Coordinating to Stabilize: A Model of Monetary Policy Coordination with Reputation Spillovers

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November 1996

Abstract

MERCOSUR, a proposal for regional integration, aims also at the coordination of monetary policies. Highly unstable, poorly integrated, and with the dominant presence of Brazil, these countries are an unlikely case for coordination in the traditional sense. Can countries coordinate monetary policy, even when the benefits usually mentioned for so doing are not present? In this paper it is shown that even in time consistent equilibria, coordination of monetary policy can arise as a time consistent policy when it provides a signal to the private sector about the policymaker’s type. It is shown that in that case coordination and inflation stabilization go hand to hand. This need for extra commitment in order to lower inflation is what makes the model appealing for the case of the southern cone countries. However, we show that bad history in inflation control, policy instability, and low levels of interdependence, main characteristics of the region, make it harder to achieve this kind of coordination.

I would like to thank David Levine, Carlos Vegh, Felipe Zurita, Robert Plunkett and Federico Weinshelbaum for their helpful comments. Any remaining errors are my sole responsibility.

XII Jornadas Anuales de Economía (1860) 1994.
I. - Introduction

In 1985 Argentina, Brazil, Paraguay and Uruguay formed MERCOSUR (Common Market of the South). The first article of the Asuncion treaty\(^1\) proposes to create a common market and the coordination of macroeconomic policies. The article reads (author’s translation):

On December 31st, 1994, The Participating States decided to create a Common Market, henceforth known as “MERCOSUR”. This Common Market implies: [...] The coordination of Macroeconomic [...] policies among participating States: trade, agriculture, industrial, fiscal, monetary, exchange rate, capital markets, services with the goal of insuring the adequate conditions of concurrence among the participating States.”

The existing literature on policy coordination is based on the European experience and fails to explain why countries like the ones participating in MERCOSUR would want to coordinate macro policies. Based on a two-country analysis, and in the existence of a significant policy spillover effects, this literature might help explain the motives of similar sized and highly interdependent countries like France and Germany to coordinate, but does not explain why different sized countries with low levels of trade dependence, such as those in the MERCOSUR, would want to coordinate.

How can monetary policy in Uruguay affect output in Brazil? What can Paraguay do in order to help Argentina mitigate the effects of an external shock? Can countries coordinate monetary policy in the absence of traditional motives? The literature on monetary policy coordination, starting with Hamada (1976), points out the advantages of appropriating the externality created by monetary shocks. In a world of two countries closely linked, a change in money supply in one country will change aggregate demand in both. Optimal unilateral monetary expansions do not appropriate the externality on the foreign country, and the resulting expansion is smaller than the optimal coordinated one.

Rogoff (1985) showed that coordination of monetary policy is only beneficial when highly interdependent countries of similar size experience positively correlated supply disturbances. MERCOSUR is characterized by low levels of interdependence among the big countries of the region, the presence of a giant like Brazil, and very different productive structures across countries, a situation strikingly different from the scenario Rogoff pointed out as the right one for coordination. Furthermore, coordinating monetary policies in Rogoff’s way, with countries of different sizes implies a floating exchange rate regime. The southern cone region’s long history of failed stabilizations is an

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\(^1\) Treaty for the formation of a Common Market among Argentina, Brazil, Paraguay and Uruguay, signed in Asuncion in 1991.
unlikely scenario for such a regime. Since the existing literature on monetary policy coordination does not seem to explain the motives of countries in MERCOSUR to coordinate, it is necessary to look for alternative explanations.

Other arguments can give basis for coordination of monetary policies. In a first approach to be mentioned, Giavazzi and Pagano (1988) suggest that countries with low credibility would want to tie their monetary policy to a strong currency in order to gain credibility; their main message is that if there were no enough credibility inside the home economy, a way to make monetary policy credible would be to commit to an international commitment to keep a fixed exchange rate. In this framework international arrangements operate as commitment devices, helping countries to stabilize. The second argument is a political one. In political spheres of MERCOSUR, there is the feeling that Brazil enters the agreement in order to shield its macro/growth policies against lobbying by the private sector. Brazil has a long history of policy instability, and joining MERCOSUR is a way the Brazilian government can credibly commit to a structural change, that includes inflation stabilization. Third: there is also a vast literature which investigates the importance of exchange rate uncertainty on investment\(^2\). Credibility tool, commitment, technology, elimination of uncertainty, are just a few examples of benefits of coordination that the traditional literature does not cover.

The purpose of this paper, is to consider a situation in which the traditional benefits of monetary policy coordination are not present, and show that coordination is still viable if it provides information about the type of policymaker they are facing. Rogoff (1985) proved that when equilibria are required to be time consistent, coordination can be counterproductive. The idea of this paper is that in a model of incomplete information, even in Rogoff’s environment of counterproductive policy coordination (as traditionally understood), coordination of monetary policy can still arise if there is a positive correlation between willingness to coordinate, and commitment to low inflation in the definition of types.

The driving force behind the result is the presence of what Cole and Kehoe (1994) called a reputation spillover. They find that in models with incomplete information, a relationship with transient benefits can be supported in equilibrium if it causes a reputation spillover which bolsters a relationship with enduring benefits.

Unlike Cole and Kehoe’s model, the reputation spillover the present paper proposes arises naturally from the structure of the game. They work an example of debt with an ad hoc spillover to a labor relationship. In our model, the committed policymaker is indifferent between coordinating and not coordinating, but the non-committed type would much rather not coordinate in time consistent equilibria. Since only the committed

\(^2\) See, for example, Baldwin and Krugman (89), Jorion (90), Bodnar and Gentry (93) and Mondino (93).
type would coordinate in equilibrium, cooperation operates as a signal of the policymaker’s type.

The proposal for coordination is a zero-inflation fixed exchange rate regime. Lack of coordination of monetary policies tells the private sector that the government is not really committed to inflation control, and results in the return to high inflation. In our model, the private sector needs additional signals of the willingness of the government to bring down inflation. This need for extra commitment in order to lower inflation is what makes the model appealing for the case of the southern cone countries. However, we show that bad history in inflation control, policy instability, and low levels of interdependence make it harder to achieve this kind of coordination.

The paper proceeds as follows: section 2 shows MERCOSUR has no grounds for monetary policy coordination on the existing literature on monetary policy coordination, and compares the region with the European Union. Section 3 presents Rogoff’s result that monetary policy coordination can be counterproductive in a standard model of monetary policy coordination based on Currie and Levine (1993). Section three also analyzes the incentives facing different types of policymakers to coordinate. Section 4 introduces the incomplete information model and shows that reputation spillovers can sustain coordination in a finite horizon game. Section 5 generalizes the previous result with more general cost functions and in an infinite horizon setting. Section 6 analyzes the importance of the particular characteristics of countries participating in MERCOSUR on their potential ability to sustain this kind of coordination. Section 7 summarizes the results.

