Regional integration and macroeconomic coordination

in Latin America

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The contagion aspects of the financial and exchange-rate crises in recent years demonstrate the need to extend the domain of macroeconomic policy from the national dimension to the regional one. This paper presents the main concepts and challenges behind macroeconomic policy cooperation in Latin America and the Caribbean and evaluates them from a game-theory perspective. Under certain conditions related to the debate on optimal currency areas, entering into a cooperative dynamic will be beneficial for all participants. Moreover, it is shown that because the welfare gains from regional cooperation are endogenous, cooperation will eventually become stable, even in the presence of a Prisoner' s Dilemma. Albeit promising at the subregional level, however, the initial conditions observed in Latin America are still far from the conditions of self-sustained dynamics. At the initial stage of coordination, cooperation is unstable, and a formal institutional setting is needed to start and coordinate the cooperative process. In addition, more traditional policies of trade integration should be pursued.

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I
Introduction

The early 1990s opened a new era for the analysis of economic interactions among the Latin American and Caribbean countries. Shocks were transmitted by two channels: real and financial. Intra-regional trade recuperated strongly thanks to the wave of trade liberalization and the resumption of economic growth after the "lost decade" that marked the 1980s. The first years of the 1990s also coincided with the large scale introduction of new financial instruments that allowed operators to trade riskier papers, opening the door to an active market of financial titles issued by the so-called "emerging economies". As a result of this innovation, the settlement of the old debt problem through the Brady agreement, and an increasing flow of foreign direct investment, the net transfer of resources to the region became once again positive, and growth resumed.

But the resumption of growth was accompanied by higher volatility, due to the nature of the new international financial market, where contagion and herding have become a prominent reality. As a result, shocks initiating in one country will have direct impacts upon trade and other real variables, financial spreads and exchange rates in its neighbouring geographical area, as well as upon the international business climate, if the troubled country is large enough (e.g., Argentina, Brazil or Mexico). This common destiny, in spite of differences in policies or fundamentals from one country to another, is a clear symptom of the emergence of a subregional dimension as a result of trade integration and financial globalization (Studart, 2002)

Because of this common component, national macroeconomic stability (including its real aspects) should now be treated as a regional public good. The existence of such externalities calls for more coordination of national economic policies in the region. Despite these interdependencies, and notwithstanding major initiatives to promote macroeconomic coordination in several subregions of Latin America and the Caribbean, cooperation does not always emerge naturally, even though it would be optimal for it to do so. Reflecting on this situation, Escaith, Ghymers and Studart (2002) state that "it is striking that there is no systematic, operational regional or subregional scheme to deal with these regional or subregional spillovers… Indeed, economic policies are still totally uncoordinated and all the decisions continue to be taken in close-knit national circles without considering any spillovers at all. The clearest symptom of this is the choice of exchange-rate regimes based on strictly national considerations."

In other words, and considering the macro-economic coordination problem from a game-theory perspective, it is obvious that the dominant "non-coordinated" strategies adopted by the countries of Latin America and the Caribbean do not coincide with the social optimum that could be achieved by incorporating regional cooperation. Ghymers (2001) considers that most institutional failures from a regional coordination perspective can be analyzed from the Prisoner's Dilemma perspective.

Starting from this premise, the present essay shows that, by incorporating recent conceptual advances in the theory of currency unions, macroeconomic coordination within regional integration schemes provides a feasible and robust solution to the Prisoner's Dilemma. The criteria for the existence of a solution are then compared with the statistical regularities observed in the region. Finally, section IV describes the institutional settings that would make possible such coordination, and section V synthesizes the main findings.

□This paper is based on a number of separate contributions made to a research agenda on regional integration, exchange rate regimes and macroeconomic coordination, implemented in the framework of the ECLAC/European Commission Macroeconomic Dialogue Network (REDIMA). The arguments presented here benefited greatly from the discussions, comments and suggestions of Christian Ghymers, Igor Paunovic and Rogerio Studart, as well as the network participants. Needless to say, I alone am responsible for any remaining errors and analytical gaps.

