# MACROECONOMIC COOPERATION FOR UNCERTAIN TIMES

## THE REDIMA EXPERIENCE

*Rodrigo Cárcamo-Díaz*

UNITED NATIONS

ECLAC

EUROPEAN UNION

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# Foreword

Fostering international macroeconomic cooperation has been an important aspiration of the United Nations since its creation, as indicated by the crucial role that international organizations of the United Nations system have played in this issue since the creation of the United Nations in the aftermath of the Second World War. At the regional level, enhancing regional integration as a means to foster economic and social development has been set as a priority goal of the United Nations. Coordination and cooperation in the economic sphere is indeed considered as instrumental in creating enabling conditions for growth and mitigating volatility and vulnerability. In this respect, the Economic Commission for Latin America and the Caribbean (ECLAC) has undertaken technical analysis and provided advice in support of the region's integration and cooperation initiatives.

However, despite the substantial efforts made by multilateral institutions and successive generations of policymakers to foster integration and cooperation initiatives both at the sub-regional and regional levels, progress in the region has not always matched the expectations of the authorities and society in general. Associated efforts in favour of closer cooperation at the macroeconomic level among Latin American countries have generally been heterogeneous and often below expectations, particularly in South America.

In this book, a new approach to international cooperation is presented, suggesting that macroeconomic cooperation should not limit itself to those cases where there are significant "real" transmission channels between different economies such as trade in goods and services

and financial markets. The main argument is that the existence of informational spillovers in the face of substantial uncertainty affecting the policymaking process provides a powerful reason for cooperation.

Policymakers face a difficult task on a daily basis: to take decisions while facing pervasive uncertainty about important elements that are likely to affect the results of their policy choices. Despite the fact that rational policymakers everywhere continually strive to overcome these problems by investing in new tools, strengthening human resources, producing better statistics and indicators, policymaking continues to be a great challenge. This may be particularly true for smaller, poorer countries that face binding resource constraints in their efforts to deal with regular uncertainty.

As the book points out, by embracing "cooperation for learning", Latin American countries stand to reap substantial benefits. In the first place, increasing the access of senior officials to information signals may reduce the problems caused by uncertainty about the current and future "state of the world", the structure of the economy and other types of uncertainty that policymakers have to deal with on a daily basis. Second, "cooperation for learning" helps smaller, poorer counties in particular. As the latter often face binding financial and human resource constraints in their policymaking efforts, the capacity to observe the policy choices, their results and the (perceived) reasons behind them can magnify the analytical resources of those countries. Lastly, cooperation for learning can help not only to improve policy results, but also to strengthen a country's institutions. This can happen as it focuses the resources of policymaking institutions on addressing the pressing policymaking needs of each country, and this is essential for growth and poverty reduction.

International and regional organizations like those in the United Nations system have an important role to play in nurturing and providing support to cooperation and learning networks. As pointed out in the book, there are several funtions that can be more effectively or efficiently fullfilled by international organizations given their role as providers of public goods. These include strengthening the absorption capacity of national institutions using technical assistance, providing expert information signals and addressing that hinder the operation of learning networks.

In order to fulfil these roles in Latin America, ECLAC created the Macroeconomic Dialogue Network (REDIMA) project, with the technical and financial support of the European Union. Its objective was to contribute to macroeconomic cooperation in Latin America, divided into three sub-regions (MERCOSUR, Andean Community and Central

America, Panama and the Dominican Republic), and to foster links and exchange of experience within the whole region and with the European Union. During its second stage (2005-2008), which is described in this book, ECLAC played an important role in providing technical support to macroeconomic dialogue and "cooperation for learning". This encompasses a wide spectrum of activities, including developing applied and empirical research on the topics on the different agendas of the REDIMA sub-regional networks, the fostering of the establishment and maintenance of bonds at the technical levels among central banks and Ministries of Finance in the region, establishing a connection between the "theoretical" or "academic" fields and the policy aspects of economic issues of relevance for macroeconomic cooperation in the monetary and fiscal policy areas in particular. This book attempts to document the concomitant and subsequent efforts to interpret, model and disseminate that experience of macroeconomic cooperation in Latin America.

Lastly, while further theoretical and empirical reserch is needed on the subject of international macroeconomic cooperation the promising results observed in the region from the implementation of "cooperation for learning" during the REDIMA II project and in the subsequent work of the official macroeconomic dialogue and cooperation groups of Central America, Panama and the Dominican Republic, and the Andean Community point to the continued relevance of work by national policymaking institutions, international and regional organizations and the international donor community in support of closer cooperation among countries in Latin America. Such tools result in cooperation, and they profit from the nature of knowledge held by every country and institution in a non-rival and complementary way. Further strengthening of these tools may result in faster or deeper links developing across countries in the region, thereby bringing ever closer the dream of greater prosperity individually and collectively for a more integrated Latin America.

**Alicia Bárcena**
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Chapter I

# Macroeconomic cooperation for uncertain times: an overview

## A.    Introduction

By mid-2008, the sub-prime mortgage crisis that started one year before in the United States had mutated into a full-blown global financial crisis. The 2008-2009 financial crisis led to large scale financial sector problems in the United States and Europe, problems which later spread to the real economy around the world, via the closely inter-connected worldwide financial and capital markets. Financial titans of the calibre of Lehman Brothers, Bear Stearns, Merrill Lynch, Citigroup, the American Insurance Group (AIG), Lloyds TSB and others were severely affected by the crisis, with many institutions either accepting large amounts of capital infusions from the State or being absorbed by others or disappearing altogether (like Lehman Brothers). Investors in capital markets saw the value of their portfolios fall as markets collapsed worldwide. Previously booming developed economies like Iceland, Ireland and Spain became mired in unemployment, recession and renewed fiscal problems, while the economies of emerging and developing markets that had been experiencing record growth during the past years suddenly saw their economic growth severely curtailed and faced an external context for financing current account or fiscal deficits that forced many of them to rely exclusively on their own reserves and other asset hoards.

In response to that crisis, governments all over the world reacted with differing speed and intensity, using the tools at their disposal to try to reduce the negative effects of the crisis on public welfare. The set of feasible macro-financial policy responses to the global financial crisis of 2008-2009 can be divided into two groups.

The first group included those policies aimed at reducing the effects of the crisis on the economic cycle, in particular on economic growth and unemployment, and at maintaining the health of the financial sector. Most of the policy measures announced by policymakers the world over focused first on monetary and fiscal policy measures to this end, such as discretionary fiscal expenditure increases, the creation of bail-out funds to support fragile financial institutions with potential systemic impact (such as the Troubled Assets Relief Program (TARP) fund in the United States), swift reductions in the policy interest rates of central banks and widespread measures to inject liquidity into the market, public subsidies for the consumption of goods and services and measures aimed at reducing imports or increasing exports (especially in developing countries).

The second group of measures dealt with the medium- to long-term functioning of the economy rather than the economic cycle. Therefore, this group relates more to the "fundamentals" of the crisis. In general, governments focused on the first group of measures, although the second group was also widely discussed by academics, the media and some policymakers. Among the latter, we find measures to address long-term issues like improving the role of the State as regulator of the financial system, the exact role of monetary policy in smoothing the economic cycle in the presence of asset price inflation, the implementation of discretionary fiscal policy and the establishment of fiscal policy measures such as structurally-balanced budgets, the introduction of incentive schemes for the financial sector that balance returns and risk-taking and so forth.

Both types of measures, however, reflect an important fact: macroeconomic policymaking is conducted under conditions of pervasive uncertainty. More specifically, macroeconomic policy is contingent not only on the policy choices of the authorities, but also on the "state of the world", while the ultimate effects of complex policy tools are also imperfectly understood, in part due to uncertainty about the true "structure of the economy".

Therefore, the global financial crisis of 2008-2009 highlighted the fact that dealing with uncertainty is what policymakers do on a constant basis, both during "normal" times and during a crisis. What a crisis does, however, is to highlight the uncertain environment surrounding

policymaking, add more urgency to the need for policymakers to use all the tools at their disposal in order to implement policy, and finally, to raise the stakes for policymaking. This does not detract from the fact that economic outcomes (including those with large negative effects on social welfare associated with a crisis) result both from policy choices made by the authorities at every moment of time under conditions of uncertainty, together with the specific values taken by variables exogenous to the policy decisions of the individual authorities but which condition the outcomes of policy.

Policymakers deal with uncertainty using several tools at their disposal. In this book, we will present how policymaking institutions can use a tool called "cooperation for learning" to improve their capacity to maximize social welfare in an uncertain environment. The key element is that this tool allows policymakers to benefit from informational externalities arising from the policymaking actions undertaken by other institutions and from the observed results of those actions. In particular, we will postulate that international macroeconomic cooperation can be beneficial for countries independently of the existence (or not) of strong real-world linkages (trade, financial markets) among countries that allow macroeconomic policy setting to have spillover effects on others. Also, policy cooperation for informational reasons (namely "cooperation for learning") is not affected by whether the assumptions essential to the "traditional approach" to macroeconomic coordination are realistic or not.

## B.    Two views on international macroeconomic cooperation

The phrase "international macroeconomic cooperation" brings to mind a picture of countries trying to coordinate their fiscal and/or monetary policy to achieve an objective that is believed to be jointly beneficial. For example, the Plaza and Louvre Accords of the mid-1980s sought to use macroeconomic coordination among developed countries (especially the United States, Japan and Germany) to address the appreciation and depreciation of the US dollar with respect to other currencies, using demand management measures and intervention in foreign exchange markets (Currie, Holtham, and Hughes Hallet, 1989; Sobel and Stedman, 2006). More recently, the global financial crisis of 2008-2009 also spurred interest in macroeconomic policy coordination, as political leaders and international organizations called for a coordinated effort to restore the health of financial intermediaries worldwide and to increase world aggregate demand, especially through increases in discretionary fiscal expenditure (Spilimbergo, Symansky, Blanchard and Cottarelli, 2008).

The calls for international macroeconomic cooperation during the 2008-2009 global financial crisis, as well as the Plaza and Louvre Accords in the mid-1980s, were all based on a view of cooperation that Chapter II defines as the "traditional approach (or framework)" to macroeconomic policy coordination. As pointed out in that chapter, under certain circumstances, a coordinated response to a negative shock by the economic authorities of all countries might be welfare-superior to the alternatives (see Ghosh and Masson, 1994; Meyer, Doyle, Gagnon and Henderson, 2002). As Chapter II explains in detail, the "traditional approach" is based on assumptions that include the following:

- Assumption 1: There are strong real-world links among countries and therefore national macroeconomic policies affect other countries via spillovers. The channels of transmission most frequently mentioned in the literature are trade in goods and services and financial flows.

- Assumption 2: The objective of macroeconomic coordination is for individual countries to choose macroeconomic policy stances that maximize the joint welfare of the group of countries involved. It is also assumed that, if such coordination efforts fail, a welfare-inferior outcome for the group of countries will be achieved.

- Assumption 3: For the aggregate of countries (i.e. for all countries as a group), the benefits of coordination are assumed to be superior to their costs.

- Assumption 4: The welfare-superior "cooperative" outcome is implementable. Implementability of an outcome means that countries will be willing and able to pursue the joint objective even if they come into conflict with domestic policy objectives. This could occur, for example, following the establishment of a binding and credible commitment among the participating countries (like an international treaty) and/or following the intervention of a supranational authority that can enforce the cooperative outcome.

- Assumption 5: Countries represented by the national policymaking institutions in charge of agreeing to and implementing the "cooperative" outcome can effectively use the tools at their disposal to achieve the desired objective. Specifically, tools like fiscal or monetary policy (and associated instruments) are assumed to be effective, under the control of the relevant authorities and not restricted in their capacity to be used by coordinating agents/institutions.

In any case, independently of the existence of strong real-world channels of transmission of macroeconomic policies among countries though trade, financial and investment links (the first assumption of the "traditional view"), the validity of the rest of the assumptions mentioned above is also far from self-evident. This is especially ominous because, as chapter II indicates, each of those assumptions conditions to a certain degree the practical usefulness of the "traditional approach" to macroeconomic policy coordination. As a result, even for coordination among developed countries, where the hypothesis of strong real-world spillovers is more difficult to reject, the economic literature is not unanimous in its analysis of macroeconomic coordination exercises like the Bonn Summit of 1978, and the Plaza and Louvre Accords (see Sobel and Stedman 2006 and other references in chapter II). This provides some "food for thought" about the policy relevance of the "traditional approach".

This, however, does not mean that international macroeconomic coordination (especially among developing countries) has no future. On the contrary, in this book we propose that international macroeconomic cooperation can be useful even in the total absence of real-world channels of transmission of macroeconomic policy effects among countries, and even if none of the five assumptions of the "traditional approach" mentioned above are satisfied. In particular, this book proposes that international macroeconomic cooperation can be welfare-increasing to national policymaking institutions, due to the existence of pervasive uncertainty that policymakers constantly have to address in order to implement macroeconomic policy. More specifically, we live in a world where ex post policy outcomes are conditional on the policy decisions made by the authorities and on the (ex ante probabilistic) outcomes of several variables that condition policy outcomes. Therefore, the main idea presented in this book is that informational externalities may enable rational policymaking institutions to learn from monitoring other institutions' policymaking practices in order to reach Pareto-superior outcomes in their own policies. We call this approach to international macroeconomic cooperation "cooperation for learning".

## C.    A world of uncertainty

International macroeconomic cooperation under the "cooperation for learning" approach is based on the informational externalities among policymaking institutions implementing policy in uncertain conditions. Consequently, we need to look into the existing types of uncertainty before further discussion of how it is affected by cooperation. Chapter III discusses in detail the challenges that uncertainty creates for policymakers.

Policymaking is always conditioned by uncertainty. Ex post, policy outcomes are the result of the policy instruments adopted by the authorities and the realization of different variables that are ex ante probabilistic. For example, today's central banks in charge of implementing monetary policy are well aware of the policy challenges posed by pervasive uncertainty. In the words of former Federal Reserve Governor Alan Greenspan (2004): "The Federal Reserve's experiences over the past two decades make it clear that uncertainty is not just a pervasive feature of the monetary policy landscape; it is the defining characteristic of that landscape. The term "uncertainty" is meant here to encompass both "Knightian uncertainty", in which the probability distribution of outcomes is unknown, and "risk", in which uncertainty of outcomes is delimited by a known probability distribution. In practice, one is never quite sure what type of uncertainty one is dealing with in real time, and it may be best to think of a continuum ranging from well-defined risks to the truly unknown".

The literature on policymaking under uncertainty is very large and goes back at least to Knight's seminal book *Risk, Uncertainty and Profit*, published in 1921, but has recently received increasing attention from both academics and policymakers (see McCallum, 1999; Greenspan, 2004; Bernoth, Hughes-Hallet and Lewis, 2008; Schmidt-Hebbel and Walsh, 2008; Sims, 2002 and 2008, and so on). This underlines one important characteristic that distinguishes modern macroeconomic analysis for policymaking, which is the role played by beliefs about uncertain elements in the economy, such as models, parameters, current and future states of the world. The construction of beliefs about uncertain elements of the world is an important issue in applied macroeconomics, and an essential one for those undertaking real-world policymaking. In practice, beliefs are constructed using a variety of tools, both quantitative (such as macroeconometric models of different types) and "judgemental", as indicated by Sims (2002, 2008) and Mishkin (2007).

In general, as indicated by chapter III, there are four "types" of uncertainty faced by macroeconomic policymakers:

- Uncertainty about the current and future "states of the world".

- Uncertainty about the true structure of the economy.

- Uncertainty about complex policy tools, especially in terms of their effects (and therefore, about the net welfare value of using them).

- Uncertainty about the future behaviour (and objectives, feasible instrument set, and so on) of other government actors.

The first three types of uncertainty are described in more detail in chapter III, so we will refer the interested reader to the discussion therein. In any case, the economic literature has dealt extensively with the issue of uncertainty in the last few years, and there are several useful references on the subject, including European Central Bank (2001), Conway (2000) and Dow (2004), among others. Perhaps the type of uncertainty most often overlooked is the uncertainty emanating from a within-government lack of coordination. That is, this type of uncertainty emerges from dropping the (rather heroic) assumption of a government that behaves as a monolithic entity capable of rationally maximizing a certain well-defined objective function. Such an implicit assumption about the "monolithic" nature of governments is quite common in the economic literature. Often, this assumption is made for modelling expediency (as it simplifies modelling substantially). However, some authors have tried to justify the "monolithic Government" assumption using theoretical arguments. For example, McCallum (1999) questions the validity in the long run of assuming that central banks and the "fiscal authority" may have preferences that differ among themselves and vis-à-vis the preferences of the public in democratic societies, where preferences of the authorities that are not consistent with those of the public would tend to be weeded out relatively promptly.