II.- The European Union and MERCOSUR: two different animals.

The theoretical justifications for monetary policy coordination, while appropriate for the European Union, do not help us think about the possible reasons countries in MERCOSUR think about the coordination of policies. Rogoff (1985) established that when highly interdependent countries of similar size suffer a supply shock that affects them in a similar manner (and the variance of the disturbance is high enough), then it is optimal to jointly determine monetary policy. If the shock were to result in an expansion of output in one country and a contraction in the other, there would be conflict with respect to what kind of monetary policy should be implemented. If one country were very large and the other very small then the large country would not want to coordinate its monetary policy. If this countries were closed economies, there would not exist a policy spillover. Then, monetary policy coordination is beneficial when:

- a) countries are affected by symmetric shocks,
- b) countries have similar sizes, and
- c) countries are highly interdependent.
We first show that this description fits better the structural characteristics of the European Union than those of MERCOSUR. Then we discuss other problems of the latter region that would be closely linked to the blueprints of coordination among those countries.

II.1) Symmetry of Shocks.

Bayoumi and Eichengreen (1994), searching for potential optimal currency areas, study the correlation of structural errors of a multivariate panel data VAR model for different geographical regions. The correlation of supply shocks for the European Union and MERCOSUR are reproduced in table 1. The coefficients are considered to be significant at the 5% level for the EU if the value is higher in absolute value than .37 and significant at the 10% level for MERCOSUR if the absolute value is bigger than .39.

In the European Union supply shocks show a strong positive correlation. If we look at Table 1 European Union countries exhibit high values for shock correlations. All countries suffer shocks that are positively correlated with those of Germany, and that is also true for all the big countries of the region. There are no significant cases of asymmetric shocks (negative correlations). Supply disturbances affect the members of the European Union in similar ways.

Though Argentina and Brazil show a large correlation in their supply shocks, the same is not true for the rest of the region. The correlation of shocks between Argentina and Brazil is 34%. However the rest of the region either exhibits very low correlation with shocks affecting the rest of the countries of the region, or as in the case of Uruguay, those correlations are negative. Except for the correlation between Argentina and Uruguay none of this correlations is significant.

Shocks are more highly correlated in the case of European Union than in the case of MERCOSUR. The highest correlation observed in the case of MERCOSUR is between Argentina and Brazil, while, and only as examples, that correlation is higher than 50% for the cases of Germany with France, Netherlands, Belgium and Denmark. Denmark with France, Netherlands with Belgium, and Denmark, and Spain with Portugal are all highly correlated. The correlations between large countries are also systematically positive.

II.2) The levels of interdependence.

Countries in the European Union show higher levels of interdependence than do those of MERCOSUR. Graph 1.A shows exports to the region as a percentage of GDP for the average of European Union countries, Germany, Brazil and MERCOSUR’S

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3.- The extreme value observed in the correlation between Argentina and Uruguay (−48%) does not seem to fit the pattern of association observed between these two countries.
average. At the time of the Werner report in 1970, the average weight of exports to the region on GDP is close to 9%. It has been increasing over time and reached 14% by 1992. Germany’s values and evolution are close to the average. In 1991, the average level of interdependence for MERCOSUR was close to 2%, and for Brazil it was 1%.

While all countries in the European Union export a significant amount of their GDPs to the region, the same is not true for MERCOSUR. Graph 1.B shows exports to EU/GDP for the four biggest countries of the region. Except for Germany, all the rest had below average relation with the region. France and Italy were close to 7% in 1970. The United Kingdom had the lowest level in that year, 5%. Though lower than average, all this values would be considered high for MERCOSUR. At the time of the Tratado de Asuncion (Graph 1.C), Uruguay had the highest export exposure to the region (7%). Barely a 1% of Brazil’s GDP depended on exports to the region. Exports MERCOSUR only represented 1.5% of Argentina’s GDP. Then while some countries have significant ties to the region, the two largest countries of MERCOSUR show only marginal export exposures. This numbers have also increased with the instrumentation of the Custom Union in MERCOSUR, but the levels are quite far from those of the European Union.

II.3) Symmetry.

Countries in European Union are more evenly matched than countries in MERCOSUR. Graph II and III compare the importance in terms of GDP of Germany and Brazil in the respective agreements. In 1968-70, at the time of the Werner Proposal, Germany’s GDP represents only .34 times of the GDP of the rest of the region. In 1990-92, at the time of the signature of the Asuncion Treaty, Brazil’s GDP was 1.30 times the GDP of the rest of MERCOSUR. This asymmetry is not as evident in the comparison of the GDP of the biggest country of the region with its main partner, France’s GDP was almost the same as Germany’s in 1968-70, Brazil’s GDP was only 40% higher than Argentinean GDP for 1990-92. Note however that while MERCOSUR accounted for only 9% of Brazil’s trade, Argentina directed 23% of its trade to the region in 1991.

II.4) MERCOSUR and chronic inflation.

With the exception of Paraguay, the countries of MERCOSUR are well known for their problems with chronic high inflation, and in some cases of hyperinflation. Argentina’s annual inflation rate ranged from 388% to 4145%, which contrasts sharply with the stability in Europe which preceded the Werner proposal in 1970, and the

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4 Comparing GDPs in USS makes more sense for the European Union than for MERCOSUR. The large swings in the real exchange rate of countries in the latter make very hard to find a specific year that would be considered normal (that is why we work with 3 year averages). As an example: in 1995 Brazil’s GDP more than doubled Argentina’s GDP, while in 1988 Argentina’s GDP was 12% higher in USS than Brazil’s GDP. The IMF is now building series of PPP based GDP measures.
achievement of convertibility in 1957, in all the members of the community. This is not the only difference. In addition to very high inflation, countries in MERCOSUR have a long history of failed inflation-stabilization attempts. Between 1967-1990 Uruguay had two failed stabilization programs. Argentina had four, and Brazil five. Even Paraguay, which had the lowest inflation rates of the region, in average had higher inflation than the least stable country in the European Union. It is clear then whose the legacy of instability and bad reputation in inflation control is.

Inherited from this past of instability is the need to incur in strong commitments to generate reductions in the inflation rate. Argentina had to fix the exchange rate by law. Uruguay, in five years of strict inflation management with a crawling peg, has not been able to get inflation to go down the 25% mark. Furthermore, the achievements of the present stabilization are seen as fragile. When the Mexican government devaluated the peso in late 1994, Argentina suffered a run against its currency, as a clear indication of the lack of confidence of private agents on the plan. Committing to low inflation alone is no longer enough to convince the private sector of the intentions of the authorities. It is what economists call a necessary but not a sufficient condition.

During the past five years, most of the countries in the region - with the exception of Paraguay - have invested in inflation stabilization. Argentina started in 1991 the Convertibility plan, and after a pair of years of strong appreciation that seriously damaged the competitiveness of exports, inflation dropped below international levels in 1995. Uruguay, also in 1991, started an active crawling peg, by preannouncing the band of the exchange rate. Inflation fell from 130% to 26% by August of 1996. Brazil started the Real plan in 1994, and reduced inflation from 2669% in 1994 to 84% in 1995.

