public policies, these obstacles would be even harder to overcome.

Accordingly, we characterise this regime as one where the TA operates on the basis of its own loss function defined over the *aggregate variables* (X, Y) ,

¹⁸ This interpretation is transparent in the words of the Presidents of the Bank of France and of the *Bundesbank*, François Villeroy de Galhau and Jens Weidmann (2016). See also Beetsma and Debrun (2016) on independent fiscal boards.

and its policy is enacted equally in all countries.¹⁹ Again, for the same reasons put forward above, we assume that the TA has zero "good" policy aversion.²⁰

Let us define X the centralised policy variable, and $Y \equiv y_1 + y_2$ the aggregate target variable. The structural relationship between Y and X at the aggregate level results to be :

$$(12) \quad Y = (AX + U)k$$

where $A = a_1(1 + b_2) + a_2(1 + b_1)$, $U = u_1(1 + b_2) + u_2(1 + b_1)$.²¹

For any aggregate shock U , the unconditional policy response of the TA is

$$(13) \quad X^* = -U/A.$$

This policy response, activated in each country, achieves the target $Y = 0$, but it generally does not ensure that all $y_i = 0$. In fact,

$$(14) \quad y_i^T = (a_j u_i - a_i u_j) A^{-1}$$

That is to say, the two countries display opposite symmetric effects that sum up to zero. The adjustment of y in each country depends on the distribution of shocks and the composition effects of the parameters a_i , i.e. the effectiveness of policy X^* in each country. It certainly happens, however, that in one country the shock is under-adjusted and in the other is over-adjusted, or that X^* is too little where it is less effective and too much where it is more effective. Therefore, *full protection* ($Y = y_i^T = 0$) is possible only if two conditions occur: 1) symmetry of policy effectiveness ($a_1 = a_2$), 2) symmetric shocks ($u_1 = u_2$).

How do welfare losses rank in this regime with respect to the NC one? In order to have a reference point, let us first consider the full symmetry case. This entails full protection of y for each country obtainable by the centralised policy X^* . The welfare loss for each country in this regime is a linear negative function of its own policy aversion (the common parameters and shock are written without country index):

¹⁹ Indeed, according to other interpretations of the "European Ministry of Finance", its role concerns the control of the *aggregate* fiscal stance of the EMU consistently with the monetary policy stance (e.g. Draghi 2014a).

²⁰ As is well known, the "single mandate" statute of the ECB for price stability, unlike "dual mandate" statutes, epitomises a central bank whose loss function has inflation (our Y) as single argument.

²¹ Assuming that the TA knows the correct *aggregate* equation of Y (e.g. by means of correct estimation of the aggregate variables) does not imply that it also possess full information of the underlying structural parameters of each country.

$$(15) \quad L_i^T = -\frac{u^2}{2\alpha^2}c_i$$

with equal policy aversion, $c_i = c$, also the welfare loss is equal. Then we know that, for each country, $\partial L^N/\partial c < 0$, $\partial L^N/\partial b < 0$, i.e. the welfare loss in the NC regime also increases with c and b . Hence the regime ranking for both countries depends, *cet. par.*, on the combination of parameters c and b . It can be shown that for any $c > 0$, and $b \in [0, 1]$, $L^T < L^N$, i.e. the NC regime always dominates the centralised TR. With our numerical parameters in section 2, we obtain $X^* = 1$, which delivers $Y = y_i^T = 0$. Now let us refer to each government's optimal choice in Figure 1. It is immediately seen that the policy assignment (1, 1) falls outside the area of Pareto-improving policy assignments: both countries are worse-off than in the NC regime – the welfare loss is $L^T_1 = L^T_2 = -0.5$ compared to $L^N_1 = L^N_2 = -0.323$. However, the differential loss decreases as b increases, which indicates the relative benefit of centralised policy under higher interdependence.