To illustrate the challenge faced by a macroeconomic policymaker in the presence of these types of uncertainty, his every day job can be compared to that of a blindfolded hunter who is using a new bow and arrow to hunt a deer. Such a hunter faces several challenges. First, he does not know the exact "state of the world" now or in the future: he cannot see exactly where the animal is and where it will be later. But he receives signals about that "state of the world": he can hear the noise of the steps the animal makes. Second, he does not know the exact "structure of the world (economy)": he cannot see the exact terrain where he is standing, whether there are bushes, or obstacles, or other elements that might affect the flight of the arrow, his policy instrument (and even if he knew, he does not know how much they might affect the flight of the arrow). He can also only imperfectly assess the weather conditions, which also affect the accuracy of his instrument. That is, he faces uncertainty about the variables and the parameters of the correct model of the world (economy). Third, he is uncertain about the true value to him of his new "complex policy tool" (i.e. the effectiveness of the instrument at his disposal): the new bow and arrows he has just bartered for or made have not been used before by him, so he does not know things like its exact reach, whether it has a bias left or right, or others that will affect his capacity to hit the deer (independently of the "structure of the economy"). However, despite the obvious challenges, it is essential that the hunter gets food for his family, i.e. that he tries to maximise his objective function.

Similar challenges are faced by macroeconomic policymakers. For example, central banks facing a negative inflationary shock due to the worldwide rise in commodity prices like petroleum (as experienced by Latin America between mid-2007 and mid-2008, and again in 2010-2011) needed to decide on their monetary policy stance: whether to increase interest rates, by how much, with what speed, and so forth, without knowing ex ante the duration of the shock or its strength. Similarly, Ministries of Finance of commodity exporting countries, faced with the same shock, had to decide on how to use public expenditure to stimulate aggregate demand, leading to questions about the size of the expenditure increase, its use (for instance to reduce outstanding liabilities, increase investment in productive assets such as infrastructure, increase social expenditure, and so on), and what to do with any remaining surpluses.

What are the effects of uncertainty on macroeconomic policymaking? In general, uncertainty has effects ex ante and ex post decision-making by policymakers. Uncertainty may lead to policymakers observing ex post outcomes that diverge from their macroeconomic objectives such as low inflation and a minimal output gap. Ex post large deviations from ex ante expected results of adopting a policy action are well documented in the literature (see Greenspan, 2003) and are due to the conditional nature of policymaking. Chapter III lists three ex post problems for policymakers emanating from uncertainty. First, fiscal or monetary policy intended to be counter-cyclical may end up exacerbating the cycle under uncertainty. Fiscal policy might be particularly vulnerable to such a problem, as its implementation lags are long. Second, forward-looking monetary policy is particularly vulnerable to uncertainty of the types mentioned above, as "incorrect" beliefs ex ante might lead to welfare-inferior policy outcomes ex post. Third, within-government uncertainty might lead ex post to higher inflation, if it results in the "fiscal dominance" of monetary policy. Lastly, uncertainty ex ante about the net value of complex policy instruments might lead to the latter not being adopted, in favour of alternatives perceived as "safer" but which are not as good from an (expected) welfare point of view.

For this reason, substantial efforts are dedicated by policymakers to improve their capacity to conduct policy under uncertainty, using all the tools at their disposal. In the next section, we look at the responses of policymaking institutions to uncertainty.

## D.    Policy responses to uncertainty: the role of international cooperation for learning

Chapter III mentions three tools regularly used by policymakers (especially central banks) to address uncertainty and implement policy. The first one is a deliberate effort directed at improving the quality and quantity of information available for policymaking. The second one is the use of different types of models (to address model uncertainty) and of rules that are robust in the face of (at least some types of) uncertainty. For example, central banks make extensive use of different models, including Dynamic Stochastic General Equilibrium (DSGE) models (see Tovar, 2008) to inform decision-making. The third tool is the (often ad hoc) process of learning from all the information available in "bits and pieces" in order to form the most accurate possible beliefs about what policy should be adopted in each period of time, in particular learning from past experience with policymaking.

The main point that both chapters III and IV make about the process of learning or "belief formation" is that learning in one national policymaking institution can benefit from international cooperation with other institutions addressing similar challenges elsewhere. In particular, it is proposed that there is a mutually reinforcing process between domestic policy improvements and international collaboration in the macroeconomic policy area. This idea, which constitutes the basis of the international "cooperation for learning" approach, can be characterized as follows:

a)    Countries want to pursue macroeconomic policies to attain their own objectives, such as output as close to potential output as possible while maintaining inflation low and stable (such as the "dual mandate" of the Federal Reserve System of the United States).

b)    In their efforts in this regard, a large challenge they face is the existence of pervasive uncertainty described in Section C. This uncertainty needs to be addressed constantly in order to conduct regular macroeconomic policy and achieve the authorities' objectives.

c)    In the presence of uncertainty about which is the "best" available policy choice, policymakers could improve their information by experimenting with different policy choices. This, however, is a costly process in terms of deviations from the objectives of the authorities.

d)    In addition to learning from their own experiences, policymaking institutions of any country can learn from the experience of other institutions (from the same or other countries) in their own efforts for addressing similar policy problems.

e)    In order to do that, they need to establish and maintain adequate links to those institutions that allow a sufficient flow of information to illuminate the capacity of the country to decide (ex ante) on welfare-superior policy decisions.

f)    Having established links to others (institution B), policymaking institution A uses its own resources to solve its policy problem given the available information, including what it receives through its links with others (such as institution B).

g)    As a result, learning institution A adopts a policy decision and observes an outcome, which is influenced by the policy decision taken and the unobservable "states of the world" and the structure of the economy. This, in turn, generates information that may be of value to other institutions (such as B) attempting similar exercises. The beneficiaries of the information generated by A include those institutions (like institution B) from which information was previously obtained by policymaking institution A.

h)    Using the existing (costly) links between institutions, others like institution B may subsequently use the information and experience generated by policymaking institution A as an input in their own policymaking processes, to the degree that they consider it useful for their own policy purposes.

Therefore, the effort of designing and adopting welfare-superior policies domestically provides incentives for countries to collaborate internationally, while international collaboration is instrumental for the design and implementation of "better" policies domestically. This relationship is summarized in figure I.1. "Nature" (or chance) first chooses the unobservable element θ, which represents the true unknown "state of the world", or the net value of a certain complex policy tool that policymaking institutions A and B are evaluating. For example, a central bank may try to estimate the size, type and reach of a certain negative shock to the economy. Figure I.1 shows the sequence of learning during two periods only, but the process can be extended for the long run.

Note that international "cooperation for learning" is built on the basic premise of informational externalities emerging from the policymaking process that can be used by the institutions connected to the one generating the relevant information.

Figure I.1
A TWO-PERIOD LEARNING PROCESS
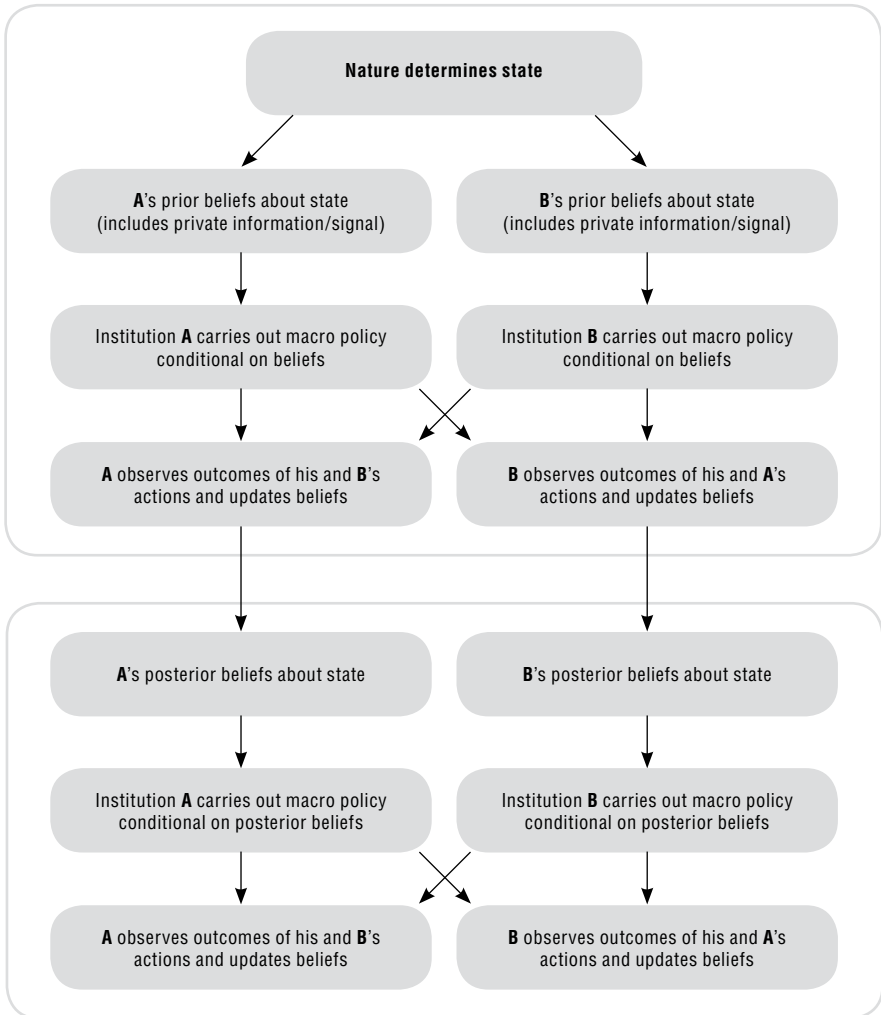


Source: Compiled by the author.

The learning process itself may be modelled in different ways. One simple possibility is to assume that policymaking institutions in different countries draw random signals about the state of the world. In that case, observing the actions taken by others provides information about the underlying true state of the world. Another possibility, which is based on the Bala and Goyal (1998) model of learning, summarized in appendix C,

is to assume that agents are bounded-rational and differ in terms of the beliefs they hold (including prior beliefs), and observe random results after choosing an action based on their beliefs. Observing the results obtained by others allows agents to update their beliefs. Therefore, sharing that information with other similar agents and using it to update previous beliefs about the unknown values under study might lead to each agent having ex post a belief that is closer to the true unknown value at lower cost than the belief obtainable in autarky. These beliefs, in turn, support alternative policy decisions that can be adopted by policymakers within a certain set of available policy decisions. The resulting outcomes of policy decisions adopted with more information (i.e. updated beliefs) are ex ante more likely to be welfare superior, leading in turn to the new information about the unknown variables being useful for other agents pursuing a similar learning process and who have informational links to the authorities obtaining the information. Learning can also be fostered by national policymaking institutions establishing links to international organizations, as the latter can be useful sources of signals about the unobservable $\theta$ of figure I.1. In particular, international organizations have significant human and financial resources to carry out research, macroeconomic tool appraisal, comparative studies and so on, that make them useful sources of signals. Chapters III and IV expand on this.

One point to note, however, is that for information to flow among different policymaking institutions, informational links need to be established among them. The establishment of links to other institutions is not costless, as it involves dedicating scarce human resources (and, probably to a lesser degree, financial ones) to forming or maintaining links. As indicated by chapter IV, these costs chiefly involve the opportunity cost of the time of senior officials. Taken as a group, the series of links connecting a certain group of institutions and international organizations can be modelled as a network whose purpose is that of fostering "cooperation for learning".

Chapter III presents a conceptual framework for understanding international "cooperation for learning", based on the model of Bala and Goyal (1998) of learning in networks. In that model, under a series of assumptions, the beliefs and welfare of different participants in a network converge in the long run. Additionally, Bala and Goyal (1998) indicate that learning may not be "optimal" in the long run, depending on issues such as the original beliefs held by participants in the network and its structure. Of particular interest is their emphasis on the importance of the original beliefs, because a group of particularly well-connected agents who hold "incorrect" beliefs, in combination with only limited "independent" sources of "correct" signals, might lead to the adoption of "non-optimal" beliefs in the long run.

The presentation and discussion of this conceptual framework allow us to better analyse and understand the implications for national institutions cooperating in order to learn how to implement welfare-superior macroeconomic policies. Most importantly, the conceptual framework of chapter III shows that the existence of "real economy" linkages (i.e. trade and financial links) between countries is not a necessary condition for macroeconomic cooperation, in stark contrast to the "traditional approach" to macroeconomic cooperation/coordination also reviewed in that chapter. The policy relevance of the latter (see Ghosh and Masson, 1994) depends on whether their multiple assumptions (a monolithic Government, significant real world spillovers during normal times among countries and so forth) are realistic enough to be applicable to policy problems. "Cooperation for learning", on the other hand, only requires the existence of valuable informational spillovers that are non-rival and the existence of links in order to be applicable to policy-relevant learning.

Significantly, the conceptual framework of "cooperation for learning" presented in chapter III also brings into focus the multilateral and symmetric nature of the "cooperation for learning" process. Those learning efforts are multilateral because learning by one institution leading to policy improvements is useful to other learning institutions, due to the existing informational externalities and information being non-rival. Cooperation for learning is also symmetric in the sense that every institution participating in a learning network might learn from policy experiments of others, depending on their own "absorption capacities". Rather than the world being divided up between those that "know" and those that "don't know", this approach is based on the understanding that each participant receives signals that can be useful for different participants to make inferences about unknown elements such as the "state of the world" or the net value of a complex policy tool. As the "cooperation for learning" approach acknowledges, in the real world no individual agents or institutions know the true value of unobservable $\theta$ at any given moment of time.

## E.    Fostering "cooperation for learning"

As we have claimed that "cooperation for learning" can be a useful tool for policymaking institutions in their regular operations, two questions immediately emerge. The first one is: are there examples of this in the real world, especially in developing countries? The second question is: how can the positive features of cooperation for learning be fostered? The first question is answered in chapter IV, which analyses in detail a case study of "cooperation for learning" in Latin America, namely

the Macroeconomic Dialogue Network (REDIMA) project. The second question is answered in both chapter III and chapter IV. In this section, we present some of highlights of that discussion.

## 1.    A case study: the REDIMA project

Chapter IV provides a detailed description and evaluation of how an international organization (the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), with the financial support of the European Commission), contributed to the creation and support of real-world cooperation for learning networks in Latin America. Specifically, the chapter analyses in detail the operation of the second phase of the Macroeconomic Dialogue Network project (REDIMA, in Spanish), which operated between 2005 and 2008 in 17 Latin American countries, divided into three sub-regions (MERCOSUR and Chile, the Andean Community and Central America, Panama and the Dominican Republic).

REDIMA operated in a region (Latin America) that is vulnerable to shifts in the terms of trade and capital inflows, and therefore, where there is substantial uncertainty surrounding macroeconomic policymaking. Most importantly, this uncertainty is not limited to crisis periods, but typical of everyday policymaking. Chapter IV presents the macroeconomic highlights of the period 2005-2010 in Latin America, including how negative supply shocks can have significant implications for the implementation of monetary policy, as shown during the spike of commodity prices in mid 2008, while the volatility in the international prices of commodities exported by most South American countries (minerals like copper, petroleum and soya products) significantly affects public revenue. That provides an important motivation for the fostering of "cooperation for learning" in the region.

By dividing the region into three sub-regional networks centred around trade initiatives (namely MERCOSUR, the Andean Community and Central America), the idea of REDIMA was to build on pre-existing cooperation instruments and to focus efforts on strengthening their work so that they could act as effective "cooperation for learning" networks as presented in the conceptual framework of chapter III. To do this, ECLAC used a series of tools, such as the provision of link subsidies, coordination services, direct provision of technical information and analysis and the identification of useful third-party inputs.

In addition to other, hard-to-measure, indirect results on policymaking, and working closely with ECLAC's regional partners (the Secretariat of the Andean Community and the Secretariat of the Central American Monetary Council), REDIMA was instrumental in achieving two concrete and direct results.