It is not likely that in this scenario, as in the good case of coordination in Rogoff (1985), any of this countries or the conglomerate could credibly commit to positive inflation rates as a result of supply shocks. Should MERCOSUR include an agreement of monetary policy coordination, it would be on the basis of zero inflation.

The current literature on monetary policy coordination fits the case of the European Union better than that of MERCOSUR. Countries in the European Union are more closely linked, more evenly matched, and more positively correlated in supply disturbances. MERCOSUR is characterized by low levels of regional interdependence, Brazil’s size, and Brazil’s low level of integration into the region. Another crucial difference between both regions is the bad history of inflation in Argentina, Brazil and

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5 We follow Kenen (1995) in the selection of this benchmark dates: the achievement of convertibility proposed by the European Payments Union (1958), and the presentation of the Werner report (1970). Monetary cooperation started shortly after World War II.

6 The referred plans are: The 70 plan and the Tablita for Uruguay; the Tablita, Austral, Spring, and Bonex plans for Argentina; the Cruzado, Bresser, Summer, and Collor plans for Brazil. The three countries have stabilization plans in place.
Uruguay. Then it does not seem plausible to argue that countries in MERCOSUR are looking to appropriate the benefits of monetary policy coordination in the spirit of Rogoff (1985) or Canzoneri and Henderson (1988). Due to the fragility of stabilization programs, any proposal for policy coordination for the region should be based on a zero inflation target, not sensible to the occurrence of supply shocks.

III.-Time Consistent Coordination of Macroeconomic Policies

This section will first show Rogoff's (1985) result that coordination of monetary policy can be counterproductive in time consistent equilibria, and then will study the policymaker's incentives to coordinate. We first introduce the model, we then study a matching of non-committed policymakers, and finishes with the study of matches between committed and non-committed policymakers.

III.1) The Model

Borrowed from Currie and Levine (1993), the model follows in the spirit of the literature on macroeconomic policy coordination. The results rest on the nonneutrality of money, and on a specification of the policymaker's cost function that makes coordination matter. Although here open economy Lucas supply curves of a policy spillover, this result can also be obtained in models with imperfect competition and nominal rigidities. Those models do not add significant insights for the purposes of the paper.

The demand side is given by:

\[ y_t^d = a_1 \xi_t - a_2 r_t + a_3 y_t^*, \]
\[ y_t^{d,*} = -a_1 \xi_t - a_2 r_t^* + a_3 y_t. \]

The home and foreign economies produce two different goods that are consumed in either country. The variable \( y \) represents output, \( e \) is the real exchange rate of the foreign country, \( r \) is the real exchange rate. Foreign economy variables are in asterisks. Equation one says that an increase (appreciation) in the foreign real exchange rate, a decrease in the interest rate and an increase in foreign demand will increase home demand. Conversely an increase in \( e \) is an depreciation of the foreign currency, and therefore reduces demand for foreign output, while the foreign real interest rate and the home

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Modern models of nonneutrality of money are one of two types: models of imperfect competition on the input markets, or models of imperfect competition on the market for output. No matter what kind of model we refer to, nonneutrality of money obtains only if a nominal rigidity is introduced. For a detailed discussion on this kind of models refer to Dixon and Rankin (1995), or to Mankiw and Romer (1991) volume 1.
demand operate in a symmetric way. All variables except the interest rate are measured in logarithms and all are measured in deviation form about an equilibrium in which output is at its natural rate.

The supply side is given by:

\[
\begin{align*}
(3) \quad y_t^s &= -b_1 \epsilon_t + b_2 (\pi_t - \pi_t^r) \\
(4) \quad y_t^{s*} &= b_1 \epsilon_t + b_2 (\pi_t^* - \pi_t^{*r})
\end{align*}
\]

The actual inflation rate is represented by \( \pi_t \), and \( \pi_t^* \) is expected inflation. An appreciation of the currency, and inflationary surprise will increase the supply of goods. A real exchange rate depreciation appears with a negative sign showing the effect on labor supply of a reduction in the wage rate caused by an increase in the price of imported goods. The unexpected inflation term is just the Phillips curve component.

Finally, the uncovered real interest rate parity condition is

\[
(5) \quad \epsilon_t = r_t^* - r_t + e_{t+1}^e
\]

Policymaker’s welfare loss function:

\[
(6) \quad W = \sum_{i=0}^{\infty} \delta^i [(y_{t+i} - \hat{y})^2 + a\pi_{t+i}^2],
\]

where \( \delta \) is the discount factor.

The non-committed policymaker dislikes deviations of output from the target level and inflation. The policymaker faces at the same time the other country’s policymaker in the coordination game, and the home private sector in the inflation game. The private sector dislikes inflation surprises, and it is assumed to be atomistic.

The timing of the game is as follows: first the private sectors in both countries set their inflation expectations, then policymakers decide whether or not to coordinate, and set the inflation rate. Once policymakers agree on a coordinated pair of inflation rates, inflation rates are fixed

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\textsuperscript{8} The nonlinearity of the cost function is needed for two reasons: a) nonlinearity in output is required to make coordination matter; b) non linearity in inflation assures the existence of a unique optimal rate of inflation under coordination of macro policies. The usage of a quadratic form is only due to tractability.
III.2) Coordination of Monetary Policy can be counterproductive: Rogoff (1985)

Our first step is to analyze the one shot game with two non-committed policymakers and to show the result that coordination can be counterproductive. In order to do so this subsection begins with a derivation of the reduced form of the policymaker’s objective function.

III.2.1) The determination of output.

The levels of output will be determined when total demand for output equals total supply of output in both markets. Since we will need to work with the aggregate output levels, when solving the coordination problem, instead of using the simple market clearing equations for home and foreign goods we will work with the sum and difference of outputs.

Adding equations (1) and (2), and solving for total demand we get:

\[ y_t^* + y_t = \frac{-a_2}{1-a_3}(r_t + r_t^*) \]

Adding (3) and (4), and solving for total supply we get:

\[ y_t + y_t^* = b_2(\pi_t + \pi_t^* - (\pi_t^e + \pi_t^m)) \]

Solving in (7) and (8) for the sum of the real interest rates, and equating gives

\[ r_t + r_t^* = \frac{-b_2(1-a_3)}{a_2}(\pi_t + \pi_t^* - (\pi_t^e + \pi_t^m)) \]

This is a standard result in the Mundell-Fleming model; surprise inflation reduces the real interest rate.