II

Macroeconomic coordination, the Prisoner's Dilemma, and the problem of inefficient equilibrium

As described in Ghymers (2001), one of the main obstacles to regional cooperation is the belief that there is a conflict between national interest and regional integration. According to this author, although most governments understand that coordinated policies would, in a perfect world, be the most suitable way of dealing with the issues and challenges presented by globalization, practical criteria lead them to implement non-coordinated policies aimed at optimizing purely national and short-sighted objectives. This situation, where individual rationality impedes coordination, is known as the Prisoner's Dilemma.

1. Cooperation and the Prisoner's Dilemma

The so-called Prisoner's Dilemma is an unfortunate social situation where myopic and selfish attitudes dominate, despite the fact that cooperation would be the best policy from a social perspective. In other words, it is a game where each player has an incentive to play in a non-cooperative way, either because playing dirty maximizes one's personal reward if the other party plays fair (i.e., follows a cooperative strategy), or minimizes one's losses if the other party decides to defect from the cooperative agreement and plays dirty himself.

The name comes from a story used by A.W. Tucker. Two suspects are taken into custody, cannot communicate with each other, and have two options: either to confess or not to confess the crime. If both confess, they will receive a jail sentence of five years. If neither confesses, they will probably be convinced of minor offences and receive a one-year sentence each. But if one confesses and the other does not, the suspect who confesses will be set free, while the other will receive a ten-year sentence. In this game, the dominant individual (non-cooperative) strategy is not to trust the other prisoner and confess to avoid the maximum punishment.

Technically, the equilibrium in this game is not a Pareto optimum: both players would be better off it they opt for not confessing. Table 1 represents symbolically the strategies and outcomes of a 2x2 ordinal game that leads to a Prisoner's Dilemma. Strategies C are for cooperation, and D for defection. R stands for the reward for mutual cooperation, T for the temptation to defect from that approach, P for the punishment in the event of mutual defection, and S for the sucker's payoff to the player who cooperates when the other does not.

TABLE 1
Symbolic representation of a 2x2 Prisoner's Dilemma game

Player A \ B	Cooperate (C)	Defect (D)
Cooperate (C)	(R,R)	(S,T)
Defect (D)	(T,S)	(P,P)

Source: Prepared by the author.

A game is basically defined as a Prisoner's Dilemma when, for both players, T>R>P>S.[1] This ranking ensures that each player has a dominant strategy that results in an equilibrium with a Pareto-inferior outcome. In such a situation, players – be they individuals, firms or States – that follow the irrefutable logic of purely rational and selfish strategies may find themselves caught in a sub-optimal situation.

Hence, it is not easy to attain spontaneously a cooperative equilibrium. Unless there is a credible and enforceable commitment on the part of the players, or coordination by an external referee, cooperation will remain elusive, even if the players are allowed to communicate with each other in advance: each player has an incentive to play in a non-cooperative way. When generalized to more than two players, this becomes a version of the so-called "Tragedy of the Commons"

[1] Another condition, applying to repeated games, is that the players cannot get out of their dilemma by taking turns to randomly exploit each other. This means that R>(T+S)/2 (Axelrod, 1984).

(Hardin, 1968). Decisions that are rational from the point of view of each individual become defective from the collective point of view.

One way out of the dilemma is to consider that the players have the option of building agreements through communication. Clearly, if the parties are able to negotiate a binding agreement, the dilemma disappears. Penalties may be built in to punish uncooperative behaviour, so that for each player R>T>P>S. Obviously, in the case of sovereign countries, which are the actors to be considered in the macroeconomic coordination game, international agreements-cum-penalties (such as the Maastricht Treaty in Europe) are not always legally enforceable, and could be subject to abrogation or renegotiation if one party considers that its "higher" State interests are at stake.