The first was the creation of an official macroeconomic cooperation and dialogue group in Central America, Panama and the Dominican Republic, called Macroeconomic Work Group, which brings together senior technical-level officials from Ministries of Finance and central banks in the region. This institutionalized the future of "cooperation for learning" work in the sub-region, and set the basis for further support of the regular policymaking of participating institutions in a very uncertain environment.

The second was the introduction by the official Permanent Technical Group of a series of macroeconomic vulnerability indicators in their periodic monitoring exercises of the economies of the region, which are discussed with peers in a yearly meeting and then published by the Secretariat of the Andean Community. This exercise not only increases transparency in the implementation of macroeconomic policy, but may also contribute to further efforts aimed at reducing fiscal vulnerability.

During this process, the REDIMA project faced several operational challenges that it had to address. As some of those challenges are likely to be of interest for other "cooperation for learning" initiatives, their analysis and how the project addressed them also add value to the review and analysis of the REDIMA experience. The first one worth mentioning was the challenge posed by imperfect communication within policymaking institutions, which highlighted both the importance of seniority of participants and the continuity of their participation in the network's activities. A second challenge was posed by the "social" (or human) nature of the network, which led to the need to address issues such as participant heterogeneity and conflicts of interest among the various roles played by each participant. Chapter IV goes into these issues in more detail.

All in all, the REDIMA case study provides a real-world example where "cooperation for learning" based on informational spillovers can provide a powerful incentive for policymaking institutions to cooperate with others in their own interest. The experience of this project provides some evidence about the potential of this approach to foster better macroeconomic policymaking at the national and regional levels.

## 2. The role of international organizations: concepts and lessons from the REDIMA Project

"Cooperation for learning" networks can be a useful instrument in the toolbox of national macroeconomic policymakers, leading them to use it in their own interest, independently of whether international organizations participate in the process or not. However, there are

reasons why intervention by international organizations in the creation and regular operation of "cooperation for learning" networks may be beneficial or even necessary.

In the first place, international organizations can provide some important coordination services necessary for the set-up and regular operation of a "cooperation for learning" network. These are related to the management of meetings, agendas, identifying experts from other institutions to contribute to the technical debates, and other fixed costs of the network that individual national policymaking institutions do not have incentives to provide, as they have public good characteristics. As shown by the experience of REDIMA presented in chapter IV, the provision of coordination services is a key element for the effectiveness of a "cooperation for learning" network, as the elaboration and management of a network's work agenda over time may condition learning by participants as it influences the benefits for a national policymaking institution of participating in such a network.

Second, international organizations can temporarily subsidize the participation of representatives from policymaking institutions in learning networks. This might be necessary because ex ante, the net benefits (i.e. benefits minus costs) of participating in a "cooperation for learning" network are uncertain. In particular, the strength and relevance of the informational spillovers that will be received in the future are uncertain. This ex ante uncertainty about future benefits of cooperation contrasts sharply with the predictability of (at least the lower bound of) costs: financial costs of participating in meetings (such as plane tickets and living expenses), the opportunity cost of the minimum amount of time from senior technical officials (which can be very high in small, poor countries) and so forth. The REDIMA project experience indicated that this problem might be particularly significant for financially constrained institutions from poor countries like those belonging to the HIPC initiative.

In the third place, international organizations have the capacity to directly contribute to creating the necessary conditions for learning to take place within national policymaking institutions. This is important, as the benefits of cooperation for learning can be conditioned by the "absorptive capacity" of participating institutions. Cohen and Levinthal (1990) refer to an organization's absorptive capacity as its ability to identify, assimilate and exploit knowledge from the environment. One important characteristic in which countries differ from one another is the capacity of public institutions like Ministries of Finance and central banks to assimilate and use information in order to implement better policies. This capacity, in turn, can be related to the amount of human and

financial resources available in these institutions, as well as a myriad of institutional, legal and incentive characteristics that may foster or hinder the learning process.

The way in which international organizations can contribute to increasing the absorptive capacity of national policymaking institutions is with technical assistance. A definition of technical assistance can be found in Mathiasen (1968): "Technical assistance consists in the transmission of learning, knowledge and techniques or material and human resources in order to help those who receive it to solve specific problems in a more suitable manner in keeping with their needs". As pointed out by Blelloch (1957), technical assistance activities have long been seen as a very complex effort of transferring ideas and "best practices" from developed countries and adapting them to the specific needs of the receiving (usually, developing) country. Alternatively, technical assistance can be seen as a deliberate effort jointly carried out by the provider and the recipient of technical assistance to increase the "absorptive capacity" of national policymaking institutions, so that the learning efforts of those institutions can take place.

Finally, international organizations can also directly provide valuable signals, information and analysis about technical topics discussed and analysed by "cooperation for learning" networks. Using their specialized human resources and financial resources, organizations such as ECLAC, the International Monetary Fund, the World Bank and others carry out their own applied research on macroeconomic policy topics that aims to contribute to the capacity of national authorities to carry out welfare-superior policies. This "traditional" role of international organizations has been stressed repeatedly in the economic literature (for instance Gilbert, Powell and Vines, 1999; Krueger, 1998), and chapter IV mentions several examples of the work carried out in Latin America in this area by the REDIMA project, including a study of fiscal rigidity in the Andean Community and some Central American countries, or an analysis of the implications of quasi-fiscal activities in Central America for the implementation of macroeconomic policy.

In summary, as indicated by chapters II and III, international organizations can play an important role in contributing to the creation of "cooperation for learning" networks, as well as providing valuable support to their continued operations over time.

## F.    "Cooperation for learning" and economic crises

Defining the concept of "economic crisis" is not straightforward. There is a wealth of economic literature that analyses periods of financial and economic distress, and this provides different definitions depending on the characteristics of the event (a financial crisis, a currency crisis, and so on). Here, the main interest is to identify characteristics common to economic crises. Furman and Stiglitz (1998) provide some insights into the core of that issue: "Causes are factors that increase the probability of a crisis. In this context, the terms "causes" and "vulnerability" are often used synonymously. Indeed, the economy can be viewed as constantly bombarded by shocks. An increase in vulnerability means an increase in the probability that these shocks, rather than being absorbed by the economy, will be translated into a systemic downturn: a currency or financial crisis".

Therefore, an economic crisis can be said to include two important characteristics:

1)     ex ante probabilistic variables whose possible outcomes condition economic results, in conjunction with policy decisions taken by the authorities at different time periods.

2)     ex post, realized stochastic variables and policy decisions by the authorities combine to produce outcomes that are considered by society (or the authorities representing society) as very "undesirable" along one or more dimensions.

In other words, the first point indicates that the occurrence of a "very undesirable" result, such as a large fall in GDP or a protracted recession, is ex ante probabilistic both in terms of what will occur and when. While history is plagued with examples of economic crises, ex ante their occurrence in a specific future time period is always a stochastic phenomenon. Developing countries like those of Latin America are more volatile than industrial countries (De Ferranti, Perry, Gill and Servén, 2000), as exogenous shocks to the terms of trade or capital inflows are more frequent and political instability, reforms and structural changes have been recurrent. In such countries, economic crisis have been frequent in the recent past but have always remained ex ante probabilistic events in terms of their intensity, type, reach and timing.

The second point refers to the severity of the ex post economic outcomes along one or more economic dimensions, such as the magnitude of losses in the financial system, the large increase in unemployment or the loss of several percentage points of economic growth, as well as socio-economic impacts such as increases in poverty or indigence, widening

income inequality, and so forth. Severity, of course, is a concept that is measured as a function of time, so the duration of the crisis period is also an element of severity.

Hence, if economic crises are characterized by their ex post severity and by their ex ante probability of occurrence at a certain time, one could think that any contribution of a tool like "cooperation for learning" to addressing economic crises would work either by a) reducing the likelihood of the occurrence of a crisis in the future; b) by reducing the severity of its effects conditional on it occurring, or c) both. Further, we can divide the potential contribution of a "cooperation for learning" network tool in two, according to timing. On the one hand, we can plausibly build a case in favour of the usefulness of "cooperation for learning" ex ante of the occurrence of a crisis. On the other hand, the usefulness of "cooperation for learning" after the occurrence of a crisis is less clear.

## 1.    "Cooperation for learning" and an economic crisis: ex ante

If severity is the defining characteristic of a crisis that is ex ante probabilistic, the behaviour of a rational policymaker aiming at minimizing deviations from its economic target variables ex ante (such as the inflation target and the "optimal" output gap, as in the case of the Federal Reserve) will involve, depending on its beliefs (which in a fully rational agent aggregates all available information), choosing a macroeconomic policy stance that will maximize (stochastic) welfare at every moment in time.

Earlier it was proposed that the "cooperation for learning" framework can reduce the uncertainty of national policymaking institutions such as central banks and Ministries of Finance at the time of choosing their policies. If that is true, this tool could increase expected ex ante welfare for each participating institution in terms of reducing the likelihood and severity of crisis by adopting policy stances that are optimal, conditional on beliefs.

Examples of this are shown in chapter IV, where the experience of the REDIMA project in Latin America mentions specific cases of such cooperation among policymaking institutions of the region and others. These include the exchange of experiences in Central America about the strengthening of the balance sheets of central banks in order to add credibility about their capacity to cope with potential financial disturbances (such as those that demand liquidity on short notice); and the introduction of "macroeconomic vulnerability" indicators in the Andean Community in order to increase transparency in the conduct

of fiscal policy and, therefore, pave the way for further advances in implementing policy tools that can reduce the effect of the economic cycle on fiscal policy.

A second potential role of "cooperation for learning" before the occurrence of a crisis is tied to the discussion in chapter III about "within-government uncertainty", which arises from communication and coordination failures among different government policymaking institutions of a certain country (such as a Ministry of Finance and a central bank). While this type of uncertainty is pervasive even during non-crisis times, during a crisis the urgency of adopting policy responses may make it even more important. Therefore, work carried out by the authorities during "normal times" to reduce this type of uncertainty might go a long way towards reducing the negative effects of a crisis if the latter does take place. That is particularly true if the reduction of the impact of the crisis benefits from a coordinated government response. As "cooperation for learning" contributes to alleviating this type of uncertainty by fostering the exchange of information, views, ideas, beliefs, models and so forth among institutions, including institutions within the same country, it can help to address the above-mentioned issue of uncertainty.

## 2.    "Cooperation for learning" and an economic crisis: ex post

Ex post (in other words, once a crisis has already occurred), authorities focus on reducing the severity of that crisis, namely its negative effects on social welfare. Importantly, the history of crises indicates that one distinguishing characteristic once it has already occurred is the urgent need for the authorities to adopt palliative policy actions.

During times of crisis, such as the global crisis of 2008-2009, macroeconomic policy has an element of urgency, in the sense that the dynamics of the economy set in motion during the crisis sometimes leave little time for the authorities to analyse and ponder the potential (uncertain) effects of policy actions. This is particularly important for those cases where "judgement" enters more heavily into a policy decision, such as the short-notice decision for a central bank on lending to a financial institution or allowing supervisory authorities to close it down. In a dynamic, deteriorating or "bad" environment, the authorities may feel compelled to act rapidly, not least due to political economy considerations. In those cases, the usefulness of "cooperation for learning" is as yet untested, as its use could require an intensive and collaborative work for which networks designed for operation during "normal times" may not be fully suitable. The reason is that these networks (like REDIMA) are often "low intensity" networks, where learning takes place

through periodic meetings and other contacts and exchanges that may not be suitable to support a rapid decision-making process such as those required by a crisis management team. Still, further research is clearly needed on this topic.

A second question that emerges about the usefulness of a "cooperation for learning" network after the occurrence of a crisis (i.e. ex post) is related to the potential "crowding out" effect of some signals over others. As mentioned above, chapter III presents the Bala and Goyal (1998) model that forms the core of the conceptual framework of "cooperation for learning". This model finds that, under certain circumstances (related to the architecture of the network), the signals sent by some participants (dubbed the "royal family" by Bala and Goyal) in a "cooperation for learning" network may have more impact than the signals sent by other participants. Under those circumstances, the nature of the signal sent by "royal family" agents may foster or hinder the network reaching the optimal outcome (namely efficient learning in the long run). More specifically, if network members have access to a large proportion of independent signals that contain "adequate" information", during "normal times" these effects on learning may be unimportant. However, during a crisis, if the value of signals is linked to the reception of financial resources like loans, grants or other financial subsidies that are tied to the signals, "royal family" effects may be exacerbated. Cash-strapped policymaking institutions (like Ministries of Finance) may be "willing" (or compelled) to implement a certain policy during a crisis, not only due to the urgency imposed by the crisis, but also due to the combination of receiving a signal from an international organization that is tied to "conditionality-related" funding, i.e. financial aid conditional on the implementation of a certain set of policies. This may be particularly true for severe crises or for countries more dependent on foreign aid.

Therefore, the ultimate effect of the "cooperation for learning" network on efficient learning, if signals are tied to financial help, will be more dependent on the quality of the signals sent by "royal family" institutions. The answer to this question depends on the ex ante probability that the international organizations able to provide such subsidies are (on average) closer than others to the (unobservable) truth.

## 3. Negative feedback effects from economic crises to "cooperation for learning" networks

It is also possible that an economic crisis might affect the sustainability of a "cooperation for learning" tool in a negative way. This may occur for two different reasons.

First, negative feedback effects may appear if the crisis increases the cost of participating in the activities of a "cooperation for learning" network for a policymaking institution, at a time when the network cannot provide immediate and direct contributions to address the negative effects of the crisis under way. That might be the case particularly if human and financial resources available to national policymaking institutions are very scarce, as the opportunity cost of these scarce resources are likely to increase during a crisis. In such cases, which might be particularly relevant for small and poor countries, myopic cost-benefit analysis could lead to reduced participation in the network, and in turn the overall value of the network might fall due to network effects, to all players, thereby reducing its future value, as described in chapter IV.

Second, negative feedback effects may appear from the empirically observed linkage (in Latin America and Asia at least) between "cooperation for learning" networks and trade-oriented or politically-oriented country groupings like the Andean Community, MERCOSUR, ASEAN and so on, as indicated in chapter V. As explained therein, the official macroeconomic monitoring groups in both South America and Central America are all related to membership to sub-regional trade groupings. Then, if it is true that, during a period of negative external shocks, countries resort to trade protectionism (due to political economy reasons), then the deterioration of the trade integration process might lead to less interest in "cooperation for learning" networks, leading in turn to a dynamic negative effect like the one described in the previous paragraph.

In any case, the extent of negative feedback effects of economic crisis on "cooperation for learning" networks requires further theoretical and empirical research that is beyond the reach of this chapter.

## G.  Conclusion

The importance of addressing uncertainty for macroeconomic policymaking has become more and more important in the eyes of policymakers (Greenspan, 2004). As the structure of the economy all over the world becomes more complex, if for no other reason than the increased linkages among countries via trade and capital markets, the variety and importance of shocks potentially impinging on the economy increases. This puts additional pressure on policymakers trying to implement policy in an uncertain environment. Macroeconomic or financial challenges that are increasingly international or even global in scope have increased the uncertainty faced by policymakers, both in industrial and developing countries, and have therefore increased the value of the tools useful in addressing it. Recent examples of these

challenges include the surge in commodity prices worldwide that lasted until mid 2008, was stopped by the global financial crisis of 2008 – 2009, and started again in 2010 and continued into 2011.

This chapter summarizes the "cooperation for learning" approach to international macroeconomic policy cooperation, and presents a case study of its application in Latin America between 2005 and 2008 with the Macroeconomic Dialogue Network (REDIMA) project. The idea behind "cooperation for learning" is that the efforts of implementing policies in the presence of uncertainty generate informational externalities on other policymakers facing similar challenges. Therefore, this book proposes that policymakers' efforts aimed at optimizing their own macroeconomic policy conduct in an uncertain environment, in the presence of connections to other policymakers facing similar challenges, can provide a powerful reason to foster international macroeconomic cooperation for purely self-interested reasons. It is for this reason that policymakers have recently stepped-up efforts to collaborate for that purpose. International organizations can play several important roles in fostering the creation and supporting the operation of "cooperation for learning" networks.