Let us now allow for asymmetric policy aversion. Without loss of generality we can set $c_2 = 1$ as standard of policy aversion, and let c_1 vary as a dimensionless variable ($c_1 = 2$ means that policy aversion of country 2 is twice that of country 1, etc.). Clearly, according to (15), *cet. par.* the higher policy-aversion country undergoes a worse welfare loss. On the other hand, we have seen that higher policy aversion in one country exerts a negative externality on the other, and that both countries are worse-off with higher interdependence. Hence one may wonder whether, for a given b , a point exists where the lower policy-aversion country prefers the TA policy and the country 1 is at least indifferent. There is no univocal result, in particular because the result is also sensitive to b .

In our numerical model, given $c_1 = 1$, we find no pair (c_1, b) such that the above condition is satisfied, i.e. no Pareto improvement is achievable relative to the NC regime. For instance, given our reference value $b = 0.25$, the ranking is $L^T_1 > L^N_1$ for $c_1 < 0.26$ (i.e. when country 1 has the lower policy aversion) but $L^T_2 < L^N_2$ for any c_1 (see also Figure 3, bottom). However, the region of disagreement between the two countries shrinks as *both* c_1 and b are larger.

Our conclusion is that the centralised TR may be effective at the aggregate level, it shields each country against the (larger) welfare losses

due to (greater) interdependence, but it is unlikely to be preferred to the NC regime by both countries even in the case of full protection of the variable y .

3.3. Political and Hegemonic Regimes

In order to relax the "corner" assumption of zero "good" policy aversion, we now examine a SR where the central policy authority, too, displays its own degree of policy aversion. In so doing, we leave the realm of pure TRs and move towards SRs with "politicised" policy authorities, or better, "political" regimes. As said above, this move so far has not gathered large agreement among scholars as well as politicians. In fact, it is relegated in the far future of a complete federal union by the recent official documents supporting EMU institutional reforms (Wickens 2016).

We therefore introduce a supranational policy authority that chooses the optimal aggregate policy X by minimising the loss function

$$(16) \quad L^P = -0.5(Y^2 + c^p X^2)$$

Given the target-variable function (12), the optimal policy is

$$(17) \quad X^P = -UA/(a^2 + c^p/k^2), \quad Y^P = Ukc^p/(a^2k^2 + c^p)$$

In the first place, note that this centralised policy, unlike that of the central TA, in general does not deliver full protection of the aggregate variable $Y^P \neq 0$. In addition, like the central TA, it suffers from the same "one-size-doesn't-fit-all" problem: in general $y_i^P \neq Y^P \neq 0$, with a mirror opposite effect in the two countries, unless the two countries are fully symmetric. On the other hand, for $c^p > 0$, $X^P < X^*$, i.e. in this regime the central authority also enacts the "good" policy in each country to a lesser extent. Thus overall this regime might be preferred to the central TA by both countries.

The critical point is how the policy aversion c^p is determined. If the aim is to elicit legitimisation and ownership of the central authority, reference should be made to the social preferences expressed by the member countries. If these have equal policy aversion, $c_1 = c_2 = c$, the solution is easy: $c^p = c$. In this case, this regime certainly dominates the centralised TR.

Interestingly, in the comparison with the NC regime the key factor is the degree of interdependence in the system. Recall that greater interdependence deteriorates the policy trade-off for both countries in the NC regime. As seen in (17), this is internalised by the central authority with the result that if k exceeds a critical value ($b = 0.75$, $k = 2.28$), the welfare loss of the NC regime results larger.

The determination of the policy aversion of the central authority is problematic when the countries differ in this dimension. Here we wish to examine the case in which the central authority is "hegemonised" by one country. We do not examine how hegemonisation takes place, and by virtue, or in force, of what one country becomes the hegemon. For instance, hegemonisation may be the result of the negotiation process leading to the establishment of the central authority.²² In the hegemonic regime (HR), the central authority chooses the optimal aggregate policy X^H by minimising the loss function

$$(18) \quad L^H = -0.5(Y^2 + c_i X^2)$$

where i is the hegemon country, and for concreteness we assume that this is the country with the lowest policy aversion.²³ The aggregate results for X^H and Y^H are the same as in (17) after substituting $c^p = c_i$.

Now the key role is played, *cet. par.*, by the difference in policy aversion between the two countries. It can be proved that the HR, though preferable to the centralised TR, generally does not achieve a Pareto improvement with respect to the NC regime.