The aggregated differences in supply across countries have to equal the aggregated differences in demand, then, subtracting equation (2) from equation (1) and equation (4) from equation (3), plugging equation (5) and solving for the real interest rate differential gives

\[ r_t - r_t^* = \frac{-b_2}{a_2 + 2a_1}(y_t - y_t^*) + \frac{2a_1e_t^c}{a_2 + 2a_1} \]

and
(11) \[ r_i - r_i^* = e_{i+1}^* - \frac{y_i - y_i^*}{2b_i} - \frac{b_2}{2b_i} \left( \pi_i - \pi_i^* - \left( \pi_i^* - \pi_i^{*e} \right) \right) \]

Equating (11) and (10), and solving for the differences in outputs we get

(12) \[ y_i - y_i^* = \frac{b_2(a_2 + 2a_1) \left( \pi_i - \pi_i^* - \left( \pi_i^* - \pi_i^{*e} \right) \right) - 2b_i a_2 e_{i+1}^*}{a_2 + 2a_1 + (1 + a_3)2b_i} \]

We now can obtain \( y_i = \frac{1}{2} \left[ (y_i + y_i^*) + (y_i - y_i^*) \right] \), then equilibrium domestic output is given by

\[
y_i = \left[ b_2 + \frac{(a_2 + 2a_1)b_2}{a_2 + 2a_1 + (1 + a_3)2b_i} \right] (\pi_i - \pi_i^{*e}) + \\
\left[ \frac{b_2}{a_2 + 2a_1 + (1 + a_3)2b_i} \right] e_{i+1}^*
\]

(13)

III.2.2) Time Inconsistency of Pareto Optimal Policies.

If we substitute the derived expression for equilibrium output into the non-committed policymaker's utility function, it is clear that the best perfect foresight equilibria is at zero inflation. If the policymaker were able to commit to any level of inflation, the best inflation rate would be zero. However we next show this equilibrium is not time consistent.

Lets now analyze the incentives of the policymaker when both the log of the next period real exchange rate, and expected inflation are zero. In that case the objective function of the domestic policymaker for the one shot game can be written as

(14) \[ Z = \frac{1}{2} \left[ \left( \frac{1}{2} (\alpha + \beta) \pi_i + \frac{1}{2} (\alpha - \beta) \pi_i^* - \hat{\gamma} \right)^2 + a \pi_i^* \right] \]

where \( \alpha = b_2, \) and \( \beta = \frac{b_2(a_2 + 2a_1)}{a_2 + 2a_1 + (1 + a_3)2b_i} \)
Since all parameters are positive then \( \alpha > \beta \), and unanticipated foreign inflation increases domestic output.

The first order conditions of the home and foreign policymaker are

\[
\frac{\partial Z}{\partial \pi_i} = \frac{1}{2} \left[ (\alpha + \beta) (y_i - \hat{y}) + 2a \pi_i \right] = 0
\]

\[
\frac{\partial Z^*}{\partial \pi_i} = \frac{1}{2} \left[ (\alpha + \beta) (y_i^* - \hat{y}) + 2a \pi_i^* \right] = 0
\]

and the symmetry conditions \( \pi_i = \pi_i^* \), and \( e_{i+1} = 0 \). Conditions (15) and (16) determine the reaction functions of both countries, and the Cournot-Nash equilibrium looks like the following graph. A and \( A^* \) are the autarkic equilibrium with static expectations, while N is the Nash outcome. The area between indifference curves above N is the set of feasible coordination outcomes.

Cournot-Nash strategies are not able to internalize the policy spillover, and as a result are less expansionary than coordination strategies. The Cournot-Nash inflation rates are:
(17) \[ \pi_t^N = \pi_t^{N*} = \hat{y} \frac{\alpha + \beta}{\alpha(\alpha + \beta) + 2a} \]

Definition: Coordination regime. We define coordination of monetary policies as the joint minimization of the average cost of the two countries: \[ \bar{Z} = \frac{1}{2} [Z + Z^*] \].

The coordinated inflation rates are

(18) \[ \pi_t^C = \pi_t^{C*} = \hat{y} \frac{\alpha}{\alpha^2 + a} \]

Once the private sector sets an arbitrarily low level of inflationary expectations, the government has an incentive to further increase the inflation rate in order to reduce the output cost. As we said earlier, since in the coordinated regime there is full appropriation of the policy spillover, the increase under coordination would be higher than if the policymakers were behaving as Cournot-Nash competitors. The private sector can solve the government problem and then they will set the expected inflation rate equal to the effective inflation rate. In the graph above, point N is the inflation rate that a non committed government would generate by acting as a Cournot-Nash competitor in the international setting of monetary policies, C shows the coordination outcome under fixed expectations.

Rogoff (1985) pointed out that if there were no commitment technology available, the private sector would be able to perfectly predict the government's action, which introduces the restriction that \( \pi^e = \pi \) for all \( \pi \). A Cournot-Nash policymaker would minimize

(19) \[ Z = \frac{1}{2} [(y_t - \hat{y})^2 + a \pi_t^2] \]

where \( y_t \) is given by equation (13). The equilibrium conditions of the problem in a symmetric time-consistent equilibrium are

\[(\alpha + \beta)(y_t - \hat{y}) + ax_t = 0, \text{ and} \]
\[ \pi_t = \pi_t^* = \pi_t^{e*}, \text{ and} \]
\[ e_{t+1} = 0, \text{ then} \]

(20) \[ \pi_t^{CNKR} = \frac{(\alpha + \beta)\hat{y}}{a}, \text{ with corresponding cost } Z^{CNKR} = \frac{(\alpha + \beta)^2 \hat{y}^2}{2a}. \]
If governments coordinate without commitment technologies, they minimize the average of their cost functions, subject to (10). In a symmetric time-consistent equilibrium

$$\pi_t = \pi_t^* = \pi_t^{**} = \pi_t^c,$$ and

$$e_t^{c} = 0$$

and

$$\alpha(y_t^* + y_t^* - 2\hat{y}) + a(\pi_t + \pi_t^* ) = 0,$$

then,

$$\pi^{\text{cNR}} = \frac{\alpha \hat{y}}{a}, \text{ with the corresponding cost } Z^{\text{cNR}} = \frac{(\alpha \hat{y})^2}{2a^2}.$$

Notice that the lowest inflation rates possible (and therefore the cost minimizing choices), are the commitment inflation rates, with and without coordination. When governments are not committed, Cournot-Nash behavior is better than coordination. According to our assumptions about the parameters, $\beta > 0$, and therefore $\pi^{\text{Nash}} < \pi^{\text{cNR}}$. Since in both cases output is zero the cost of Nash policies is lower than the cost of coordination policies. As Rogoff (1985) pointed out, coordination without commitment can be counterproductive. The result arises because coordinating governments can internalize the policy spillover. That creates an incentive for governments to drive up inflation rates, a fact which the private sector recognizes. Two non-committed policymakers, when matched to play the present game would rather not coordinate.

III.2.3) Alternative policymaker matchings.