This approach to international cooperation, namely to see it as a tool that can help countries deal with uncertainty in their regular implementation of macroeconomic policy, differs radically from the "traditional approach" to international macroeconomic cooperation, which sees cooperation as a way of improving the joint welfare of countries facing shocks in the presence of spillovers from the setting of domestic macroeconomic policies.

Lastly, this chapter also discusses whether the macroeconomic "cooperation for learning" tool has any potential use for dealing with economic crises. As an economic crisis has both an ex ante probabilistic identity and requires urgent action, we briefly discuss the potential role of a "cooperation for learning" network by looking at those elements. In general, the likelihood that such a tool can contribute to ex ante crisis prevention or impact reduction comes from networks being able to strengthen the capacity of policymakers to implement macroeconomic policies based on more accurate beliefs about the uncertain conditions that affect economic policy implementation. Having said that, however, it must be understood that "cooperation for learning" is ill suited to dealing with the urgent nature of resolving/addressing the crisis ex post. This is due to the slow and probably non-linear nature of learning processes.

Chapter II

# The traditional framework for analysing macroeconomic policy cooperation

## A.    Macroeconomic policy cooperation: a look at the concepts

Macroeconomic cooperation (or coordination) is an often rather loosely defined concept[1] in the literature that covers diverse forms of cooperation among countries in the setting of their national macroeconomic policies. Common to most definitions is the idea that a lack of macroeconomic cooperation among countries can lead to welfare losses at the regional level due to the existence of spillovers emerging from national policies.[2] These spillovers occur if there are interdependencies[3] between countries in terms of prices (including exchange rate and interest rate movements), real demand for goods and services (i.e. trade links) and financial flows (Bryant (1995), Currie and Levine, (1993), Hughes Hallet (1986), Mooslechner and Schuerz (1999)).

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[1]    *"Many words beginning with C pervade discussion of this topic. These include "cooperation", "consultation", "collaboration", "coordination", "collusion" and "coalition". Unfortunately, different authors use the words differently, which leads to some confusion"*, Bryant (1995) pp 392. See also Meyer, Doyle, Gagnon and Henderson (2002), pp. 1, footnote 2.

[2]    It is important to specify that the traditional model of policy coordination refers to the coordination of voluntary policy decisions, which affect other jurisdictions via spillovers. Therefore, this excludes non-voluntary spillovers caused by a crisis. Thus, a shock produced by a crisis is not subject to coordination, as it is involuntary ex ante, assuming rational policymakers.

[3]    In addition to interdependencies, Mooslechner and Schuerz (1999) also justify coordination with the existence of international public goods. They also survey different definitions of the term "coordination".

The study of international macroeconomic policy coordination has a long history, which can be traced back at least to early work by Meade (1951)[4] about macroeconomic policy responses in a multi-country world in the presence of spillovers. Since the seminal work of Hamada in the 1970s[5] this topic came increasingly under the scrutiny of the economic literature, later moving into the policymaking debate of developed countries in the 1980s and early 1990s (Meyer, Doyle, Gagnon and Henderson, 2002; Bryant, 1995; Currie and Levine, 1993). More recently, despite the fact that the accumulated theoretical and empirical literatures on these topics for OECD countries have become large (McKibbin, 1996), macroeconomic coordination has been largely absent from concrete policy discussions in the last few years.

In general, game theoretic analysis has focused on positing that in the absence of a deliberate effort by countries facing a symmetric negative shock to reach a "cooperative solution"[6] where the joint welfare of the group of countries is maximized, a Pareto-inferior non-cooperative outcome will be reached.[7] This literature pays less attention in general to the possibility of the existence of Pareto-rankable multiple solutions to the static international macroeconomic policy coordination game,[8] and assumes that there is a unique non-cooperative Nash Equilibrium[9] (Ghosh and Masson, 1994) of the macroeconomic policy game that is

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[4]   See, among others, chapter VIII on fiscal and monetary policy responses for achieving "internal" or "external" balance in a multi-country world.

[5]   For example, see Hamada, K. (1976), "A Strategic Analysis of Monetary Interdependence", *The Journal of Political Economy*, Vol. 84 (4), Aug., 1976, pp. 677 - 700.

[6]   We will use this term because it is the one most frequently used by the game theory literature, although in the international coordination literature other terms are used. For example, Bryant (1995) refers to "full coordination".

[7]   As an example of this literature, Currie and Levine (1993) comment: "*One approach, the hard-nosed realistic one, would be to accept that we are in a world where cooperation is limited, and design the best type of policy that one can expect for the United Kingdom. In other words, we design our policy treating the behaviour of other countries as given. This it should be noted, is the standard approach to policy design, since almost all our models are of the single open economy, treating the rest of the world as exogenous. If all countries do the same, we arrive (perhaps iteratively) at a non-cooperative solution to the policy problem. The second approach, the soft-headed idealist one, is to assume a world of cooperation, and design policy internationally in such a way as to secure the best overall performance, subject to the cooperating members sharing in the resulting benefits. To do this, of course, requires a model of many economies, specifying the interdependencies between them. The difficulty is that the non-cooperative solution, hard-nosed through it is, may yield pretty disastrous outcomes*" pp. 34 - 35. Hughes Hallet (1986) proposes that the point of comparison should not be the non-cooperative Nash Equilibrium outcome, but the situation where countries simply ignore the existence of interdependencies, which he calls "*isolationism*".

[8]   One exception is Cárcamo-Díaz and Goddard (2008), which presents a game of public investment in multinational transport infrastructure using non-cooperative games with multiple equilibria.

[9]   That implies assuming that country behaviour leads to equilibrium: "*outcomes that occur when agents' actions are mutually consistent*", Maskin (2000), pp 120.

inferior in welfare terms to the "cooperative solution". Key to reaching that result is the existence of supranational institutions that can enforce a cooperative solution.[10]

In addition to the focus on a static cooperative solution, and acknowledging the difficulty of implementing it, the international coordination literature proposed that in the presence of repeated non-cooperative play (in other words, absent joint maximization), countries may be capable of achieving an outcome Pareto-superior to the non-cooperative Nash Equilibrium of the static macro policy game. This could be achieved, it was argued, by constructing "reputation"[11] of cooperation by introducing into repeated play of the non-cooperative game the threat of "punishments" (for example the *tit-for-tat* strategy. See Canzoneri and Henderson, 1991 and Fudenberg and Tirole, 1991) by all countries of those who "defect" from the "nice" action[12] in the non-cooperative stage game.

We will call this view of policy coordination, which focuses on the attainment of a cooperative solution to the static macroeconomic policy game and on repeated play of a non-cooperative stage game, the "traditional view".[13]

While, a priori, both monetary and fiscal policy can be subject to coordination when facing a shock, a significant part of the literature (including Canzoneri and Henderson, 1991; Ghosh and Masson, 1994) of macroeconomic coordination has concentrated on modelling monetary policy rather than fiscal policy coordination. There are several reasons for this, and they include the prolonged lags between policy proposal,

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[10] The focus of the traditional approach on cooperative solutions is clear in Ghosh and Masson (1994): "*There are really two ways in which cooperation may be sustained. The first is institutional: regimes may be sustained by international treaties, agreements and institutions. […] Second, governments which are not myopic may abide by the cooperative agreement out of self-interest. Suppose that a defection from the coordinated regime is "punished" by a reversion to the non-cooperative regime for a specified length of time. In the game theory literature, this is known as a "trigger" mechanism. […] The "folk theorem" of repeated games suggest that such trigger mechanisms can sustain the cooperative regime without any explicit enforcement penalties between governments*", pp 193.

[11] The frequent use of the word "reputation" for the *tit-for-tat* or *grim* strategies in repeated games can be rather confusing, as it differs from its standard use in game theory in games of incomplete information. See Fudenberg and Tirole, chapter 9.

[12] "*[…] we are concerned with a repeated prisoners' dilemma game, not an isolated one. In this context, the question is whether one can devise a set of threats of penalties to be imposed on those players or countries who renege*" Currie and Levine (1993), pp. 36.

[13] Our "*traditional view*" of policy coordination is close to Bryant's "Policy Optimization Analysis" view of international coordination. See Bryant (1995). Meyer et al. (2002) specify the "*traditional view*" of coordination: "*[…] we use "cooperation" to refer to an agreement among policy makers in two or more nations that involves achieving a Pareto efficient outcome and that is credibly enforced, for example, by a supranational authority. In cases in which there is a set of two or more self-enforcing Equilibria, we use "coordination" to refer to an attempt to achieve one particular equilibrium out of the set*" footnote 2, pp 1.

decision and implementation (Tanzi, 1988) and the difficulty of fine-tuning fiscal policy in the face of strong sectorial interests (Persson and Tabellini, 1997), among others.[14]

## B.    A simple model of monetary policy coordination

In this section and in appendix A, we will briefly summarize a simple static Mundell-Fleming-type model introduced by Ghosh and Masson (1994) in order to illustrate the concept of policy coordination. This will be particularly useful later on to contrast with the idea of "cooperation for learning" which we present in chapter III. In the (quite extensive) literature on policy coordination, however, there are many more recent open-economy macroeconomics models that include micro-foundations and that analyse the dynamics of the economy. These include Corsetti and Pesenti (2001), Obstfeld and Rogoff (2002), Canzoneri, Cumby and Diba (2005) and Benigno and Benigno (2006), among others. Those models improve on the previous models in the literature because, for instance, they allow welfare analysis of monetary policy from micro-foundations. However, we discuss here a simpler model without micro-foundations, as the focus of this section is only to review how macroeconomic policy coordination can increase welfare in theory.

The Ghosh and Masson (1994) model describes how the policymakers of two countries (the Home and Foreign countries), which are subject to random negative shocks, behave in order to minimize inflation and to maintain output at its full employment level. The most important element of their model, as shown in appendix A, is that there are real spillovers from a monetary policy decision of one country onto the other one.

Of particular interest is how such policymakers cope with a symmetric inflationary shock. As the authors assume that each country's policymakers face a trade-off between inflation and unemployment, individual attempts by each country to maximize its objective function using monetary policy assume that the other country's policy decisions remain unchanged and yield suboptimal results. In the case of a symmetric monetary shock, this "non-cooperative" behaviour results in

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[14]    There are, however, authors who have included fiscal policy in their analysis of coordination. For a simple example, see McKibbin (1996).

a Nash Equilibrium,[15] where both countries adopt an excessively tight monetary policy stance, as is shown in appendix A. This is because a benevolent planner (such as a supranational authority) that wanted to maximize a weighted average of the welfare of both countries would choose a less restrictive monetary policy stance. The difference between the result obtained by such a benevolent planner (a "cooperative" solution) and the "non-cooperative" result stems from the former taking into account spillovers from policy changes in one country on the other one. Ghosh and Masson (1994) show that such a "cooperative" result of the policy game is Pareto superior. This result is what lies at the core of most of the literature on the advantages of policy coordination.

The authors also show that, if the government ignores the existence of spillovers altogether (rather than simply assuming that spillovers exist but that the other country maintains its policy stance constant), the result of such a "myopic" non-cooperative individual optimization is even worse in welfare terms than the non-cooperative result that acknowledges the existence of spillovers. The possibility that countries behave myopically motivates the claim in the literature about the benefits of macroeconomic dialogue, as posited by Bryant (1995).[16]

In the light of the Ghosh and Masson (1994) model, an important empirical question is to what degree countries behave in a non-cooperative way or whether they behave myopically, ignoring the reaction functions of other countries. A priori, it is reasonable to think that the answer to this question will depend at least in part on the size of the parameters in the reduced form equations reflecting the impact of the foreign country on the domestic economy.[17] It is reasonable to think that the weaker the links between economies, the more likely it is that countries will (rationally) ignore the reaction functions of other countries.

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[15]    Fudenberg and Tirole (1991) specify the concept of Nash equilibrium: "*A Nash equilibrium is a profile of strategies such that each player's strategy is an optimal response to the other players' strategies*", pp. 11. Further: "*Nash equilibria are "consistent" predictions of how the game will be played, in the sense that if all players predict that a particular Nash equilibrium will occur then no player has an incentive to play differently*", pp. 13.

[16]    "*…significant gains may result merely from governments' exchanging information and acting strategically rather than acting in an insular or myopic manner. Benefits may be achieved, in other words, without trying to move all the way to the explicit coordination of national policy instruments, but merely by moving from outcomes where international interdependence receives little attention to noncooperative outcomes where national decisions are decentralized, yet governments exchange information about their economies and policies*" Bryant (1995), pp. 410.

[17]    Namely, parameters $\beta$ and $\eta$ of the reduced-equations. See appendix A.

This is especially likely if the full certainty assumption of the model is relaxed or if there are some costs[18] of including the other country in the model used for policy purposes.

Lastly, note that the model of Ghosh and Masson (1994), as detailed in appendix A, has a unique Nash equilibrium, as the reaction functions of both countries are linear and intersect only once. In a different model, with non-linear reaction functions, multiple equilibria may appear and significantly complicate the analysis. Multiple equilibria would require, inter alia, a mechanism to identify ex ante which non-cooperative equilibrium would be more likely to emerge.

## C.    Policy relevance of the traditional policy coordination approach for Latin America

Having presented the traditional view of international macroeconomic policy coordination in the previous section, we will now look into its relevance for Latin America. First, we will show that intra-regional trade at the sub-regional level (for example among trading groups like the Andean Community) is heterogeneous in Latin America and bilaterally sizable[19] only in Central America. This might indicate that bidirectional trade channels of transmission of macroeconomic policy are not very strong in South America. Second, we will briefly revise some implementation issues that cast doubts over the policy relevance of the traditional approach as a viable proposition for increasing macroeconomic cooperation.

### 1.    The size of macroeconomic policy transmission channels

Crucially, as indicated by Darby (1986), macroeconomic policymakers in one country will care about the policies adopted in other countries if and only if the effects of the latter are transmitted internationally and affect the former. Therefore, the strength of international transmission channels is

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[18]  These costs can be modelled in different ways. In particular, Conlisk (1996) and Rubinstein (1998) discuss alternatives to the use of the perfect rationality assumption in economic models. Removing the perfect rationality assumption allows the introduction of elements like information processing costs. Such a change would argue in favour of agents preferring simpler analytical frameworks to complex ones for decision-making purposes.

[19]  Imagine there are two countries (A and B) that trade with each other. For trade to be important as a channel of transmission of macroeconomic policy for both, exports and imports of each country to the other need to be sizable, for example, as a percentage of total trade. Contrario sensu, if only A exports to B (i.e. B imports from A), the channel of transmission is unidirectional only.

essential for justifying international macroeconomic coordination[20] in the traditional approach. This has an interesting complement in cases where there are very large asymmetries, that is, in cases where policy changes in country A can be transmitted into country B, but not vice versa (due to the scale of the transmission channel in one direction only). This is especially true when a country with a very large economy trades with a neighbour with a very small economy. In those cases of large asymmetries, in the event of a negative shock it might be advisable to pursue a cooperative solution from a joint welfare point of view, but such a solution could be very difficult to implement, as the benefits of coordination are very small for the large country. Therefore, both the size and the direction of policy transmission channels are important for the traditional approach.

In Latin America, several authors have analysed the evolution and perspectives of the different sub-regional integration efforts (MERCOSUR, the Andean Community and the Central American Common Market), especially looking at whether trade within the different blocs expanded over time, thereby increasing the degree of macroeconomic interdependence of the countries.[21] The idea is that closer economic relations involve closer trade relations, so an increase in the latter is taken to indicate an increase in the former, associated with a stronger transmission channel for macroeconomic policy. In general, the literature (Carrera and Sturzenegger, 2000; Heymann and Navajas, 2000; Cárcamo-Díaz and Goddard, 2008) found that within-bloc trade in MERCOSUR and the Andean Community increased both in volume and as a percentage of total trade *vis-à-vis* the situation before the signing of the agreements.

A comparative modelling effort like the Brookings model comparison project carried out for developed countries (McKibbin, 1996; Ghosh and Masson, 1994) is required to better assess transmission channels of policy among sub-regions in Latin America, to better include all potential channels of policy transmission in the analysis, including the financial channel.[22] Such an exercise is beyond the reach of his chapter.

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[20]  "…*it seems reasonable to assume that transaction density should surpass a certain threshold before perceived spreads between benefits and costs of a process of monetary unification become large. […] …MERCOSUR still has a considerable margin for a reciprocal liberalization of markets, as a previous instance for the existence of strong economic incentives to make monetary policies converge*", author's own translation of Heymann and Navajas (2000), pp. 122.