Let the two countries be symmetric except for policy aversion, with $c_1 > c_2$, and let country 2 be the hegemon, with $c_2 = 1$. Given the common structural parameters and shock, for the hegemon the welfare loss of the HR is constant and independent of c_1 . We know that instead in the NC regime, the larger c_1 , the stronger the negative externality and the welfare loss for country 2. Therefore, there exists a critical value $c_1 > 1$, beyond which $L^{H_2} > L^{N_2}$, i.e. *at some point* the hegemon might find it preferable to bridle country 1 with the HR.²⁴ In our numerical model, the preference switch of country 2 occurs when country 1's policy aversion is much higher ($c_1 = 9.67$; see also below, Figure 3). However, this threshold is lower when interdependence is higher. The first important, perhaps counterintuitive, result is that the hegemon country itself does not systematically prefer the HR to the NC one.

²² Hegemonic regimes have long been studied in international relations (e.g. Kindleberger 1981, Keohane 1980). The weight of German "preferences" in the (Franco-German) design of the ECB and of the fiscal regulations of the EZ is documented by several authors (e.g. Eichengreen and Frieden (eds.) 1994). The hegemonic drift of the EMU crisis management is carefully examined by Bastasin (2015a, ch. 17) and Fabbrini (2015, ch.2).

²³ Hence, the centralised TR can be regarded as a special case of HR where $c_i = 0$.

²⁴ Recall that this was not the case in the centralised TR. So the hemogenised central authority does make a difference for the hegemon country.

The reason is that, albeit "hegemonised", the central authority optimises over the aggregate variables of the two countries, which, *cet. par.*, is suboptimal for country 2. The second important result is that, as $c_1 > 1$, the welfare loss of country 1 in the HR increases more than in the NC regime for any $b \in [0, 1]$, so that $L^H_1 < L^N_1$. Therefore, there is no way that the HR can be preferred by both countries.

3.4. Europe

We now move to a fourth possible regime, one in which a third player acts as a "mediator" of the policy game, call it "Europe". Europe does not have coercive power, but it can "indicate" the two players a combination of x_1 and x_2 . As in the standard supranational models, Europe uses a Utilitarian loss function and minimises the sum of the two countries' welfare losses:

$$(19) \quad L^E = L_1 + L_2$$

Once again, the European solution may or may not be Pareto improving depending on the characteristics of each country. It is known that the European solution is Pareto superior to the NC equilibrium if the countries are fully symmetric. Indeed, it coincides with the Nash Bargaining solution. Algebraically $L^E > L^N$ is always strictly verified for both countries. The intuition is that the minimisation of the joint loss function eliminates the negative externality of mutual interdependence, so that the symmetric policy assignment is $x^E > x^N$, i.e. it coordinates the two governments on a larger use of x , and allows both countries to achieve $y^E > y^N$ (see (10)).

The picture is more ambiguous when the countries are not symmetric. The ranking between the loss generated by the European solution and by the NC equilibrium for each country is not univocal but depends on the relative size of the relevant parameters.

In the case of asymmetric policy aversion, let as usual be $c_2 = 1$ and $c_1 > 1$. The European solution, as explained above, coordinates both governments on a higher level of x . The additional policy "effort", however, is lower for the more policy-averse country 1 and higher for the less policy-averse country 2. As a consequence, the preference for Europe over the NC regime increases with c_1 for country 1 and decreases for country 2. Both countries are better-off with Europe only up to a certain degree of asymmetry ($c_1 = 1.5$ in our numerical model: see Figure 3 below) beyond which the less policy-averse

country is worse-off with respect to the NC equilibrium.²⁵ The region of agreement of the two countries is non-empty for any degree of interdependence $b \in [0,1]$ but it shrinks when it is higher. Therefore, under asymmetric policy aversion, Europe dominates the NC regime only within a limited range of asymmetry.