Up to this point we have analyzed only the particular case in which two non-committed policymakers face each other. We have shown those policymakers would prefer to find a way to commit to zero inflation, but cannot in a one shot game. What happens in the other matchings? Would a committed country coordinate? Does Germany have an incentive to coordinate with Greece?

A committed country strictly prefers coordinating when matched with a non-committed country in the short run. Given our definition of coordination, once a pair of countries decide to coordinate, they set their inflation rates, eliminating the possibility of cheating between countries. Furthermore, since no committed government would agree on positive inflation rates, any agreement that includes a committed government will credibly produce zero inflation rate in the committed country. The minimization of the average cost function will result in higher foreign unanticipated inflation when countries coordinate than when they behave as Cournot-Nash competitors. In summary for the committed country
the inflation cost would be zero no matter what, while the inflation cost is decreasing in foreign inflation surprise, and since the higher inflation surprise outcome arises under coordination, the committed country strictly prefers to coordinate when matched with a non-committed country.

The non-committed type does not want to coordinate when matched with a committed type. Clearly given that the other country sets inflation to zero the best the non-committed policymaker can do is the autarky outcome. If this country coordinates, by the mechanism previously described, then the inflation rate under coordination will be higher, and therefore suboptimal. In this framework, coordination is not a disciplinary tool as in Giavazzi and Pagano (1988), on the contrary coordination will permit the exploitation of the spillover created from the non-committed country to the committed one.

We have then proven

Proposition 3.1. In any matching of policymaker types, the type committed to inflation stabilization would be at least as well off when coordinating monetary policy as when she behaves as a Nash competitor. The non-committed type would rather not coordinate.

Note that a direct result of the previous proposition is that, in time-consistent equilibria, the only way a policymaker would want to coordinate is if she has reputation of being committed, and this fact suggest the idea of the existence of a certain kind of reputation spillover.

III.2.4) Coordinating with fixed exchange rates.

Coordination of monetary policies has generally taken the form of a fixed exchange rate regime. Our definition of coordination only generates this kind of agreement when two identical policymakers are matched, i.e. a two non-committed or two committed policymakers. In asymmetric matchings our definition allows for different inflation rates, and therefore, constitutes a system of floating exchange rates.

If we restrict our definition of coordination to a regime with fixed exchange rates, then the incentives of policymakers in asymmetric matchings change. Now neither policymaker wants to coordinate. The only inflation rate the committed policymaker will subscribe to in an agreement with fixed exchange rates is 0%. However the private sector of the country of the non-committed policymaker would not believe their government will stick to that agreement. If the governments coordinate on the basis of zero inflation, unanticipated inflation in the country of the non-committed policymaker would be negative, and would create recessions in both countries. Coordinating with fixed exchange rates is counterproductive for both the committed and non-committed policymaker in time-consistent equilibria.
In the rest of the paper we want to concentrate on the case of the two non-committed policymakers, because the model best fits MERCOSUR. These countries have a history of lack of commitment to stabilization plans. So we will concentrate on interactions between two non-committed policymakers with their respective private sectors and among themselves. Our aim is to show that even in this, worst case scenario, coordination will arise in a dynamic framework if it provides a signal of the policymaker’s type.

**IV.-A Model of Coordination with Reputation Spillovers in a Finite Time Setup.**

**IV.1) Reputation Spillovers.**

The traditional literature on incomplete information and reputation assumes that different types of interaction between the government and the private sector have distinct reputational effects. In that sense the government has a distinct reputation related to debt contracts, to wage contracts, to inflation control, and to other areas. Government’s actions in one sphere do not affect its reputation in other areas. Reputational separability, though convenient in some situations, does not seem very plausible in the real world. Should firms ignore the conduct of the government in debt financing when deciding whether to invest in physical capital? Should unions disregard government’s behavior with respect to inflation control when deciding wages? It seems clear that makes more sense to work with a more general concept of reputation.

Cole and Kehoe (1994) introduce the concept of reputation spillovers. In their model whether or not the government commits to a policy will influence not only its reputation with regard to that policy, but also in other areas. Focusing on a model of debt, they show that if reputation in the debt arena spills over to another relationship with enduring benefits, then it would be possible to recover the feasibility of positive debt even in a Bulow-Rogoff environment (government has means to save). If the government is not definitely excluded from the credit market, Bulow and Rogoff show that it is optimal to renege on debt in the second period, and finance investment with period 2 savings. Cole and Kehoe show that with reputational spillovers from a relationship with enduring benefits it is possible to sustain relationships with transient benefits. Cooperation in a relationship worth nothing to a player is supported because cooperation in the worthless

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9 The model they propose is one in which whether the government fulfills its debt obligations or not gives a signal to unions about the type of government they are facing. Since defaulting on debt will reveal a bad type government, then the unions will enter punishment stages even if the government does not default in their own contract (something that does not happen in an equilibrium path, where if the government were to default in one relationship, it would default in the other too).
relationship is a requirement for getting the benefits of the relationship with enduring benefits.

The model we develop in the next section applies Cole and Kehoe’s reputation spillovers to a model of coordination with time inconsistency. As we showed in the previous section the only government that will be willing to coordinate, is the committed government, since non committed governments incur higher costs coordinating. In Cole and Kehoe’s paper unions look at whether the government fulfills a debt agreement or not to determine whether they can trust them on the wage contract. In our model the reputation spillover derives from the structure of the game.

We will work with two types of government, the committed-coordinator and the non-committed-coordinator. The committed-coordinator will always fulfill the agreements she is involved in, since defaulting in any relationship has prohibitive costs for her. The non committed type has a cost function as defined by (6). According to what we saw in the previous sections, coordination is worthless for the committed type, and is costly for the non committed type in subgame perfect (time consistent) equilibria. Cole and Kehoe will characterize coordination of monetary policies as a relationship with transient benefits. On the other hand, controlling inflation has enduring benefits.

IV.2) Coordination in an incomplete information setup.

We will show coordination of monetary policies is sustainable in the short run when it helps to build a reputation of being tough on inflation control. Assume there are two possible types of policymakers: committed to inflation control-coordinators (the “good” type), and non committed to inflation control-non coordinators (the “bad” type). The policymaker’s type is only unknown to the private sector in each country.¹⁰ Let \( p_0 \), the prior probability of a policymaker being of the committed-coordinator type, be known to the private sector. In the one shot game the non committed policymaker will set inflation optimally given inflation expectations. However, with the incorporation of additional periods, there is an incentive to improve the public’s perception of the government in order to obtain a better default payment in the future. In a dynamic setting there is an incentive for the bad type to mimic the good type, which implies setting inflation to zero for some periods in order to build reputation.