[21]  "*Two autonomous economies choose an economic policy that consists in preferentially increasing the commercial exchange, investment and factor mobility among them. After a while, this generates a level of macroeconomic interdependence that did not exist at the beginning and a monetary influence area is thereby formed. […] Greater monetary interdependence encourages a trade integration area to ask itself about the advisability of coordinating macroeconomic policies*", author's translation of Carrera and Sturzenegger (2000), pp. 45.

[22]  There is, however, insufficient evidence supporting the existence of strong non-trade transmission channels in Latin America (other than financial contagion during a crisis).

However, the Brookings model comparison project showed significant differences in the values of the different policy multipliers attributed to different models. Therefore, in the face of widely diverging values for transmission parameters, it is possible that policymakers might instead use simple measures of trade connections as a rule-of-thumb proxy to build their beliefs about policy spillovers. Along these lines, tables II.1, II.2 and II.3 summarize trade data in the three sub-regional groupings in Latin America: MERCOSUR, the Andean Community and Central America.

Table II.1
TOTAL EXPORTS AND IMPORTS

| Country | Total exports | | Total imports | |
|---|---|---|---|---|
| | Percentages of total | Percentages of GDP | Percentages of total | Percentages of GDP |
| | To the Andean Community | | From the Andean Community | |
| Bolivia (Plurinational State of) | 7.3 | 3.0 | 9.7 | 2.9 |
| Colombia | 6.5 | 1.0 | 4.5 | 0.7 |
| Ecuador | 13.2 | 4.9 | 11.2 | 3.8 |
| Peru | 5.1 | 1.2 | 11.0 | 2.6 |
| | To the world | | From the world | |
| Bolivia (Plurinational State of) | 100.0 | 41.7 | 100.0 | 29.9 |
| Colombia | 100.0 | 15.5 | 100.0 | 16.3 |
| Ecuador | 100.0 | 37.1 | 100.0 | 34.0 |
| Peru | 100.0 | 23.6 | 100.0 | 23.2 |
| | To MERCOSUR | | From MERCOSUR | |
| Argentina | 23.0 | 4.9 | 34.8 | 6.1 |
| Brazil | 11.0 | 1.5 | 8.5 | 1.1 |
| Paraguay | 48.1 | 9.9 | 33.7 | 20.9 |
| Uruguay | 26.9 | 5.0 | 43.9 | 12.2 |
| | To the world | | From the world | |
| Argentina | 100.0 | 21.3 | 100.0 | 17.5 |
| Brazil | 100.0 | 13.7 | 100.0 | 12.6 |
| Paraguay | 100.0 | 20.6 | 100.0 | 62.1 |
| Uruguay | 100.0 | 18.5 | 100.0 | 27.8 |
| | To Central America and Panama | | From Central America and Panama | |
| Costa Rica | 19.5 | 6.1 | 5.7 | 2.9 |
| El Salvador | 59.1 | 7.0 | 19.8 | 7.6 |
| Guatemala | 43.6 | 6.0 | 14.4 | 4.7 |
| Honduras | 28.8 | 6.3 | 25.0 | 14.2 |
| Nicaragua | 34.1 | 8.0 | 21.6 | 14.5 |
| Panama | 9.8 | 0.5 | 8.2 | 3.2 |
| | To the world | | From the world | |
| Costa Rica | 100.0 | 31.4 | 100.0 | 51.2 |
| El Salvador | 100.0 | 11.9 | 100.0 | 38.3 |
| Guatemala | 100.0 | 13.8 | 100.0 | 32.9 |
| Honduras | 100.0 | 21.7 | 100.0 | 56.9 |
| Nicaragua | 100.0 | 23.4 | 100.0 | 67.4 |
| Panama | 100.0 | 4.9 | 100.0 | 38.9 |

Source: Author's compilation, using ECLAC data (BADECEL).

Table II.1, using data from 2008,[23] indicates that intra-regional trade remains a small portion of total trade for many countries in South America. Only the three smaller MERCOSUR members (Argentina, Paraguay and Uruguay) in South America export more than 15% of their total exports to their regional partners. In terms of imports, only Argentina, Paraguay and Uruguay in South America import more than 15% of total imports from their regional partners. On the other hand, trade within Central America is more important both in terms of exports and imports. It is also important to note that intra-regional trade in Central America has grown recently.[24]

Second, measured as a percentage of GDP, within-bloc trade remains limited in many countries in South America. Only Paraguayan exports to the country's sub-regional partners account for more than 5% of GDP, while Argentina, Paraguay, and Uruguay import more than 5% of GDP of imports from their regional partners. In Central America, again, intra-regional trade is in general more important as a percentage of GDP than in both MERCOSUR and the Andean Community. For example, exports to regional partners in Central America (excluding Panama) during 2008 were on average 6.7% of GDP, but only 5.3% of GDP in MERCOSUR and 2.5% of GDP in the Andean Community.

Third, a non-negligible proportion of within-bloc trade in South America (but not in Central America) is composed of primary products that often have an international price in foreign currency (United States dollars) and that are probably less likely to act as a transmission channel of domestic macroeconomic policy, given the possibility of substitution in other markets.[25] This is observable in table II.2, which shows primary[26] exports and imports of the three sub-regions. Table II.3 shows non-primary exports and imports, deducting primary exports and imports from total trade.

Therefore, looking at simple intra-regional trade in Latin America suggests three phenomena.

In the first place, there is a significant asymmetry of trade flows within MERCOSUR: while Argentina, Paraguay and Uruguay imported 5.4%, 12% and 5% of their GDP, respectively, from Brazil, while the

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[23]  In the case of Paraguay, it uses data from 2006.
[24]  For example, comparing 2006 and 2009.
[25]  That is, of course, if the regional partner country is not an international price-setter, in which case macroeconomic disturbances in that country can affect the world price of the commodity.
[26]  Under the category "primary" products we include 45 groups of products classified under the Standard International Trade Classification (SITC) second revision, following the classification by Lall (2000) of developing country exports according to technological content.

latter country imported 0.96% of its GDP from Argentina, 0.05% of GDP from Paraguay and 0.03% of GDP from Uruguay. A similar trend can be seen with exports (although the differences are smaller). This indicates that macroeconomic policy changes in Brazil are potentially capable of spilling over to the other three members of the bloc, and especially to Uruguay and Paraguay, due to the importance of trade with the two other countries. However, the reverse is unlikely to occur, as Paraguayan and Uruguayan trade with Brazil is relatively small for

Table II.2
PRIMARY EXPORTS AND IMPORTS

| Country | Total exports | | Total imports | |
|---|---|---|---|---|
| | Percentages of total | Percentages of GDP | Percentages of total | Percentages of GDP |
| To the Andean Community | | | From the Andean Community | |
| Bolivia (Plurinational State of) | 3.8 | 1.6 | 0.3 | 0.1 |
| Colombia | 0.3 | 0.0 | 0.7 | 0.1 |
| Ecuador | 8.3 | 3.1 | 0.9 | 0.3 |
| Peru | 0.5 | 0.1 | 6.7 | 1.6 |
| To the world | | | From the world | |
| Bolivia (Plurinational State of) | 80.0 | 33.3 | 3.4 | 1.0 |
| Colombia | 52.2 | 8.1 | 8.9 | 1.4 |
| Ecuador | 77.6 | 28.8 | 10.0 | 3.4 |
| Peru | 42.5 | 10.0 | 19.9 | 4.6 |
| To MERCOSUR | | | From MERCOSUR | |
| Argentina | 4.3 | 0.9 | 5.1 | 0.9 |
| Brazil | 0.7 | 0.1 | 2.1 | 0.3 |
| Paraguay | 31.2 | 6.4 | 2.5 | 1.5 |
| Uruguay | 5.8 | 1.1 | 4.7 | 1.3 |
| To the world | | | From the world | |
| Argentina | 43.0 | 9.2 | 7.9 | 1.4 |
| Brazil | 37.0 | 5.0 | 18.6 | 2.3 |
| Paraguay | 70.5 | 14.5 | 2.7 | 1.7 |
| Uruguay | 54.3 | 10.0 | 23.4 | 6.5 |
| To Central America and Panama | | | From Central America and Panama | |
| Costa Rica | 1.4 | 0.4 | 0.8 | 0.4 |
| El Salvador | 2.4 | 0.3 | 3.4 | 1.3 |
| Guatemala | 3.7 | 0.5 | 2.2 | 0.7 |
| Honduras | 11.4 | 2.5 | 1.5 | 0.9 |
| Nicaragua | 19.0 | 4.4 | 1.4 | 0.9 |
| Panama | 2.9 | 0.1 | 0.3 | 0.1 |
| To the world | | | From the world | |
| Costa Rica | 24.6 | 7.7 | 10.0 | 5.1 |
| El Salvador | 13.7 | 1.6 | 19.7 | 7.6 |
| Guatemala | 38.5 | 5.3 | 10.2 | 3.4 |
| Honduras | 49.0 | 10.6 | 7.1 | 4.0 |
| Nicaragua | 64.4 | 15.1 | 19.1 | 12.9 |
| Panama | 77.9 | 3.8 | 5.9 | 2.3 |

Source: Author's compilation, using ECLAC data (BADECEL).

the latter. In the second place, in the Andean Community the trade transmission channel of macroeconomic policy seems to be weak in all countries, as non-primary imports from other Andean countries in 2008 never accounted for more than 3.8% of GDP. The average was 2.1% of GDP, and for Colombia (the largest economy), the figure was just 0.6% of GDP. In the third place, for Central American countries, intra-regional trade is more important in than in the other sub-regions, both in terms of exports and imports.

Table II.3
NON-PRIMARY EXPORTS AND IMPORTS

| Country | Total exports | | Total imports | |
|---|---|---|---|---|
| | Percentages of total | Percentages of GDP | Percentages of total | Percentages of GDP |
| | To the Andean Community | | From the Andean Community | |
| Bolivia (Plurinational State of) | 3.5 | 1.5 | 9.5 | 2.8 |
| Colombia | 6.2 | 1.0 | 3.8 | 0.6 |
| Ecuador | 4.9 | 1.8 | 11.2 | 3.8 |
| Peru | 4.6 | 1.1 | 4.3 | 1.0 |
| | To the world | | From the world | |
| Bolivia (Plurinational State of) | 20.0 | 8.3 | 96.6 | 28.9 |
| Colombia | 47.8 | 7.4 | 91.1 | 14.9 |
| Ecuador | 22.4 | 8.3 | 90.0 | 30.6 |
| Peru | 57.5 | 13.6 | 80.1 | 18.6 |
| | To MERCOSUR | | From MERCOSUR | |
| Argentina | 18.7 | 4.0 | 29.7 | 5.2 |
| Brazil | 10.3 | 1.4 | 6.5 | 0.8 |
| Paraguay | 16.9 | 3.5 | 31.2 | 19.4 |
| Uruguay | 21.1 | 3.9 | 39.2 | 10.9 |
| | To the world | | From the world | |
| Argentina | 57.0 | 12.2 | 92.1 | 16.1 |
| Brazil | 63.0 | 8.6 | 81.4 | 10.2 |
| Paraguay | 29.5 | 6.1 | 97.3 | 60.4 |
| Uruguay | 45.7 | 8.5 | 76.6 | 21.3 |
| | To Central America and Panama | | From Central America and Panama | |
| Costa Rica | 18.1 | 5.7 | 4.9 | 2.5 |
| El Salvador | 56.7 | 6.7 | 16.4 | 6.3 |
| Guatemala | 39.9 | 5.5 | 12.2 | 4.0 |
| Honduras | 17.5 | 3.8 | 23.5 | 13.4 |
| Nicaragua | 15.1 | 3.5 | 20.2 | 13.6 |
| Panama | 7.0 | 0.3 | 7.9 | 3.1 |
| | To the world | | From the world | |
| Costa Rica | 75.4 | 23.7 | 90.0 | 46.1 |
| El Salvador | 86.3 | 10.2 | 80.3 | 30.8 |
| Guatemala | 61.5 | 8.5 | 89.8 | 29.6 |
| Honduras | 51.0 | 11.1 | 92.9 | 52.8 |
| Nicaragua | 35.6 | 8.3 | 80.9 | 54.5 |
| Panama | 22.1 | 1.1 | 94.1 | 36.6 |

Source: Author's compilation, using ECLAC data (BADECEL).

Overall, data indicate that, in comparison with intra-European trade before the Treaty of Maastricht, intra-regional trade in most of Latin America is smaller, suggesting weaker trade channels of transmission of macroeconomic policy. This reduces the interest in the study of macroeconomic policy coordination vis-à-vis those countries enjoying stronger trade links (such as those in Europe). Carrera and Sturzenegger (2000) attribute their finding of weak transmission mechanisms to the lack of coordination of macroeconomic policies in MERCOSUR.[27]

Having said that, however, even if trade transmission channels of macroeconomic policy are relatively weak at the aggregate level of the economy, the former may have important sectorial implications, with some sectors of the economy being potentially more influenced by changes in the macroeconomic environment in trading partners than others. In the case of substantial integration between specific sectors of the economy, despite only weak links at the aggregate level, it is more likely that sectorial links might be considered by policymakers when choosing policy actions. At the industry or firm level, investment links among countries may also transmit shocks in two ways, even if the product markets where the firm operates in different countries are not connected by trade.[28] First, success or failure of firm strategies in one country may lead to behavioural changes in another. Second, as the firm can be considered to be an asset in the hands of investors of different countries, success or failure in one country may impact the price of the asset in other countries, if the financial markets of different countries are connected. These financial links have been less extensively analysed in the literature than trade links, but are also potentially important, as they can also "transmit" policy actions and shocks across borders. Asset market connections across borders imply, inter alia, that asset price differences across borders come under arbitrage pressures. Therefore, events that impact on asset prices in one country may affect asset prices in other countries whose financial markets are connected to the former. Additionally, the movement of stocks of assets across borders generates income flows that persist over time and that can also transmit shocks and policy decisions.

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[27] "*In the case of MERCOSUR, the impact on trade flows was seen to be limited, and foreign direct investment is still a minimum percentage of the total for the member countries. All this explains why MERCOSUR has still not generated the incentives to seek further coordination of macroeconomic policies*", author's translation of Carrera and Sturzenegger (2000), pp. 47.

[28] For example, if a certain firm operates in two countries but sells in each country only what it manufactures there. That would be the case, for example, with firms producing non-tradable products or services.

## 2.    Implementation issues

Irrespective of the size of the transmission channels of macroeconomic policy in Latin America, there are other question marks over the policy relevance for the region of the traditional approach to macroeconomic policy coordination. Extensive theoretical literature (see Hughes Hallet (1986), Canzoneri and Henderson (1991)) and empirical literature (e.g. Oudiz and Sachs, 1984, McKibbin, 1996) has looked into whether and why macroeconomic coordination was welfare-enhancing (for large developed countries in particular) and by how much. However, substantially less attention has been devoted by the economic literature to identifying how to implement coordination in the presence of implementation difficulties that reduce the ex post welfare gains of coordination. The strong assumptions made by the traditional view have, though, been highlighted in some of the international coordination literature such as Meyer et. al (2002)[29], while the need to focus on the feasibility of cooperation and coordination rather than on its desirability was pointed out by authors such as Bryant (1995).

In what follows we revise some implementation issues[30] that cast doubt over the policy relevance of the traditional approach to macroeconomic policy coordination. Most of those emerge when we relax some of the assumptions of the traditional approach described in section B. It is important to incorporate these implementation issues into the analysis, as such difficulties may rule out the feasibility of a cooperative solution or lead to a welfare-decreasing result if the ex post costs of coordination exceed its benefits in terms of welfare.

### a)  The need for credible supranational institutions

The implementation of a cooperative solution in a macroeconomic policy game is probably impossible without a strong, credible, long-term political commitment such as the one that gave birth to the European Union.[31] That political commitment in Europe became institutionalized in the form of the European Commission and all its associate institutions.

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[29]  *"Each country must have the same considerable amount of information about the structure of the world economy, any shocks, and the tastes and actions of all countries. In addition, each country must use this information in a relative sophisticated way: using its own welfare function, it must calculate its optimal policy response for any given policy responses by all the other countries"* pp 13.