3.5. Overall regime ranking when countries' policy aversion differs.

In order to focalise our findings and their implications, we now summarise the welfare loss ranking of the SRs and the exit option of the NC regime. Though the main qualitative results expounded so far have general validity, for concreteness we make use of the numerical model introduced in section 2. To this end, we assume full symmetry ($a_1 = a_2 = 1$, $b_1 = b_2 = 0.25$, and $u_1 = u_2 = -1$) except in policy aversion. Country 2 is taken as benchmark for policy aversion ($c_2 = 1$). The exercise consists in drawing and comparing the levels of welfare losses in each regime and each country as functions of the policy aversion of country 1. For any value of c_1 the Pareto dominant regime is the one with the lowest loss for both countries. The result can be seen in Figure 3.

When $c_1 = 1$ we are in the full symmetric case, and as already explained Europe is the dominant regime. Any other SR is dominated, for both countries and in the same order, by the NC regime. Let us recall why. The decentralised TR with penalty (not reported) is systematically dominated by the NC regime for any non-zero penalty. It may however dominate the others for a penalty sufficiently small. The centralised TR is dominated by all the others, because although it grants full protection of the variable y in each country, it ignores social preferences and it fails to deliver a better trade-off with the required effort in the use of the "good" policy $X^* = 1$. With equal policy aversion, the regime with political central authority (coincident with HR) ranks in the middle, and it ranks higher, the higher is the degree of interdependence.

²⁵ A paradox appears here. At first sight, one might think that it is country 1 (say Greece, or Britain) that suffers most from remaining in Europe owing to its higher policy aversion. However, at some level of asymmetry, it is country 2 (say Germany) with lower policy aversion that suffers more and opts out for non-cooperation. The point is that, as seen above, in the NC regime the welfare loss increases with policy aversion. By implication, the exit threat of high policy-aversion countries is not credible (whereas it is for low policy-aversion countries) or is based on miscalculation of their welfare losses in the NC regime.

Now let us examine the regime ranking for each country when their policy aversion differs ($c_1 > 1$). In the first place, for both countries the centralised TR continue to be dominated by all. The next is the HR, and interestingly, as explained above this is true also for the hegemonic country 2, unless country 1's policy aversion is sufficiently high.

Therefore, the thrust of our analysis is that, under asymmetric policy aversion, the single alternative remains Europe *vs.* exit and the NC regime. The fundamental reason and implication are straightforward: if countries perceive the exit option as a means to freely pursue national optimal policies, then no viable, i.e. incentive compatible, supranational regime can be designed where national social preferences are totally ignored. As a matter of fact, full-fledged federal systems do not operate by enacting "good" policies at the level of each federal unit independently of their social preferences, but by aggregating social preferences of federal units through the electoral system, and then allocating different competences and powers across the various levels of government. From this point of view, the strategy of strengthening the existing EMU regulatory framework based on rules enforced by technocratic, "non politicised", agencies may not be successful. A symptom can be read in the drift towards disguised *de facto* "politicisation" by way of the disorderly enlargement of the so-called intergovernmental method.²⁶

However, an important point is that, as shown introducing Europe, the high policy-aversion country 1 always prefers Europe to non-cooperation, whilst the low policy-aversion country 2 agrees on Europe only up to a threshold level of policy aversion of country 1 ($c_1 = 1.5$) beyond which *it is country 2 that switches to non-cooperation*. Therefore, Europe is the dominant regime only within a limited range of asymmetry in social preferences between countries.

4. Conclusions

There is large evidence that European countries, the EMU in particular, are engaged in an interdependence war with huge social and economic costs.

²⁶ Penetrating, detailed analyses of this process are provided by Bastasin (2105a) and Fabbrini (2103, 2015). In the light of our model, our own critique of the intergovernmental method is that it has been disguised and disorderly, whereas it should be harnessed within openly political institutions.

In many fields, policy choices are almost exclusively driven by the pursuit of national welfare considerations in a non-cooperative way. Since these are highly integrated countries, with substantial interdependencies and reciprocal spillovers, non-cooperative choices typically generate large welfare losses for all. In this regard, the EMU as a supranational institution with the overarching end to generate and distribute collective benefits from integration and policy coordination seems off the mark.