Thus, communication by itself does not solve the dilemma in this context, and the problem of governments is how to make credible commitments. This typical macro-policy problem could also be studied from the game-theory point of view. Indeed, it is still possible to reach a cooperative outcome without a formal binding contract, when games are considered in a dynamic perspective. Time is an important factor is resolving cooperation deficits. The fact that players have to meet again and again pave the way for "nice" strategies to develop, even when players are selfish: cooperation is based upon self-interest, without the aid of central or supra-national authorities. Two key requisites for cooperation to thrive in this context are that the cooperation must be based on reciprocity, and the weight of future outcomes must be important enough to make this reciprocity stable.

Players in real life, be they individuals, firms, or countries, do not play the game just once, but interact over and over again. Thus, each player can develop a reputation and earn credibility [2] about his behaviour and learn about other players' conduct. The players not only learn about each other's behaviour, but also become capable of rewarding cooperative forms of conduct (strategy C) or punishing uncooperative ones (D).

This strategy is called the Tit-for-Tat strategy: player A starts out cooperating, and continues to do so as long as the other player B cooperates. If B does not cooperate and plays the D strategy, there is still time to counter attack with one's own D strategy, and avoid the disastrous CD or DC outcomes. This Tit-for-Tat strategy is the best alternative when games are infinitely repeated or at least repeated with a sufficient number of iterations. When games are finite, however, there is a high probability that the other (perfectly rational) player will use the selfish and uncooperative strategy in the last occurrence of the game, since the other player does not have the possibility to retaliate. Because of the same reasoning, there will be no cooperation at the next-to-last occurrence, and so on.

However, cooperation may prevail, because in real life the hypothesis of pure rationality and pure selfishness is not always representative of the actual behaviour of players. As demonstrated by Axelrod (1984), cooperation can emerge even in a world of unconditional defection, if at least some of the players are willing to initiate the game using a cooperative ("nice") strategy. Cooperation can evolve from small clusters of individuals who base their cooperation on reciprocity and have even a small proportion of their interaction with each other. In the author's words "The most promising finding is that, if the facts of Cooperation Theory are known by the participants with foresight, the evolution of cooperation can be speeded-up." (Axelrod, 1984, p.24).

2. Costs and benefits of coordination

The technical part of the discussion about the benefits and costs associated with macroeconomic coordination is usually analysed from the standpoint of the Optimal Currency Areas criteria (OCA).[3] Countries considering whether to adopt the currency of a third country (e.g., dollarization) or to join a currency union (e.g., the European Economic and Monetary Union) weigh the potential benefits against the expected costs. Since Mundell (1961) developed the concept of OCA, the criteria are defined in terms of trade relationship and symmetry or asymmetry of external shocks. The greater the linkage, the more desirable a union; to compensate for imperfections in the first two criteria, two additional ones are considered: degree of labour mobility and/or system of fiscal transfers.

In the Mundell-Fleming model, then, the nature

[2] The concepts of reputation and credibility in game theory are very complex and require assumptions about the degree of rationality of players, asymmetric information, the different characters of the players, and many other ingredients. Since our purpose is only to present basic concepts of game theory, we have tried to make all this as simple as possible.

[3] See Escaith and Paunovic (2003) for examples of fiscal cooperation.

of the exchange rate regime determines the degree of freedom for using monetary policy as a response to external (real) shocks. In a pegged regime, a shock would be transmitted directly to the economy through the reduction/increase in international reserves and the resulting reduction/increase in the money supply and hence, given nominal rigidities, in aggregate demand. A flexible exchange rate would permit more flexible use of monetary policy to counteract the external shock and adjust relative prices, at the expense of higher inflation levels.

According to Mundell (1961),[4] currency area optimality occurs when the benefits of relinquishing the exchange rate as an internal adjustment instrument outweigh the costs of adopting a single currency in a fixed exchange regime. These criteria indicate the specific conditions under which it is advantageous for a group of economies to adopt a single currency, based on an analysis of the (microeconomic) gains of efficiency and the (macroeconomic) costs of the loss of flexibility.