In the Bayesian equilibrium here considered, the private-sector’s beliefs about the government are summarized by a conditional probability that the government is committed-coordinator. This conditional probability denoted \( p_1 \) is the government’s

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¹⁰ Given the timing of the game in which the policymakers get together to set inflation rates after the private sector formed inflation expectations, whether the type of a country’s policymaker type is revealed to the other country’s policymaker or not is not relevant, since in the negotiations the type will be revealed. This is so because since inflation is a positive policy spillover, revealing each other’s type is the best way of appropriating the gains from inflation surprise under coordination.
reputation. In this equilibrium the conditional probability \( p_t \) summarizes the history of past events at the beginning of period \( t \). Agent’s strategies depend on \( p_t \) and the history of actions which have already occurred that period. At every possible state, each agent acts optimally, given the strategies and beliefs of other agents, and updates beliefs according to Bayes’ rule wherever possible. Since the committed government never defaults, Bayes’ rule implies that the probability that the government is committed-coordinator in \( t + 1 \), conditional on coordinated zero inflation at \( t \) (and all previous periods) is

\[
p_{t+1} = \frac{p_t}{p_t + (1-p_t)q_t},
\]

where \( q_t \) is the probability of a non-committed government setting a zero inflation rate and coordinating.

If the committed government sets zero inflation, and the non-committed government does so with probability \( q_t \), then expected inflation is

\[
\pi^c = p_t \times 0 + (1-p_t)q_t \times 0 + (1-p_t)(1-q_t)\pi^c,
\]

where \( \pi^c \) is the coordination inflation rate with parametric inflation expectations.

The non-committed type government will either cooperate and set inflation to zero, or default in both relationships: first in inflation control coordinating the default inflation rate to maximize the gains from inflation surprise, and in the next period in coordination of macro policies. Even if the non-committed government decides to default in inflation control it would coordinate in the defaulting period. We found in the previous sections that since coordinating without commitment is costlier than Cournot-Nash behavior, governments prefer not to coordinate monetary policy once reputation is lost. In the default period the private sector’s inflation expectations are static, then the government’s reputation is intact, and it is still optimal to coordinate in order to fully appropriate the benefits of surprise inflation. What are the non-committed government’s choices? At any point in time it can either comply with the two relationships, and then face the same decision next period, or default in inflation control, reveal its type, earn the coordination payoff and receive the punishment payoff from the next period up to \( T \).

The value function of this kind of government at time zero can then be written as

\[
V^T_{0}(p_0) = \min \{ V^{T,c}_{0}(p_0), V^{T,NC}_{0}(p_0) \}, \text{ where the value of complying is}
\]

\[
V^{T,c}_{0}(p_0) = Z(0,\pi^c_0) + \delta V^{T-1}_{0}(p_1), \text{ and the value of defaulting is}
\]

\[
V^{T,NC}_{0}(p_0) = Z(0,\pi^c_0) + \delta V^{T-1}_{0}(p_1).
\]

\[
\text{Notice that since inflation expectations are given, the government will fully exploit the benefits of inflation surprise when coordinating. Since this is a very symmetric model, both governments will coordinate in the defaulting period, and from then and on they will not coordinate any more.}
\]
\[(26) \quad V_{t}^{T, NC}(p_{0}) = Z(\pi_{0}, \pi_{0}^{e}) + \delta \frac{1}{1-\delta} Z^{NCNR}(1-\delta^{T-1}) \]

\(Z(0, \pi^{e})\) is the one period cost when the policymaker sets inflation equal to zero to build a reputation, and \(Z(\pi, \pi^{e})\) is the one period cost when generating positive surprise inflation (default).

To look at the process of reputation building we have to allow for mixing behavior in the case of the non-committed government. If the non-committed government is not mixing then \(q_{t}\) would be either zero in the case of a government that revealed its type, or one whenever the bad type pretends to be committed-coordinator, and Bayesian updating would not be possible. It is only possible to update \(p_{t}\) when the dishonest government is playing a mixed strategy. This occurs in an indifference situation, i.e. when the cost of sticking to the commitment strategy equals the cost of defaulting. The next equation shows the mixing condition for period \(T-t\):

\[V_{t}^{T-1, NC}(p_{t}) = Z(\pi_{t}, \pi_{t}^{e}) + \delta \frac{1}{1-\delta} Z^{NCNR}(1-\delta^{T-t-1}) = V_{t}^{T-1, CD}(p_{t}) = \]

\[= Z(0, \pi_{t}^{e}) + \delta Z(\pi_{t+1}, \pi_{t+1}^{e}) + \delta^{2} \frac{1}{1-\delta} Z^{NCNR}(1-\delta^{T-t-2}) \]

For this example we use the following specification of the period cost function, proposed by Barro and Gordon (1983):

\[(28) \quad Z_{t} = \frac{a}{2} \pi_{t}^{2} - b y_{t} \]

As suggested earlier, governments dislike inflation, and like output. With this cost function the values of the Nash inflation rate, the coordinated inflation rate and their corresponding costs become:

\[\pi^{NCNR} = \frac{b(\alpha + \beta)}{a}, \]

\[Z^{NCNR} = \frac{b^{2}(\alpha + \beta)^{2}}{2a} \]

\[\pi^{CD} = \frac{2b\alpha}{a}, \]

\[Z^{CD} = b\pi^{e} + \frac{2b^{2}\alpha^{2}}{a} \]
where \( \pi^{\text{NCNR}} \) is the inflation rate a non committed-coordinator will achieve once its type is revealed, \( Z^{\text{NCNR}} \) is its corresponding one period cost, \( \pi^{\text{CD}} \) is the coordinated inflation rate of default and \( Z^{\text{CD}} \) is the cost in the period of default. The cost of sticking to inflation control-coordination of monetary policies is

\[
Z(0, \pi^t_i) = b\pi^t_i
\]

The indifference condition after operating and rearranging terms becomes

\[
(29) \quad \pi^t_i = Z^{\text{NCNR}} - \frac{2b\alpha^2(1-\delta)}{a\delta} = \phi
\]

Since none of the terms in (29) depends on \( t \), the referred equation implies that expected inflation is constant, but expected inflation should also satisfy (23) at every point in time, therefore we can get an expression for the mixing probability of the policymaker:\(^{12}\)

\[
(30) \quad q_t = \frac{2\alpha b(1-p_t) - a\phi}{2\alpha b(1-p_t)}
\]

from where we get that

\[
(31) \quad p_{t-1} = \left(1 - \frac{a\phi}{2\alpha b}\right)^t
\]

The policymaker’s value function is:

\[
V_0(p_0) = Z^d + \delta/(1-\delta)Z^{\text{NCNR}}[1-\delta^{t-1}], \text{ if } p_0 \prec \left(1 - \frac{a\phi}{2\alpha \beta}\right)^T
\]

\[
\delta Z^d + \delta^2/(1-\delta)Z^{\text{NCNR}}[1-\delta^{t-2}], \text{ if } p_0 \prec \left(1 - \frac{a\phi}{2\alpha \beta}\right)^{T-1}
\]

\[
\delta^{T-1}Z^d + \delta^T/(1-\delta)Z^{\text{NCNR}}, \text{ if } p_0 \prec \left(1 - \frac{a\phi}{2\alpha \beta}\right)
\]

\[
\delta^T Z^d, \text{ if } p_0 \prec \left(1 - \frac{a\phi}{2\alpha \beta}\right)
\]

\(^{12}\) Since the policymaker does not care about the actual value of \( q_t \), we get the \( q_t \) that comes from the private sector problem.
We have completed the demonstration of

**Proposition 4.1.** - In the game analyzed in this section, coordination of monetary policies arises together with inflation stabilization in a Bayesian equilibrium for a number of periods \( \tau(p_o) \) if \( p_o \) is high enough.