By means of a standard policy game between two interdependent countries, we have sought to shed light on the causes and consequences of interdependence wars in non-cooperative strategies. In our model the key problem lies in the national social preferences over "good" but costly policy choices, i.e. the degree of policy aversion embedded into the government's policy function. On the other hand, we have examined what supranational policy regimes may achieve a Pareto improvement, that is policy choices that reduce welfare losses for both countries. We interpret this criterion as a kind of stress test of the supranational regimes against the exit option towards the NC regime. Some of these regimes mimic the existing setup of the EMU, others are more-forward looking in the spirit of recent documents and plans of reform of the EMU. We have also distinguished between "technocratic" regimes, where the supranational authority acts independently of national social preferences, and "political" ones, where national social preferences are in some way considered. Among the latter, one that we call "Europe", mimics a classic federal institution, i.e. it minimises the additive loss function of the two countries.

The main result of our analysis is that Europe dominates any other supranational regime, and the true final alternative is between Europe and exit for the non-cooperative regime. From this point of view, the strategy of strengthening the existing EMU regulatory framework based on rules enforced by technocratic, "non politicised", agencies may not be successful.

We have also shown that the agreement on Europe may not be unconditional. A critical factor is asymmetries across countries, notably in the degree of policy aversion. If this is too large, the lower policy-aversion country minimises its welfare loss by opting out for the non-cooperative regime.

The political-economy implications for Europe as viable supranational regime to be further investigated are mainly two. The first is the progressive reduction of asymmetries. The so-called "structural reforms" in a variety of

fields, that play a central role in the EC governance strategy, can be read in line with this aim. However, the actual efficacy and viability of this long-standing, restless, strategy is open to question, the more so the closer the reforms are to entrenched social preferences. More deeply, should supranational institutions be conceived as means to reduce national differences or as a means to cope with national differences?

The second implication is that, as taught by the theory and practice of international agreements, compensations may be necessary. In our model, the recipient of compensation is the *less policy-averse country*. Compensation may be pecuniary or non-pecuniary, such as benefits in other fields open to negotiation. One major form of compensation to be further analysed in our setup is the change in the weights of countries in the policy decision making process represented by the joint loss function of the two countries. It can be expected that in order to prevent the less policy-averse country from exit, the weight granted to its social preferences should be increased *vis-à-vis* the policy aversion of the other country.