The usefulness/sustainability of an OCA is often determined as a function of labour mobility, economic size and openness, similarity of production structure and the symmetry (or asymmetry) of economic shocks. Deep trade interrelationships, symmetrical exposure to external shocks and synchronization of business cycles increase the expected net benefits of adopting a common currency and a common monetary policy. Indeed, shocks affecting all the countries in a similar fashion, at the same point in their business cycle, do not call for a change in exchange rates. Labour market flexibility and mobility reduce the real adjustment costs when shocks and cycles are not perfectly symmetrical, while the existence of fiscal compensation schemes opens up the possibility of transfers between losers and winners.

Despite their theoretical interest and the qualitative guidance they provide, the practical usefulness of OCA criteria is limited. In particular, they are not fully operational for decision-making purposes, as in practice they cannot be used to quantify a balance of costs and benefits (McCallum, 1999). Moreover, a more recent trend in the literature centres on two empirical questions that reassess the relevance of the above-mentioned OCA criteria.

The first of these questions examines the problem of the balance between costs and benefits by revising the actual cost for a country of losing the ability to use the exchange rate as a policy instrument and looks at the effectiveness of nominal adjustments of the exchange rate. When an economy suffers a nominal shock, adjusting parities is not an adequate instrument, and a regime with a fixed exchange rate will do better in terms of welfare.[5] Indeed, the exchange rate is potentially useful as an instrument in situations when shocks are simultaneously country-specific, real and temporary. According to this literature, the probability of such situations is becoming smaller as trade integration reduces the significance of national borders and as stability-oriented policies curtail policy-induced shocks. Furthermore, contemporary advocates of monetary unions think that the pure and perfect exchange-rate flexibility option is not the correct alternative when discussing costs and benefits of OCAs, because modern-day trade and financial interrelationships make pure flexibility a nonviable option (Buti and Sapir, 1998).

The second "revisionist" trend in the OCA literature is of special interest from the point of view of the present essay. Regional trade integration increases business-cycle correlation and promotes new institutional initiatives that will set up a positive feedback loop for intraregional trade itself. Thus, cooperation creates its own conditions of sustainability. In the following section, we will discuss these aspects in greater detail and show how they apply to the Prisoner's Dilemma issue.

3. Dynamic gains from regional coordination of macroeconomic policies

As already noted, recent developments in the positive theory of OCA and the European Monetary Union (EMU) experience show that the optimality criteria are in fact endogenous. As stated by Frankel and Rose (1996), and as illustrated by the case of the European Union, the suitability of OCA criteria cannot be judged on the basis of historical data, since the structure of the national economies – especially their trade structure – will be affected by the creation of a currency area and is likely to change. In those authors' words, the OCA criteria are jointly endogenous:

"Countries are likely deliberately to link their currencies to those of some of their most important

[4] McKinnon (1963) and Kenen (1969) are also important contributors to the standard literature on OCAs.

[5] See Parrado and Velasco (2002).

trading partners, in order to capture gains associated with greater exchange rate stability. In doing so, they lose the ability to set monetary policy independently of those neighbors. The fact that their monetary policy will be closely tied to that of their neighbors could result in an observed positive association between trade link and income links. In other words, the association could be the result of countries' application of the OCA criterion, rather than an aspect of economic structure that is invariant to the exchange rate regimes." (p. 15).

As a consequence, the authors state in their conclusion (p. 22) that "some countries may appear, on the basis of historical data, to be poor candidates for EMU entry. But EMU entry per se, for whatever reason, may provide a substantial impetus for trade expansion; this in turn may result in more highly correlated business cycles. That is, a country is more likely to satisfy the criteria for entry into a currency union *ex post* than *ex ante*."

In this endogenous framework, regional monetary and exchange rate coordination can be represented by a new kind of a non-zero sum game, where the positive outcome increases when the game is repeated: the more you play, the more you gain. Because of objective reasons, linked to the OCA criteria (weaknesses of trade and financial integration, asymmetry of business cycles), and subjective factors (reduced credibility of regional commitments and weak institutional enforcement procedures), initial gains from consensuating regional policy response to external shocks may be low compared with the outcome of non-cooperative strategies. We recognize here the typical Prisoner's Dilemma problem, where the structure of incentives is perverse. But because of the endogenous nature of the OCA criteria, as time goes by and the more countries interact, the higher is the welfare gain obtained from coordination and the lower the temptation to defect.