[30]  A fundamental problem that we will not address is the validity of an assumption of game theory models of international cooperation that countries can be modelled as "agents" that behave "rationally", maximizing their own welfare given available instruments. In this chapter, rationality will be assumed throughout.

[31]  Although necessary, it may not be a sufficient condition, as indicated by the difficulties faced by the European Union in introducing a coordinated response to the 2008-2009 financial crisis (for example in terms of bank deposit guarantees).

A strong and credible supranational institution is necessary to enforce a cooperative agreement[32] and make side payments to transfer welfare from the "winners" to the "losers" of a cooperative solution. In particular, this is important as the costs and benefits of coordination are uncertain ex ante (Ghosh and Masson, 1994) and may not accrue to the same actors, thereby requiring a redistribution effort by a supranational entity (like the Structural Funds of the European Commission)[33]. In Latin America, the large asymmetries in transmission channels indicated by MERCOSUR trade data in tables II.1 and II.3 suggest one such case where the benefits of implementing a cooperative solution in the face of a common negative shock might benefit smaller members Paraguay and Uruguay much more than Brazil.

Supranational institutions that have been delegated authority by national governments[34] may also be important in the presence of non-verifiability[35] by peers (such as other institutions or countries) of the events or reasons that may lead to a cooperative agreement being breached.[36] Otherwise, cooperative solutions are unlikely to be feasible, as individual countries have an incentive to deviate.[37]

The key point is not only that a supranational institution needs to exist for cooperative solutions to be feasible. The former also have to be strong and credible, in the sense that they can implement a cooperative

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[32]  "*Cooperation involves commitments by two or more countries to follow efficient policies. Commitment is possible when there is a supranational authority that can punish departures from announced polices so severely that departures are unthinkable*" Meyer et al. (2002), pp. 5.

[33]  "*Even where actors agree that a particular outcome would be good for everyone, differences in the magnitude of benefits and/or the distribution of costs give actors incentives to behave strategically and such behaviour in turn makes agreement on mutually beneficial actions more difficult to achieve*" Willet (1999), pp. 232.

[34]  In this book, we will refer throughout to supranational institutions in this way. For example, the European Commission is a supranational institution according to this definition, as it has the capacity to enforce policy for countries (e.g. competition policy for large firms), while the G-7 is not.

[35]  Interestingly, Ghosh and Masson (1994) (pp. 10) acknowledge the existence of the non-verifiability problem, but counter that external monitoring by international organizations might solve this problem. If addressing non-verifiability requires the capacity to force countries to reveal information, it is questionable that anything other than a strong and credible supranational institution with coercion powers can force countries to reveal true information when such behaviour is not ex ante incentive compatible.

[36]  This, for example, rules out the feasibility of "trigger strategies" like *tit-for-tat* for punishing deviation from the agreement as, in the presence of non-verifiability of domestic conditions by other governments, it may not be optimal to "punish" a country that deviates for reasons of *force majeure*, especially when punishment is costly to the punishers (and the punishment strategy is, therefore, not renegotiation-proof. See Fudenberg and Tirole, 1991, pp. 174).

[37]  For example, in the model in appendix A the optimal value from a cooperative point of view of the instrument $m_{coop}$ in equation (19) is not a Nash Equilibrium and countries individually would choose the value of $m_{noncoop}$ in equation (17).

solution. For that, a supranational institution needs political backing that is solidly based on a common view of the importance of coordination that can survive political changes in the countries of a region. In Latin America, neither MERCOSUR nor the Andean Community fulfils this requirement. MERCOSUR was designed with little supranationality in its structure, while the Andean Community in the last few years has faced the problem of strongly differing views among the member countries about important issues like trade agreements with other regions. These differences in views led to the withdrawal of the Bolivarian Republic of Venezuela from the Andean Community in April 2006, and appeared again in the form of dissent among the remaining four members in the bloc's negotiation of a trade agreement with the European Union.[38]

Alternatively to the necessity of having a supranational institution when there are side-payments needed to implement a cooperative solution, sometimes a simple agreement might suffice to implement some limited objective upon which there is consensus. That was the case with the agreement reached by the G-20 countries in November 2009 regarding their willingness to maintain expansionary monetary policies for the duration of the crisis. In such a case, international organizations like the International Monetary Fund played an advisory and support role to the monitoring of these policies, which were in the individual interest of each of the participants.

### b) Uncertainty about costs and benefits of coordination

The traditional approach implicitly assumes that the benefits of coordination ( the welfare gains of moving from the non-cooperative equilibrium to the cooperative solution) are known with certainty, and that the costs of implementing coordination are negligible or do not exist.

Most of the work to study the challenges of implementing a cooperative solution in a macroeconomic policy game has focused on the problems of measuring the benefits of coordination rather than its costs.

In the first place, some of the literature on economic policy coordination has long recognized the existence of pervasive uncertainty in the design and implementation of macroeconomic policy, and this can affect coordination efforts and complicate the estimate of the gains

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[38]   Differences of opinion among Andean countries led to the suspension by the European Commission on 30 June 2008 of the fourth round of negotiations of an Association Agreement between the Andean Community and the European Union, which was scheduled to start in early July 2008. See INTAL Monthly Newsletter No. 144, July 2008. Available at www.iadb.org/INTAL/.

associated with coordination.[39]. Authors like Darby (1986),[40] Feldstein (1988),[41] and Bryant (1995) called into question the usefulness of using the traditional approach to analyse coordination due to the existence of such pervasive uncertainty. In particular, policymakers face three types of uncertainty: uncertainty about the structure of the economy[42] (for example, about the impact of macroeconomic policy instruments on the economy), uncertainty about the true state of the world (the exact state of the cycle, given that statistical information is provided only with a lag and is often revised, both of which are unknown) and about the policy actions of other public institutions in the future (due to political preference changes). We review these types of uncertainty in more detail in chapter III.

Uncertainty might severely affect the desirability of macroeconomic policy coordination, potentially leading to welfare-decreasing decisions being made if uncertainty is overlooked. As an example of the effects of uncertainty on macroeconomic coordination, Ghosh and Masson (1994) analyse two types of uncertainty. Additive uncertainty makes reference to disturbances that impact the level of the target variables, without changing the policy multipliers, while multiplier uncertainty refers to the uncertainty surrounding the impact of policy instruments on the economy.[43] For additive uncertainty, the classical reference in the economic literature is Poole (1970). See appendix B for how additive and

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[39]   In terms of the importance of uncertainty in terms of affecting the feasibility of the *traditional view* of policy coordination, according to Bryant (1995): "*The fundamental obstacles to feasibility are various types of uncertainty. In real-life circumstances, policymakers and analysts in a "home" nation are uncertain about (a) the current positions of the home and foreign economies – the so-called initial conditions and shocks that are currently buffeting those economies; (b) the objectives and intentions of policymakers in other national governments – the loss functions that guide the policymakers' decision; and (c) the actual functioning of the world economy, including especially the ways in which policy actions themselves influence the home and foreign economies*" pp. 425.

[40]   "*I see little relevance of the game –theoretic analysis to a world in which policymakers cannot agree on the causes of the current values or the effects of specific policy actions either domestically or internationally*" pp. 548; "*It is at best a second-order question how alternative forms of international coordination effect the transmission process, but even that question cannot be addressed in game-theoretic models which presuppose a known, fixed structure of economic cause and effect*" pp. 549. It is perhaps not surprising that this paper has been quoted very little by the traditional coordination literature.

[41]   "*Uncertainties about the actual state of the international economy and uncertainties about the effects of one country's policies on the economies of other countries make it impossible to be confident that coordinated policy shifts would actually be beneficia*l" Feldstein (1988), pp. 10.

[42]   This type of uncertainty includes model uncertainty. As Willet (1999) states: "*Not only do economists' views of the appropriate model to optimize often differ widely, the range of views of policy makers is, if anything, even broader. For evaluating the consequences of policy actions it is the "true" model that counts, but for predicting policy actions it is the policy makers' ideas that are relevant.*" pp. 222.

[43]   In the model from appendix A, additive uncertainty affects the shocks $u$, $v$ and $w$, while multiplier uncertainty affects $\alpha, \beta, \eta, \phi$.

multiplicative uncertainty can be introduced into the Ghosh and Masson (1994) model. Appendix B shows how additive uncertainty about a macroeconomic shock (in this case, a common inflationary shock) to the economy of a country leads to a "non-cooperative" result that is Pareto-inferior to the "non-cooperative" result in the absence of uncertainty.

The uncertainty surrounding policy multipliers can also severely affect welfare of the coordination game. Brainard (1967) carried out the seminal work on the importance of multiplier uncertainty for policymaking. That author's analysis for closed economies, extended by others since then, has provided support for claims in favour of moderate policy responses to shocks in the presence of uncertainty. Appendix B also shows how the introduction of multiplicative uncertainty into the Ghosh and Masson (1994) model leads to equilibrium policy stances that generate lower welfare than in the absence of such uncertainty.

Therefore, this limited incorporation of uncertainty about the benefits of the cooperative solution shows that increased levels of uncertainty surrounding policy multipliers and future values of shocks to the economy lead to non-cooperative Nash Equilibria that are Pareto inferior to the results without uncertainty. This also means that, if the expected benefits of implementing a cooperative solution in the absence of learning are not large ex ante, uncertainty may wipe out those benefits, and ex post a cooperative solution may be welfare-decreasing in the presence of even moderate implementation costs.

Let us now briefly turn to the issue of the costs of implementing coordination. The costs correspond to efforts required to agree on, implement and monitor a cooperative solution. Without sufficient theoretical and empirical analysis about the difficulties (i.e. costs) of implementing MPC, it is difficult to conclude that coordination is Pareto-improving: if potential gains from moving to the cooperative solution from the non-cooperative Nash equilibrium are small and uncertain and the costs of implementing the former are non-zero and uncertain ex ante, this might not be the case. While such disregard for the implementation hurdles to be surmounted by macroeconomic coordination may render coordination even among developed countries with substantive interdependencies unattractive, *a priori* it can be argued that the problem may be especially problematic for developing countries where interdependencies are small due to limited financial links and scarce intra-regional trade.

### c) Is the monolithic view of government as a rational player satisfactory?

An important source of difficulties in implementing coordination is the fact that governments seldom behave as a monolithic entity.

Normally, game-theoretic analysis of coordination assumes that complex interaction taking place within governments can be ignored by simply assuming that those interactions lead to the existence of a "composite" decision-maker,[44] who has a certain well-defined (known) payoff function resulting from the mentioned interaction.[45] As has been recognised in the literature on economic relations (Bryant, 1995, Ghosh and Masson, 1994; Tanzi, 2006) and international relations (Mooslechner and Schuerz, 1999; Putnam, 1988), this ignores the complexities of political bargaining that takes place in a certain country and that might make or break an international coordination effort.[46] As Tanzi (1988) points out, this may be particularly important for the coordination of fiscal policy, as control over fiscal policy by the Executive (which would arguably be in charge of negotiating and implementing a cooperative coordinated solution with other countries) is at best tenuous in several countries, including the United States. The diverse views of policymakers deciding on monetary policy in some Latin American countries can also readily been seen by reading the records of central bank board meetings of those countries.[47]

In the international relations literature, Putnam (1988) addresses this issue by introducing two-level games, which combine the game among different governments, on the one hand, and the game of the governments with their different internal interest groups, on the other.[48]

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[44]  In the words of Mooslechner and Schuerz (1999), "*Each national government is a unitary decision-making agent who acts in a strategic way according to its interests which are biased towards domestic welfare. [...] The policy-optimizing approaches rest on rational choice assumptions and on the hypothesis of a unitary-actor*" pp. 176. Furthermore, Bryant (1995) cautions that "*If taken literally, the assumption of a national loss function assumes that each national government behaves as if it is a unitary actor with a capacity unambiguously to rank alternative outcomes and to make rational choices among them*", footnote 14, pp. 405, and further: "*In all nations, the ship of state has many captains, and policy decisions are far from fully integrated. With a multiplicity of domestic agents pulling and pushing against each other, it requires a big stretch of the imagination to see the national government as a unitary actor with a well-defined national loss function*" pp. 419.

[45]  As pointed out by Eichengreen (1998) "*…the institutions that aggregate interest group pressures at the national level drop from sight when attention turns to the strategic interaction of governments*" pp. 1001.

[46]  "*…theoretical models of coordination. These papers assume that each government's preferences of macroeconomic outcomes can be adequately captured by an objective or welfare function. […] In the real world, however, […] it is hard to identify governments 'true objective functions; in fact, policymaking in all countries usually represents an aggregation of various views with weights that shift over time*" Ghosh and Masson (1994), pp. 2.

[47]  For example, see www.banguat.gob.gt/publica/conferencias/cbanguat158.pdf.

[48]  "*The politics of many international negotiations can usefully be conceived as a two-level game. At the national level, domestic groups pursue their interests by pressuring the government to adopt favourable policies, and politicians seek power by constructing coalitions among those groups. At the international level, national governments seek to maximize their own ability to satisfy domestic pressures, while minimizing the adverse consequences of foreign developments*" Putnam (1988), pp. 434.

That author makes two interesting points that impinge on the validity of coordination analysis using the traditional approach and ignoring the within-country dimension of the analysis. The first point is that the range of outcomes that is "feasible" is limited ex post by binding domestic (political, institutional) constraints in the participating countries, and that ignoring those constraints can hinder coordination.[49] For example, an attempt to internationally coordinate fiscal policy that requires one country raising taxes or lowering expenditure over a period of time may be rejected ex post by parliament in that country,[50] breaking a previous international agreement. In the second place, the author suggests that, due to the internal heterogeneity of a country, "aggregated" preferences (the result of aggregating all domestic interests to obtain the "national" utility function) might change during the course of international negotiations as a result of them. He terms this "reverberation".[51] If that were to be true, and if preference changes are significant (or coordination outcomes are not robust to small preference changes), using the traditional approach to model international policy coordination might be misleading,[52] especially for interactions over extended periods of time. Therefore, acknowledging that within-country negotiations might result in unstable preferences that are very difficult to model deals a serious blow to the possibility of implementing a cooperative solution that is dynamically stable (sustainable over time), and also complicates the capacity to implement a Pareto-superior non-cooperative Nash equilibrium in the presence of multiple equilibria.

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[49]  Putnam (1988) calls this "involuntary defection", when an international agreement is rejected by one or more of the constituencies of the participating countries. In practice, the existence of binding domestic political constraints might be difficult to verify even ex post by an outside observer, whether defection is involuntary or not.

[50]  One hypothesis is that the action set used by the Executive carrying out coordination with other countries ex ante may be different from the one ex post, for example, due to imperfect observability of the latter as it is a function of an unobserved variable like future political strength of a party.

[51]  "*In some instances, perhaps even unintentionally, international pressures "reverberate" within domestic politics, tipping the domestic balance and thus influencing the international negotiations*" pp 454. As one possible source of reverberation he mentions "cognitive factors and uncertainty": "*It would be a mistake for political scientists to mimic most economists' disregard for the suasive element in negotiations. Given the pervasive uncertainty that surrounds many international issues, messages from abroad may change minds, move the undecided, and hearten those in the domestic minority*" pp. 455.

[52]  Putnam (1988) also reaches a similar conclusion: "*The phenomenon of reverberation […] precludes one attractive short-cut to modeling two-level games. If national preferences were exogenous from the point of view of international relations, then the domestic political game could be molded separately, and the "outputs" from that game could be used as the "inputs" to the international game*" pp. 456.

Note that this open question about the policy relevance of the monolithic view of government as a single rational entity affects any analysis of coordination using game theory. For example, when the non-cooperative solution is not unique and government preferences are not ex ante clear due to internal diversity of opinions, it may be difficult to justify the use of coordination devices for a Pareto-superior result to emerge.[53]

### d) Action sets: definition and homogeneity issues

Another difficulty of coordination stems from the assumption by the traditional approach that, while the payoffs to policymakers of adopting a certain action might be different for individual policymakers, the action set available ex ante is the same. In other words, governments have access to the same policy tools in different countries.

According to Rasmusen (2001), the action of a certain player (such as a policymaker) is a choice that the latter can make, while the action set is the whole set of actions that are available to the policymaker. Therefore, adopting an action involves choosing from those available.