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Figure 1

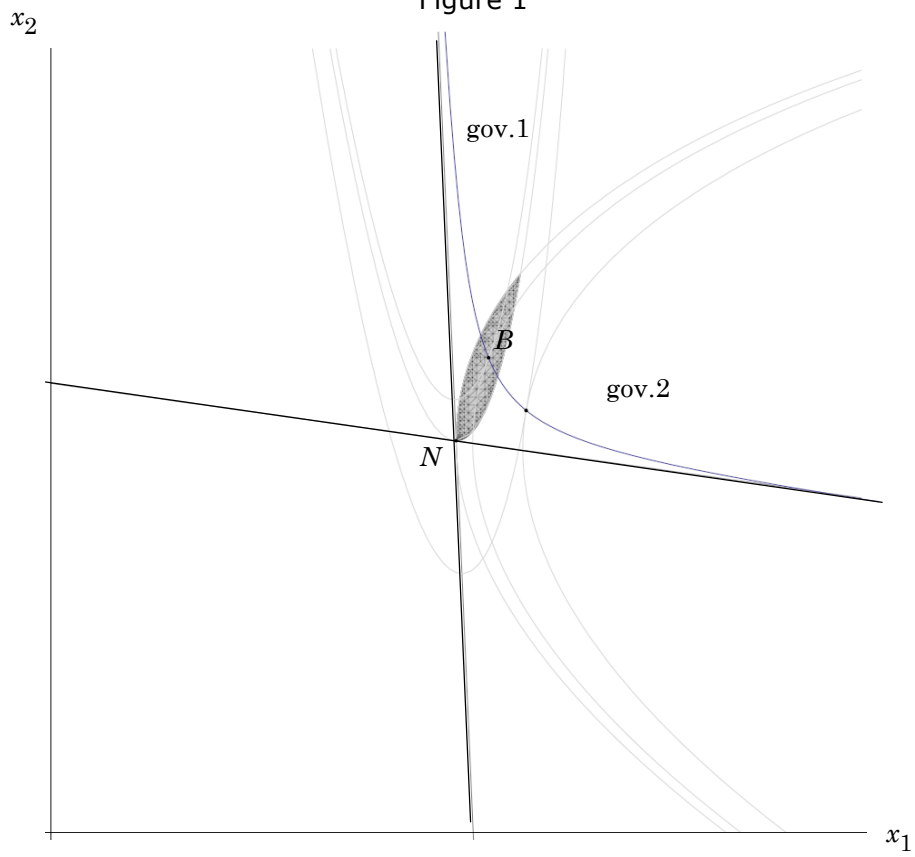


Figure 2

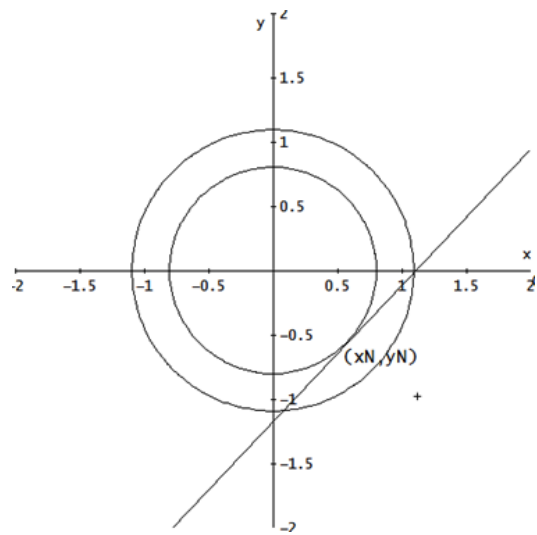
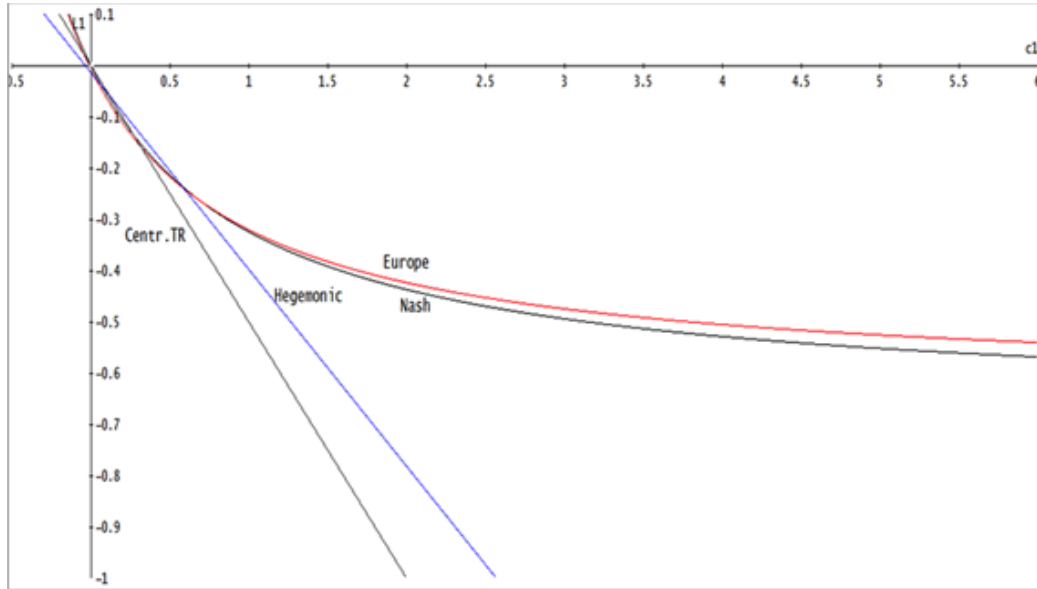


Figure 3
 Regime ranking for country 1 with increasing policy aversion relative to country 2



Regime ranking for country 2 with increasing policy aversion of country 1