If we go back to the formal representation of the Prisoner's Dilemma (table 1), the gain from cooperation $R(t)$ depends positively on the number of times the game is repeated (t).

$$dR/dt > 0$$

Figure 1 gives a tree representation of this game. The first letter in parentheses denotes the strategy of A, while the second is the strategy of B. For simplicity, let us assume that B applies a tit-for-tat strategy. Both countries cooperate in the initial round and gain R_0.

- If A defects in the first iteration, he gains T and B suffers the S outcome, but both gain only P in the second round, once B applies the tit-for-tat countermove.
- If A cooperates, both countries gain R_1, with $R_1 > R_0$.

The same reasoning applies to subsequent moves, with $R_t > R_{(t-1)}$.

Thanks to the endogenous and incremental nature of R_t in this class of games, the gains from cooperation should increase with time such as to reach the situation when $R_{(t^*)} > T$. Remember that a Prisoner's Dilemma exists only when, for both players, $T > R > P > S$ and the dominant strategy dictates that each player should defect and follow a non-cooperative strategy. After repeating the game up to time t^*, welfare gains from cooperation increase to a point where defecting is no longer the dominant strategy (see figure 2 for a graphic representation of the outcome of the cooperative game).

Obviously, the initial stages of the cooperative game are critical for its success, when Rt is lower than T or too close to it, thus making the net gain from cooperation too uncertain. This caveat is particularly important when referring to the Latin American situation, where the initial degree of trade and financial integration is weaker than in the European case.

FIGURE 1

Game tree representation

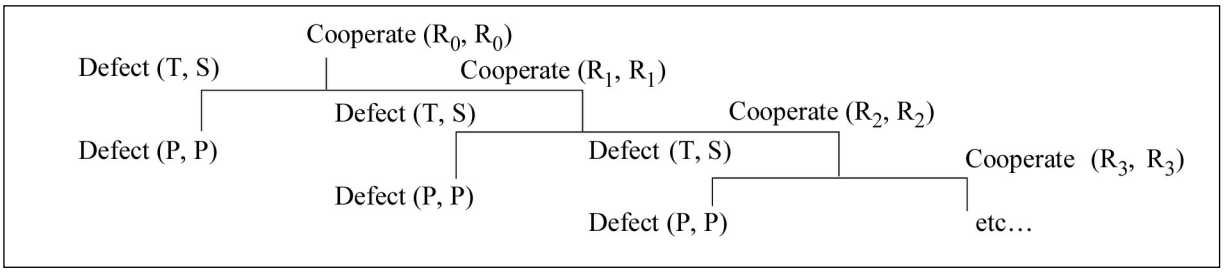
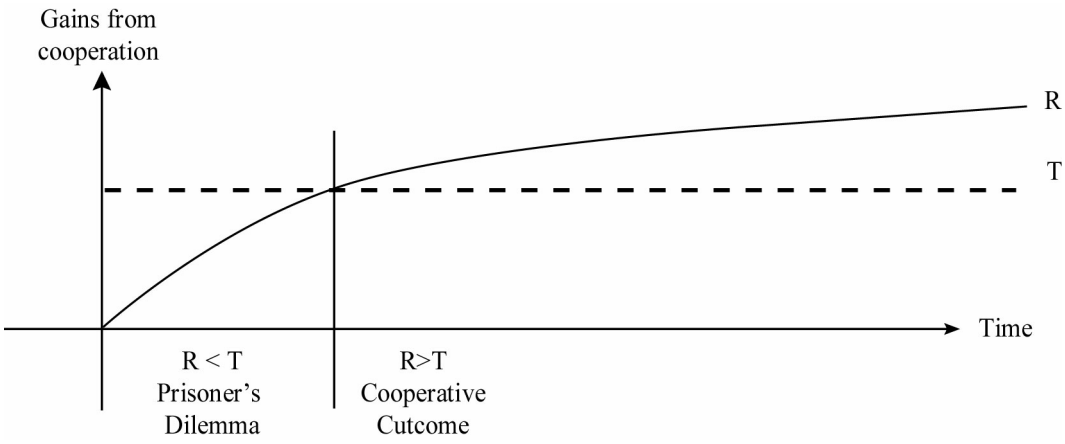