The first point that emerges is that defining the action set is important for macroeconomic coordination models, especially in the case of fiscal policy. The issue is that actions available to the authorities in the real world are not lump-sum expansions or tightenings of the fiscal stance. Real-world policymaking involves using complex tools like budgets, tax reforms, extraordinary expenditure bills, and so forth, as the way in which the fiscal stance is altered. The key element is that the fiscal policy stance is not the action itself, but the (uncertain) result of an action taken by the fiscal authorities. For example, an income tax reform that leads to an overall revenue increase (and therefore, a fiscal tightening) might have several characteristics and ways of implementing it. Therefore, the action set of a group of countries may be heterogeneous due to the incapacity of certain countries to use some of those complex tools to achieve a certain policy stance. Potential reasons for this include the knowledge or human resource requirements of implementing some of those tools, political economy restrictions due to distributional or allocation effects of adopting some policy tools or lack of familiarity with the characteristics (form, requirements, cost and so on) of the policy tools in question on the part of domestic officials.

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[53]   See Cárcamo-Díaz (2005) and the references therein for a discussion of games with multiple non-cooperative solutions and possible coordination tools. See Cárcamo-Díaz and Goddard (2008) for a description of the coordination game played by South American countries within the framework of the Initiative for Infrastructure in South America (IIRSA).

Secondly, and even if the distinction between fiscal tools and fiscal policy stance (i.e. between tool and result of using the tool) were not important,[54] in international macroeconomic policy coordination games, coordination may not be possible if countries are not free to choose the fiscal or monetary stance that they consider to be optimal.

In Latin America, fiscal policy choices are restricted for at least three reasons. First, many Latin American countries have a high degree of budget rigidity, with a substantial proportion of income allocated by law (or the constitution) to specific uses or with a large proportion of expenditures that are difficult to reduce in the short term (such as public wages). Cabrera and Fuentes (2009) find evidence of this for Guatemala, Honduras and Costa Rica, where using 2006 data they find rigidity coefficients of over 100% of current income.[55] Second, while the debt position of Latin American countries improved significantly as a percentage of GDP between 2003 and 2009,[56] (see figure II.1), Non-Financial Public Sector gross debt levels continue to be significant in many countries. Third, several countries in the region, especially highly indebted poor countries (HIPC) like Honduras and Nicaragua, have an important perceived "social debt", with excess demand for basic public services and relatively low fiscal revenue as a percentage of GDP. All three reasons, to different degrees, work to restrict the capacity of fiscal policy to be used as a tool that can be internationally coordinated.

Similarly, in the conduct of monetary policy there are limitations to its use for international coordination purposes. Even without looking into the issue of whether a country pursuing a domestic inflation target can engage in international macroeconomic coordination,[57] the fact that several countries have exchange rate regimes that limit the capacity to conduct monetary policy limit the action set of countries willing to coordinate their monetary policy stances. In particular, countries with pegged regimes (hard or soft) or crawling pegs have few (or no) degrees of freedom for using monetary policy in an international coordination

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[54] This assumes that policymakers can use fiscal policy as an instrument that can be adjusted to obtain any desired fiscal stance in the face of shocks

[55] *"The three considered countries showed during 2006 fiscal rigidity levels higher than their current income. Therefore, they had to use resources from internal or external debt issuance to cover the remaining expenditures related to the rigidities and to make other expenses non subject to those. [...] In all cases, the rigidities are due to constitutional reasons, legal norms, contractual agreements and economic reasons"* Cabrera and Fuentes (2009) pp. 343.

[56] This, in spite of the increase in public indebtedness during 2009 vis-à-vis 2008 due to the international financial crisis and the resulting expansion in public deficits across the region.

[57] In those cases, the building of credibility by the central bank is based on a transparent commitment to the attainment of low and stable inflation in the medium term, following certain rules. The use of monetary policy in a non-transparent international coordination exercise may potentially reduce that credibility.

exercise, ceteris paribus. For example, in Latin America at the end of 2008
Ecuador, El Salvador and Panama had the United States dollar as their
official (de jure) currency, while the Bolivarian Republic of Venezuela had
a fixed exchange rate, Nicaragua and Bolivia had crawling peg regimes
and Honduras had a de facto fixed exchange rate.

Figure II.1
NON-FINANCIAL PUBLIC SECTOR DEBT IN LATIN AMERICA, 2003-2009
*(Percentage of GDP)*
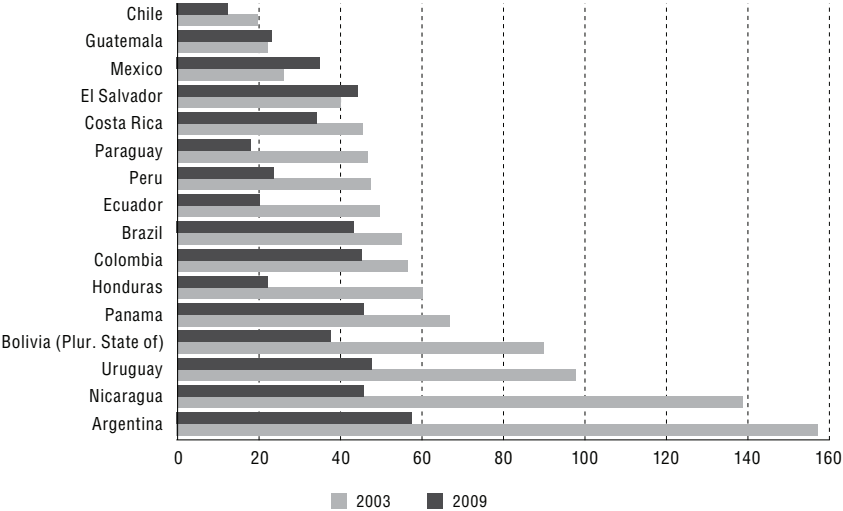


Source: Economic Commission for Latin America and the Caribbean (ECLAC).

Chapter III

# Macroeconomic policy cooperation as social learning in networks

## A.    A different approach to policy cooperation

In chapter II, we pointed out that the traditional approach to policy coordination among developed countries (see, for instance, Currie and Levine, 1993) has three important characteristics. First, it justifies the need for macroeconomic cooperation on the basis of perceived price and quantity interdependences and spillovers from policies among developed countries. Second, it focuses on estimating the potential gains of achieving a cooperative solution where welfare is jointly maximized, generally ignoring the difficulties/costs in implementing it. Third, the traditional approach uses a series of strong assumptions in its modelling of country interaction, presented in chapter II (in other words, countries (or government institutions) acting as monolithic rational players; action sets used by agents being homogeneous enough to allow coordination and so on).

In the previous chapter, we also presented some data suggesting that bidirectional interdependencies among Latin American countries (especially in South America) may still be small due to limited intraregional trade, while there are substantial open questions about the feasibility of implementing macroeconomic policy cooperative solutions once one starts looking into the multiple implicit assumptions imposed by the "traditional view".

In the light of the above, it is useful to ask three questions:

- Assuming that only weak real-world channels for spillovers exist (such as intra-regional trade with value added), and rejecting the validity of the assumptions of the traditional view about macroeconomic coordination, is there a role for international macroeconomic cooperation?

- If international macroeconomic cooperation were found to be potentially useful, how could it be modelled? and

- What is the role of international organizations in fostering such cooperation?

In this chapter we will attempt to answer these three questions.

In a context where the implementation of macroeconomic policy is contingent on uncertain elements like the state of the economy and a model that optimally reflects its true structure, policymakers carry out significant efforts to address pervasive uncertainty in their recurrent work. This involves, inter alia, learning from their own conduct of policy. However, as other policymakers are simultaneously trying to address similar issues in their own policymaking efforts, there is an informational externality from such domestic isolated policy-making efforts that provides incentives for increased international cooperation among policymakers. In particular, public institutions can learn from others in order to improve their own policymaking.

However, in order to learn, institutions need to dedicate resources to the learning process: the acquisition of knowledge can be a costly activity. For example, officials learning about the net value of a new policy instrument need to dedicate time (which has a significant opportunity cost for senior officials, especially in small and poor countries) to the analysis of the potential consequences of adopting such a measure. In the case of learning from others, the difficulty of transmitting and receiving information is a very important issue. For example, the need to convey and receive information that is difficult to codify (for instance to be published in a journal, press statement or position paper) may require direct contacts between policymakers. Those direct contacts, if repeated over time so as to generate links among the different institutions, can be modelled as interactions within a learning network.

We conclude the chapter by presenting a model of how such learning networks can contribute to learning by helping national policymaking institutions to choose optimal actions in the long run, and by discussing further some of the implications of the model and its limitations.

## B.   Uncertainty and policymaking

Policymakers face an environment where uncertainty is the rule rather than the exception (Blinder, 1997; Greenspan, 2004). Despite that, policy still has to be decided and implemented in such an environment on a regular basis.

While a detailed discussion of the different ways in which uncertainty can affect macroeconomic policy is beyond the reach of this chapter,[1] it is important to highlight the importance of uncertainty for the conduct of monetary and fiscal policies. Dow (2004) presents an interesting discussion of the different views and types of uncertainty, seen from the Keynesian tradition's viewpoint. There is also an extensive literature about uncertainty and the conduct of monetary policy (Conway, 2000; Goodhart, 1999, Greenspan, 2004; Sims, 2008). According to the economic literature, the types of uncertainty faced by policymakers can be classified into four.[2]

The first type of uncertainty faced by policymakers is around the state of the economy both now and in the future. Uncertainty about the <u>current</u> state of the economy stems from two sources. The first source is that the data available for analysis are only an imperfect approximation to important macroeconomic constructs monitored by policymakers such as Gross Domestic Product. The quality of the data[3] used and the fact that early estimates do not coincide with later estimates of the variables (as additional information is incorporated) are both sources of uncertainty at the ex ante stage of policymaking. The second source is the complexity of calculating some necessary indicators of the state of the economy. There are several possible ways of calculating trend GDP,[4] the NAIRU[5] or equilibrium real interest rates. The uncertainty about the state of the economy in the future refers to the difficulty of predicting future shocks. The size, duration, sign and probability distribution of these future shocks are uncertain *ex ante* at the time of taking policy

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[1]   There is an extensive and growing literature addressing the challenges faced by policymakers that have to conduct macroeconomic policy under uncertainty. For example, on the challenges faced by monetary policy see Conway (2000), Dow (2004), Goodhart (1999) and Sims (2008).

[2]   ECB (2001) also includes uncertainty about the response of the private sector to a policy change. However, that type of uncertainty can be understood as being part of the uncertainty about the structure of the economy.

[3]   There is plenty of anecdotal evidence about this point, at least for developing countries in Latin America, where available resources for the production of statistics are often found wanting in several countries.

[4]   For example, different filters may be used on data to separate "trend" from "cycle".

[5]   Laubach (2001) presents estimates of the NAIRU for seven industrial countries and discusses some methodological issues involved in its measurement.

decisions (Conway, 2000). In chapter II and appendix B, we referred to Ghosh and Masson's (1994) "additive uncertainty" as uncertainty about the size of a future[6] shock, for which the distribution function is supposed to be known *ex ante* by all policymakers. Additive uncertainty is often assumed to be unimportant within the economic literature, on the basis that there is no uncertainty about the relationship between the structure of the economy and macroeconomic policy, as in that case the "certainty equivalence" principle[7] holds.

The second type of uncertainty is uncertainty about the structure of the economy. In the economic literature (for example, ECB, 2001), this type of uncertainty is often divided into two parts. In the first place, policymakers cannot identify with certainty which model most accurately describes a country's economy. This type of uncertainty is known as "model uncertainty", which Bryant (2005) terms "*the single greatest impediment to sound policymaking within national governments*".[8] Along these lines, Blinder (1997) not only states his belief that "*no one knows the "true model" of the economy*", but also claims that at the Federal Reserve, "*no effort is ever made to reach consensus on the model of the economy*".[9] Brock, Durlauf and West (2003) and their commentators Leeper and Sargent (2003) present an interesting discussion of policy evaluation in the presence of model uncertainty, including a discussion about the negative effects of ignoring model uncertainty in monetary policymaking. In the second place, even if the "true" model (namely the one that most accurately models the functioning of the economy) were known, policymakers may still face uncertainty about the parameters of that model. This type of uncertainty is known as "parameter" or "multiplicative" uncertainty.[10] A seminal contribution about this type of

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[6]   The shock is "future" in the sense that it can only be measured *ex post*. An alternative view of the shock, which is the one in Poole (1970), is that the shock occurs today, but the data measuring it have a lag: "*The stochastic terms in the model may be interpreted as arising from a one-period lag in data availability on the level of income. If income data were available instantaneously, then random disturbances would show up immediately in terms of their effects on income, and the policy instrument could be adjusted accordingly, assuming, of course, that policy actions took effect instantaneously. But if information on the goal variable becomes available with a lag, the instantaneous feedback principle is no longer applicable, and it is necessary to think of the goal variable as being a function of the instrument.*" Poole (1970), pp. 207.

[7]   This means that the loss function that the central bank is trying to minimize is quadratic and that the model is linear. For example, see Blinder (1997).

[8]   Bryant (1995), pp. 428.

[9]   Both claims appear in Blinder (1997), pp. 8.

[10]  Goodhart (1999) in footnote 1, page 109, shows a simple example of the difference between measurement error and parameter uncertainty.

uncertainty is Brainard (1967).[11] In appendix B we reviewed the effects of uncertainty about the parameters of the model of the economy used by the authorities on a simple theoretical model of policy coordination.

The third type of uncertainty refers to the uncertainty surrounding the action set of each policymaker, particularly in the case of the fiscal authorities. While in New Keynesian macroeconomic models like Clarida, Galí and Gertler (1999) monetary policy involves a choice of a value for the policy instrument (such as the policy interest rate), discretionary fiscal policy is often represented as a shift in aggregate demand brought about by an exogenous change in government expenditure or on taxes (Romer, 2000; Taylor, 2000). Therefore, the action set for monetary policy policymakers during "normal" times is the series of values that the instrument (the interest rate) can take. However, under some circumstances (like the 2008-2009 global financial crisis), central banks may have incentives for adopting new policy tools, as indicated by the experience of the Federal Reserve[12] in 2008-2009. In the case of fiscal policy, policymaking issues are normally quite complex. Often, changes to public expenditure or revenue require the fiscal authorities to use complex policy instruments like budget-making, tax reforms and the like. Modifications of expenditure or revenue are the result of the use of these tools by fiscal policymakers and the ex post net results[13] of using such instruments may be ex ante uncertain (for example, the effect of a tax reform or a tax amnesty).

Also, using fiscal tools not only results in modifications in revenue or expenditure, but (depending on the instrument) may also have important allocation effects (benefiting some productive sectors and harming others) and distributional effects (benefiting some groups of the population, present or future, and harming others). That is, the results of using fiscal tools are multi-dimensional and exceed revenue and expenditure. If the effects on dimensions other than expenditure or revenue (such as inequality) are also ex ante uncertain, and those dimensions enter into the welfare functions of fiscal policymakers, the

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[11]  See also Brock, Durlauf and West (2003), pp. 256 – 258.

[12]  In order to increase the access of financial institutions to adequate liquidity during the 2008-2009 crisis, the Federal Reserve started using new tools like the Term Auction Facility, the Term Securities Lending Facility and the Primary Dealer Credit Facility, as well as introducing new rules for the use of existing tools like facilitating access to the discount window for institutions in need of liquidity. See the remarks by Federal Reserve Chairman Bernanke at the Federal Reserve Bank of Atlanta Financial Markets Conference in Sea Island, Georgia, on May 13, 2008.

[13]  The net results of using a certain tool also include the cost of using it. Even if the state of the world and the structure of the economy (including the behaviour of private sector agents) are perfectly known, the net results of using a new policy may be uncertain ex ante if the difficulties and costs in terms of human resource use, institutional changes necessary and so forth are uncertain.

uncertainty of using complex fiscal instruments may be enhanced. A similar case can be made with the tools at the disposal of the central bank for modifying the exchange rate (including sterilized intervention in the foreign exchange market and restrictions to capital inflows, regulations affecting the transaction costs of assets): the net results (which are often also multidimensional) may be ex ante uncertain.