Given the mixing path (31), the value of the prior probability of the good type, \( p_o \) will determine whether or not the policymaker would cooperate in any period. We have shown then that coordination-stabilization may go together in this case.

We next show for the most general case of a nonlinear cost function on inflation, that in an infinite horizon setting, coordination-stabilization will be achieved with the reputation spillover, no matter the value of \( p_o \), if the policymaker's discount factor is close enough to one.

**V. The infinite horizon case.**

Repeated games implies having to face the problem of multiple equilibria. Since the analysis of the infinite number of equilibria involved is impossible to deal with, the literature has taken the shortcut of analyzing the dimensions of the equilibrium set, in what we know as the Folk theorems. The purpose of this section is to establish the conditions for the existence of a coordination equilibrium, to apply the equilibrium selection argument of Fudenberg and Levine (1988) and show that the coordination equilibrium satisfies it.

**Definition:** Coordination -Stabilization equilibrium. We define a coordination stabilization equilibrium as one in which zero inflation and coordination occur from time zero, and inflation expectations are set to zero unless there is a deviation from zero inflation in the past.

Proposition 5.1 establishes the conditions for the existence of this kind of equilibrium.

**Proposition 5.1.** - In the infinite horizon game, if \( p_o \) is strictly positive, no matter how small, then a coordination-stabilization equilibrium exists if the policymaker is patient enough, i.e. her discount factor is close enough to one. Furthermore this result is independent of the form in which the cost function of the policymaker depends positively on inflation and deviations from target output.

Proof.- Over an infinite horizon the long run player faces the same decision every period. Is it worth coordinating on a zero inflation rate to earn the coordination payoff? If it is optimal to coordinate in one period then it is optimal to coordinate in all periods. If
defaulting on both relationships is better, then the payoff becomes the default payoff in zero plus the high inflation payoff after revealing the government's type.

\[ V = \min \{ V(\text{coordination}), V(\text{default}) \}, \]

where

\[ V(\text{coordination}) = \frac{\delta^2}{2(1 - \delta)}, \]

and

\[ V(\text{default}) = Z^d + \frac{\delta}{1 - \delta} Z^{\text{NCNR}} \]

The value of ZNCNR is the one in equation (20),

\[ Z^d = \frac{\delta^2 (a^2 + 4\alpha^2 a)}{2(4\alpha^2 p_0 + a)^2}, \]

then coordination will occur if and only if,

\[ V(\text{coordination}) > V(\text{default}), \]

or

\[ \rho > \frac{Z^0 - Z^d}{Z^{\text{NCNR}} - Z^d} \]

(32)

In other words, if the governments are patient enough then they will choose to coordinate on the basis of a zero inflation policy to capture the enduring benefits of the inflation-stabilization relationship.

Note that we have not used a precise functional form for the condition (32). This condition depends only on the default cost being lower than both the coordination-stabilization cost, and the punishment cost, i.e. on the existence of an incentive to create surprise inflation. ♦

As we previously said, even though we have shown that coordination stabilization is an equilibrium, it is only one of a infinite number of them. We then need to address why this equilibrium and not any other.

For infinite horizons, Fudenberg and Levine (88) have shown that reputation is a mechanism of equilibrium selection. In repeated games with incomplete information, the existence of reputation effects allows the long run player, in this case the government, to assure themselves on average the payoff which corresponds to the Stackelberg equilibrium (the strategy they would like to commit to). Since the posterior probability \( p_r \) is increasing over time, it would take a finite number of periods to convince the private sector that the government is playing like a committed-coordinator type, and therefore it would take a finite number of periods to get the private sector to set their inflation expectations to zero.
Then even if forced to fight for reputation, the governments, if patient enough would be able to ensure themselves in average their Stackelberg payoff, which in our example would be the payoff of the zero inflation coordinated equilibrium. We can conclude that the government would select among strategies that ensure him that payoff.\textsuperscript{13,14}

Coordination is not a target in itself, but a means to achieve a main target. In the model here analyzed, coordination operates as a signal of the kind of policymaker in office, and occurs in equilibrium despite not having enduring benefits, solely because coordinating is the only way the policymaker has to convince the private sector of its intentions. In some sense, the coordination agreement helps to keep the private sector expectations under control, and operates as a break on the claims on expansive monetary policy. Coordination can be seen, in the model, as the “natural” commitment tool to ensure the private sector that the government is sticking to a zero inflation rule.

This argument seems particularly suitable to countries that are in the middle of a process of inflation stabilization program, and in particular to those that are going through the recession phase of the cycle. As documented in Vegh () inflation stabilization processes go through a recession late in the program, with the increase in unemployment associated. If the increase in unemployment is large and persistent, the stabilization program might face strong pressures to generate expansive policies to solve the problem. If that is the case, an international commitment might help as a shield, and one with no additional costs.

\textbf{VI.- Some Comparative Statics.}

This section studies the impact of the special characteristics of MERCOSUR, as compared to the EUROPEAN UNION.

\textbf{VI.1) Changes in the impact of foreign demand on local output.}

In the model proposed, the key to the policy spillover is the impact of foreign demand on domestic output. An unexpected surge of inflation in the foreign country will exacerbate foreign output, boosting home demand. We have established that the degree of

\textsuperscript{13} In a game in which the governments do not deterministically set the inflation rate they would be able to ensure themselves at least the zero inflation, zero expected inflation payoff, since the introduction of a disturbance would allow them to default a finite number of times without revealing their true type.

\textsuperscript{14} Actually some perverse behavior on the private sector side can preclude the government from reaching the coordination-stabilization equilibrium. If the private sector systematically sets high inflation expectations, then the government will be forced to choose between sticking to zero inflation and creating a recession, and fulfilling the private sector expectations keeping output at its natural rate and creating positive inflation. For more on the importance of expectation traps see Chari, Christiano and Eichenbaum (1996).
interdependence between countries is a stylized fact that differentiates MERCOSUR, from the EU
ROPEAN UNION, the latter being the more exposed to regional demand.

How would changes in the level of regional interdependence change our results?

**Proposition 6.1.-** Countries with high levels of interdependence (measured by the parameter \(a_3\)) will be able to obtain coordination-stabilization with lower prior probability of being of the good type.