FIGURE 2

Dynamic gains from cooperation and the Prisoner's Dilemma



Source: Escaith and Paunovic (2003).

III

Economic convergence, integration and policy coordination in Latin America

As already noted, despite their limitations OCA criteria are a good starting point to look at the feasibility of initiating a dynamic process of policy coordination in a regional framework. The issue depends not only on national considerations, but also on externalities linked to the regional dimension of the transmission of shocks.

The evolution of the Latin American and Caribbean economies since the mid-1980s shows a convergence in terms of macroeconomic policies and achievements. Confronted with the negative shock of the debt crisis of 1982, the necessary adjustment following the reversal of net financial resource transfers from the rest of the world and episodes of high to hyperinflation, most countries embarked upon stabilization programmes. These programmes shared a nuclear set of common objectives, strategies and instruments. The increased dependence on external finance during the 1990s also led to a reduction in the freedom of domestic policy makers to diverge from orthodox policies.

The trend not only affected macroeconomic policies *stricto sensu*, but also brought a deeper transformation of the institutional framework via structural reforms. The evolution of reform indexes (ECLAC, 2001) shows that by the end of the 1990s most Latin American and Caribbean countries had achieved convergence in terms of trade, financial and capital liberalization reforms.

As a result of these trends, most of the countries of the region entered the 2000s with many shared characteristics, not only in their way of thinking about making economic policies, but also in the results –both positive and negative– of those policies. Sharing common objectives, institutional frameworks and instruments provides quite fertile ground for macroeconomic policy coordination. Whether it is optimal to integrate this dimension into the national strategies

depends in part on the comparative review of their exposure to external shocks. The first aspect to be analyzed is trade integration.

1. Trade integration

One of the central factors in macroeconomic policy coordination and OCA is the degree of trade interrelationship between potential partner countries throughout the trade sector. This is traditionally analyzed in terms of trade flows and symmetry of external shocks.

a) *Intraregional trade*

Since 1991, with the recovery from the 1982 debt crisis, trade with other Latin American and Caribbean countries, especially within integration subregions (Andean Community, CARICOM, Central American Common Market, Mercosur), has increased much faster than trade with other countries, at least up to 1998. Thus, intraregional trade, which represented 13% of total exports in 1991, rose to 20% in 1998: an implicit growth rate of almost 15% annually in real terms. Due to the crisis in Mercosur and a decline in the Andean group, this share went down to 16% in 2002, reducing the annual growth rate over the 1991-2002 period to 9% (table 2). This growth is particularly significant from our perspective, because trade has grown much more rapidly than the domestic product, increasing its contribution to the level of economic activity.

TABLE 2

Latin America and the Caribbean: Trends in trade and domestic product, 1991-2002

Latin America and the Caribbean (LAC)	Average annual growth rate[a]	
	1991-1998	1991-2002
Total supply	4.5	3.3
GDP	3.3	2.5
Imports of goods and services	12.0	8.0
Exports of goods and services	8.5	7.3
Exports to other Latin American countries [b]	14.8	9.2

Source: Prepared by the author on the basis of ECLAC data.
[a] Percent, from data at constant 1995 prices
[b] Estimated from data at current prices.

Economic transactions within each subregional integration scheme have been taking on an increasingly important role (figure 3), not only in quantitative but also, and especially, in qualitative terms: while trade with countries outside the region is composed of

FIGURE 3

Integration schemes: Trade within subregions, in relation to total exports
(Percentages)