**Proof.-** In the finite horizon example, a reduction of \(a_3\) will reduce \(\beta\), the Nash inflation rate and the cost of the Nash regime \(Z_{\text{NONR}}\). That will impact the composite parameter \(\phi\), and shift up the trajectory of Pt. ♦

So high levels of interdependence imply high levels of punishment costs, and that helps deter default. That has a twofold meaning: on one hand, lower prior probabilities of the good type will sustain coordination-zero inflation, and a given \(p_0\) will sustain coordination-zero inflation for more periods. In the infinite horizon case, the reduction in \(a_3\) will increase the required discount factor. Then low interdependence in the case of MERCOSUR is a minus in terms of the joint management of the coordination and inflation stabilization relationships.

**VI.2) The policymaker's time horizon.**

Countries in MERCOSUR have a long history of inflation. There are two ways to characterize this kind of behavior in the present model: either considering that the region’s policymakers are short-sighted, or that they have a bad reputation in inflation control. Being short-sighted implies having a discount factor close to zero. What is the importance of this factor in the process of reputation building? We will show

**Proposition 6.2.1-** The closer the discount factor of the non-committed policymaker to one, the easier it is to sustain coordination-stabilization.

**Proof.-** In the infinite horizon setting, condition (32) ensures the above. In the finite horizon example, an increase in the discount factor increases \(\phi\), and therefore determines a lower value of \(p_t\) for all \(t\), meaning that the same prior probability will support more periods of coordination-stabilization. ♦

The planning horizon of the policymaker is another indicator of its patience.  
**Proposition 6.2.2-** As \(T\) tends to infinity, the number of periods of coordination-stabilization tends to infinity too.
Proof.- Let \( \tau(T) \) be the number of periods in which coordination-stabilization occur for \( T \). At \( \tau(T) \) the policymaker would be indifferent between coordination-stabilization and default.

Let's now say that the time horizon goes to \( T' \). Is the policymaker still indifferent between coordinating and defaulting in \( \tau(T) \)? The answer is no. Notice that if the policymaker still defaults in the same period, the increase in the time horizon represents a increase in the number of punishment periods, meaning that the cost of defaulting is now larger than its benefits. Then it has to be true that \( \tau(T') > \tau(T) \), and this is true for all \( T \).

We have shown that far-sighted stable governments will find it easier to reach coordination-stabilization than unstable ones.

VI.3) The inflation-output tradeoff.

The more output oriented a government is in a model like the one in this paper, the more inflation it will produce. Clearly as either the cost of inflation (a) decreases or the benefits from output increases goes up (b), the incentive to inflate go up in the one shot game. In our example, \( \pi^A \) and \( \pi^{NCNR} \) go up. However, in the repeated game this implies that changes in the inflation-output preferences affect both the benefits and the costs of defaulting. As a increases the one shot benefits from deviating increase, but at the same time the cost of deviating increases too, that results in a subset in the parameter space in which there is no clear message about the increase in a on the possibility of achieving coordination-stabilization. In the end the increase in a will make reputation unnecessary, and coordination-stabilization will be the natural outcome. This suggest the following:

Proposition 6.3- As \( a \) tends to infinity, the discount factor needed to get coordination-stabilization goes to zero.

Proof.- Define the expression on the right hand of (32) as \( \eta(a) \). \( \lim \eta(a) \) as \( a \) tends to infinity is zero.

The reputational spillover proposed in this paper is an example of the type of extra cost economies in MERCOSUR have to incur in order to achieve stabilization. As we said in section II, the long history of very high inflation and failed stabilization attempts, forces this chronic inflation countries to create additional signals of their commitment to inflation stabilization. However, being this a pertinent proposal for the southern cone region, this kind of coordination does not result easier for countries with those structural characteristics. Low discount factors, low \( T \), low interdependence, and strong output orientation are a description of this characteristics in our model, and we have shown that the more intense those attributes are, the more difficult coordination-stabilization becomes.

24
VII. Summary and Conclusions

The traditional proposal for policy coordination is not suitable for MERCOSUR. In section 2 we showed that the dominant presence of Brazil, which also has a very low exposure to the region in terms of GDP, together with the all around low levels of interdependence and the lack of significant correlation in supply shocks make MERCOSUR's an unlikely case of monetary policy coordination as thought of in the traditional literature. The long history of failed stabilization attempts, and the resulting skepticism about monetary policy, constrains the possibilities of southern cone countries to participate in an agreement that would generate positive inflation. Furthermore, most of the countries of the region have invested in inflation stabilization in the last years. Then any proposal for monetary policy coordination has to be based on zero inflation, and therefore fixed exchange rates.

We have shown in the paper that coordination of macroeconomic policies can be obtained when there are no enduring benefits to the participating countries. The literature on Macroeconomic Policy Coordination initiated by Hamada (1976), and further developed and summarized by Canzoneri and Henderson (1988) and Currie and Levine (1993) shows us that coordination of monetary policy occurs because it has value on itself. In those models the existence of policy spillovers creates a space for coordination to appropriate the consequences of macro policy, or to minimize the costs of external shocks. In the model presented on the paper, coordination renders no benefits in equilibrium, other than creating the appearance that the policymaker in office is office is the "good" type, using Cole and Kehoe (1994)'s terms, coordination has transient benefits, and can only be sustained by a reputation spillover to a relationship with enduring benefits, in our case the inflation stabilization game.

Giavazzi and Pagano (1988) argued that low credibility countries will look for international commitment technologies. In their setup, a low credibility country can gain reputation by pegging its nominal exchange rate to a "strong" currency, meaning the currency of a country with a government with reputation of the good type. An institutional arrangement with this strong country would give as a result an inflation rate equal to some kind of weighted average of the partner’s autarky inflation rates. In the model analyzed above a matching between a non-committed policymaker and a committed policymaker occurs only when the inflation rate of the committed type is set to zero and the inflation rate of the other policymaker is set to a value typically higher than the one the policymaker would have wanted given that the other country set its inflation to zero. Our result also differs from Giavazzi-Pagano in that the coordination partner need not to be a committed type to obtain inflation stabilization. In fact the model is symmetric, and
therefore the foreign country has the same set of incentives than the home country. Credibility arises as a result of reputation building, and both countries start with the same levels of reputation, and share the same reputation path.

The main characteristics of the coordination agreement in the model are compatible with the blueprints for coordination on the MERCOSUR. The agreement is based on a zero inflation rate, and therefore, in the setup of the model, constitutes a fixed exchange rate agreement. Also, any deviation from coordination or zero inflation results in a return to the high inflation equilibrium, result that shows the fragility of stabilization in this kind of formulation.

Finally we have shown that being this a pertinent proposal for the southern cone region, this kind of coordination does not result easier for countries with their structural characteristics. In fact the traditional populist policymaker of the southern cone, with bad reputation in inflation control, with unstable policies, and a strong orientation to the reduction of unemployment and output will have more problems to stabilize, in the sense of this paper, than a policymaker that is suffering a once in a lifetime surge of inflation.