The fourth type of uncertainty is special, because it is endogenous to the public sector. This refers to the uncertainty about the future actions of different public institutions, that is, within-government action uncertainty. This uncertainty is important in a forward-looking policy context (due to the existence of lags), as policymakers setting monetary and fiscal policy instruments today try to estimate future behaviour of the other public institutions setting policy. This type of uncertainty is different from the above-mentioned uncertainty about future shocks to the economy, and from uncertainty about the structure of the economy, as it is endogenous to the government. In particular, while the "strategic" uncertainty about the future behaviour of the private sector may be included into the uncertainty about the structure of the economy, that the same should not be applied to within-Government strategic uncertainty. The distinction between the two is that the degree of coordination between government agents is endogenous, and an important area of policy work (actual or potential) for developing countries. One of the main forms of this type of uncertainty emerges from the interaction between a central bank and the authorities setting fiscal policy, in particular when future preferences of the authorities choosing fiscal policy are not easy to ascertain ex ante (for instance, the level and composition of public expenditure chosen by the next government may be uncertain, even in the absence of shocks). In the economic literature, there has been a recent revival in the study of the implications of coordination between monetary and fiscal policy (see Leitemo, 2004; Hughes-Hallet, 2008).

Let us now discuss some examples of how these types of uncertainty impact macroeconomic policymaking.

In the first place, if the true state of the economy is highly uncertain, fiscal or monetary policy that is intended to be counter-cyclical may end up exacerbating the cycle. This is particularly challenging when the implementation lags of macroeconomic policy are long, as is the case for both fiscal policy (Taylor, 2000) and monetary policy (Blinder, 1997). Some recent empirical work carried out for developed countries (Bernoth, Hughes Hallet and Lewis, 2008, use data for OECD countries) also indicates that studies that found fiscal policy to be acyclical or pro-cyclical (such as Galí and Perotti, 2003) using ex post data can be reinterpreted when using real-time data. As policymakers decide on

discretionary fiscal policy on the basis of available information at the time of the decision, a finding that fiscal policy for OECD countries was pro-cyclical[14] using data that is only available ex post, in some cases only years later, may be misleading. Bernoth, Hughes Hallet and Lewis (2008), using real time data, found that fiscal policy was intended to be counter-cyclical, and that the pro-cyclical nature of fiscal policy observed using ex post data may be due to the errors in estimating the future evolution of key variables such as GDP (current and future) and trend GDP. An additional problem pointed out by Solow (2005) is that fiscal policy, unlike monetary policy, cannot easily correct, at the implementation level, an incorrect estimate as new information arrives during the budget execution period.

In the second place, monetary policy, which is forward looking, is negatively affected by model and parameter uncertainty. In order to better attain its objectives, monetary policy needs information in order to form beliefs (often incorporated into macroeconometric models of different types) about the connections between instrument changes (such as changes in the interest rates) and outcomes such as output and inflation.[15] The need to conduct monetary policy that is robust to this type of uncertainty has given rise to an extended literature that looks at the construction of robust monetary policy rules (see Hansen and Sargent, 2000; Orphanides and Williams, 2007).

Cobham (2003) looks into possible reasons why the Bank of England has a tendency to "smooth" instrument interest rates over time, carrying out mainly small adjustments in any one direction, with few reversals of direction. By examining the minutes of the Bank authorities over time, the author finds that the main reason for the smooth adjustment of rates is the way in which beliefs of the Monetary Policy Committee became updated as new information arrived: as the Committee members became more convinced of a deteriorating (improving) state of the world, interest rates were cut (raised). Cobham (2003) also finds that the Monetary Policy Committee, in 11 out of 23 minutes, mentions the need to wait for (imminent) information to reduce uncertainty, adding further to the importance of uncertainty as a factor affecting belief formation for the conduct of monetary policy.

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[14]  Galí and Perotti (2003) find that "…*EMU countries' fiscal policy in the pre-Maastricht period seems to have been significantly procyclical, a feature that largely disappears during the post-Maastricht period*", pp. 536.

[15]  Andrews and Willett (1997) argue that the combination of theoretical and empirical research with the stagflationary experiences of the 1970s led to a fundamental change in perceptions about the ultimate utility of expansionary macroeconomic policies in the middle and long terms. This reflected better knowledge of the true underlying structure of the world economy.

In the third place, uncertainty about the value of a complex policy tool may lead to policy choices that are perceived (beliefs) as "safer", despite being welfare-inferior. For example, if the costs and benefits of implementing a tax policy reform proposal are very uncertain, the reform may not pass. This is particularly relevant for developing countries, where public revenue is a small percentage of GDP.

Finally, within-government uncertainty, emanating from lack of coordination among government entities, failures of communication and so on, may also lead to welfare-inferior results. This might be particularly serious if it leads to "fiscal dominance" in the conduct of monetary policy, thereby leading to higher inflation.

## C.    Addressing uncertainty

Policymakers constantly work to reduce the uncertainty surrounding their decision-making. In particular, central banks devote considerable resources on a constant basis to address uncertainty about the state of the economy and about the structure of the economy, in different ways.

In the first place, central banks use significant amounts of resources in order to improve the collection and compilation of relevant economic statistics, in order to reduce measurement error of real-world variables. In Latin America, the combination of this effort with other factors may have contributed to the fact that central banks in the region are in many cases important producers of statistics. In this region, the fact that central banks sometimes enjoy larger amounts of independence from political power, that they also often face softer budget constraints, and institutional weaknesses in other government institutions may have contributed to this de facto significant role in the elaboration of statistics.

In the second place, central banks often try to implement monetary policy in ways that are robust to uncertainty about the model of the economy (Hansen and Sargent, 2000) and uncertainty about the state of the economy (Orphanides and Williams, 2002). For example, robust control theory is a tool used by authors like Sargent (among others) to improve the capacity of monetary authorities to conduct monetary policy under conditions of model uncertainty. According to Dow (2004), these models have the advantage of mathematical tractability, but at the cost of arbitrarily constraining the "extent" of uncertainty they consider. As pointed out by McCallum (1999), lack of agreement about the "appropriate" specification of models used for monetary policy, and in particular about the dynamic connection between monetary policy decisions and real responses by economic aggregates is one of the main difficulties faced by monetary policy. Sims (2008) proposes that,

in order to address specifically model uncertainty, the models used by central banks should be probability models in the sense that they should characterize the probability distribution of observations. The author believes that such a practice could allow model comparison based on observed data. Among other recommendations, Sims advocates the adoption of modern Bayesian methods in modelling, in order to better incorporate "judgement"-based adjustments to models.[16] Brock, Durlauf and West (2003) propose that the method of averaging models may be a way of getting around the serious problems for policymaking brought about by model uncertainty. All in all, there is an extensive literature on these issues,[17] a review of which is beyond the scope of this paper.

In the third place, central banks and Ministries of Finance try to learn from the experience of conducting monetary and fiscal policy, respectively: an "on-the-job" learning effort by experimentation that goes beyond looking for "robust rules". In practice, policymakers go beyond the adherence to simple rules, using "judgement" in order to decide on policy. This has been widely documented in the cases of the central bank of the United Kingdom and the European Central Bank.[18] As policymakers face real world uncertainty about the outcomes of choosing one action from a set of several possible ones, "judgement" implies forming expectations about the possible outcomes associated with these actions, and policymakers will learn (or modify their prior expectations) from observing the outcomes of previous actions taken.

Different models in the economic literature of learning assume different degrees of forward-looking behaviour by learning agents, where the upper bound is the fully optimizing agent.[19] Non-fully optimizing agents do not experiment in a rational way, although they use the experience of the past to build a belief that is used to maximize the current period's utility. The fully optimizing agents instead take into account the effect that their choice of action today will have on the future stream

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[16]   "*More commonly, judgement influences projections by bringing in expert knowledge of current information that does not show up in the model's data series. […] The judgemental information is naturally characterized as beliefs, with specified precision, and Bayesian inferential methods provide a clear method for combining such information with information that emerges from observed data*" Sims (2008), pp. 2468.

[17]   See an interesting discussion about the subject in Dow (2004). The literature on robust monetary policy conduct has exploded in recent years, in parallel with the increasing acknowledgment of the importance of uncertainty for policymaking. See Hansen and Sargent (2000) and the references therein.

[18]   For example, see ECB (2000) for the two "pillars" used by the ECB to conduct monetary policy .

[19]   See Wieland (2000) for an explanation of how a fully optimizing policymaker maximizes the discounted sum of expected current and future rewards, where the expectation is about current and future beliefs, which change over time because future actions affect them. Chamley (2004), chapter 9, presents a simple example of this problem.

of payoffs via the change in beliefs that will result from today's action. Therefore, learning from one's own actions is costly for fully optimizing policymakers: if they want to "learn" the (stochastic) outcome of a certain policy stance, they need to "pay the price" of potentially adopting a policy stance that may turn out to be ex post Pareto-inferior to actions with known distribution functions of outcomes. Therefore, policymakers face a trade-off between choosing the policy stance with the highest known expected payoff and experimenting with a new policy stance. This type of problem is known as a "bandit problem" [20] in the literature (Wieland, 2000; Easley and Kiefer, 1988). A $k$-armed bandit[21] problem is a sequential decision problem where, in each subsequent period, an agent faces $k$ possible actions from which to choose. Choosing action $i$ produces an observation, which not only is the "reward" for the action, but also can give the agent information about future choices among the $k$ available actions. The objective of the agent is to maximize the present value of the stream of "rewards" received from choosing an action in each period. Each action (or arm of the bandit) produces an ex ante unknown payoff and the agent does not know which action produces the highest average payoff. By playing the different available actions, the agent can obtain information about which action is "best" (given the state of the world). As the observations from each action are the "rewards" for the agents, they need to balance the rewards obtained from the different actions with the information they obtain from choosing different actions.

However, policymakers are not alone in their efforts to learn, as other policymakers also carry out policy that result in actions and outcomes observed, which can contribute to the learning efforts of policymakers who observe the results. In this way, "learning from others"[22] complements[23] the experience of any country trying to estimate the same unknown state of the world, to learn something about the structure/behaviour of its own economy, and about the net benefits of

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[20]   The earliest economic papers on bandit problems (and a classic reference) we find Rothschild, M. (1974), "A Two-Armed Bandit Theory of Market Pricing", *Journal of Economic Theory* Vol. 9, pp. 185 – 202.

[21]   A k-armed bandit is a slot machine that has k arms.

[22]   The term may have been coined by Foster and Rosenzweig (1995) in their analysis of technical change in agriculture. I use this term to describe learning rather than the more frequent term "social learning" due to the normal association of the latter term with Bayesian learning under full rationality. The literature on social learning is extensive. See Banerjee (1992) for a seminal paper on the subject, Gale (1996) for an early survey and Chamley (2004) for a book-sized treatment. An alternative term proposed by Gale and Kariv (2003) for learning from others assuming bounded rationality is "social experimentation". See footnote 82.

[23]   Bolton and Harris (1999) examine the case of strategic experimentation where, in order to evade the costs of experimentation, under certain conditions policymakers may be willing to observe others rather than carry out a costly experiment.

adopting a new complex policy tool (such as a new type of income tax or budget procedure). Later on, it will be shown that "learning from others", when implemented within a structured learning network, becomes "cooperation for learning".

The reasons for learning from others as a complement to individual learning efforts are twofold. First, the observation of other agents allows policymakers to obtain additional signals about the optimal action to adopt, in the light of:

- an unobservable "state of the world", which conditions the stochastic payoffs of choosing different policies;

- an unobservable (and changing) structure of the economy, including both relevant variables and parameters; and

- the existence of complex policy tools, especially for fiscal policymaking, for which ex ante net benefits are uncertain, even adjusting for the state of the world and the structure of the economy.

Second, the institution designing and implementing policy might face binding constraints in its capacity to carry out costly experimentation, especially in the case of introducing new methods and policies. There are potentially many reasons for this, including administrative weaknesses, financial and human resource constraints and political considerations. If the cost of processing a signal observed from others is smaller than generating that signal internally, learning from others might be efficient.[24]

## D.    International cooperation in networks

Cooperation among policymaking institutions (in order to learn) appeared in Cooper (2005), in his description of the possible ways in which central banks might cooperate. Specifically, Cooper lists six possible types of cooperation:

a)    To exchange information, providing basic facts of each major national market on outstanding credits, new borrowings, central bank regulations and the like.

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[24]    As an example of a binding constraint for learning by experimentation, consider a central bank whose policy decisions are influenced by sectorial interests and political concerns. In the face of a negative supply-side inflationary shock of unknown duration, such a central bank could be less willing to raise interest rates aggressively to maintain private-sector expectations anchored, as the cost of increasing the output gap may be higher due to the above-mentioned political economy constraints.

b)      Closely related to a), to fill gaps in statistical information by including data that benefit from cross-checking with sources in other countries (such as foreign credit).

c)      To exchange views about "how the world works", and on objectives of central bank policy.

d)      To exchange information on the economic outlook, that is, not on facts, but on perceived short- and medium-run prospects.

e)      To standardize concepts and regulations, adjusting the information collected according to needs so that it can be directly compared and is as complete as is required for central banks to operate.

f)      To agree on actions.

The first five ways of cooperating described by Cooper (2005) fit within our analysis of cooperation among authorities for the purposes of learning and addressing the effects of uncertainty on policymaking. However, we also need to specify is the way in which policymakers from different institutions connect to each other.

In the recent past, the communications and information technology revolutions that have been associated with globalization have resulted in significant reductions in the cost of accessing data and information, thus placing the latter within the reach of policymaking institutions at very low cost. Therefore, one might be tempted to simply assume that the learning effort could be limited to monitoring data, publications, news, and other publicly available material regularly collected and analysed by the staff of a national policymaking institution for use by their policymaking authorities, in the form of reports or as an input fed as data or assumptions into the macroeconometric models used to inform the policymaking process of the institution, However, obtaining data or information from others in this way, while very useful, is only part of a learning process.

In particular, some types of learning from others require the specific dedication of resources to creating costly links with those others. One reason for this is that some types of knowledge accumulated during the implementation of public policy by the authorities are not easily codifiable, even if the knowledge or information is not sensitive (i.e. confidential). Institutions have knowledge about the state of the world, the structure of the economy and about complex policy tools that is not easily codifiable. Examples of non-codifiable information transmission observed during REDIMA meetings include discussions about ways used by Ministries of Finance to carry out fiscal policy in countries with extreme budget rigidity, and discussions of the implications of measures adopted by some governments to re-capitalize their central banks.

Codifiability issues create the need for direct contact between institutions carrying out policymaking, in particular, for those technical experts within institutions who are charged with complex aspects of policy-making such as design and implementation; the incorporation of new techniques or procedures (for instance, measuring risk in the banking sector) and so forth, to connect with their peers elsewhere in order to reduce the uncertainty they face in their day-to-day work. This has resulted in the multiplication of seminars, conferences, meetings and other gatherings of professionals, often involving the participation of experts from international organizations or academia, where the exchange of knowledge, discovery of new methods and ideas potentially useful for the expert's work are an important reason for attending. Such contacts, if repeated over time, can be modelled as participation in a network.[25]

In recent years, a large literature has emerged analysing the way in which agents become part of networks. Goyal (2004) provides a recent survey of this literature. In that literature, a network is composed of nodes that are connected to each other by links. The economic literature has investigated how different network architectures come to be, especially analysing the way in which agents choose to form links with other agents. For example, Goyal (2007) presents a model of network formation where links between agents are created and maintained over time as a rational decision on the part of agents. In his model, links exist thanks to the voluntary decision of each agent who trades off the costs of forming and maintaining the link against the benefits of doing so. As an example, for a central bank, the costs of maintaining links to

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[25] Not only technical officials, but policymakers too also actively participate in formal or informal learning networks. In particular, while the technical details of implementing new complex policy tools or better understanding the structure of the economy (using quantitative tools for example) may be delegated to senior technical officials, policymakers constantly monitor the uncertain "state of the world" that shapes policy results. As pointed out by the governors of the two most important central banks in the world: "*Personally, I have found the opportunity to share views regularly with President Trichet and other leading central bankers at various international meetings extremely valuable. We are all in frequent contact by phone as well. Our consultations allow us to keep abreast of developments in other countries, to compare our analyses of developing trends, and to draw on each other's experience and knowledge,*" speech by B.S. Bernanke, Chairman of the Board of Governors of the United States Federal Reserve System at the Fifth Central Banking Conference "The Euro at Ten: Lessons and Challenges, Frankfurt am Main, 14 November 2008. In a speech by J.C. Trichet, President of the European Central Bank, at the same conference "*…reflecting upon our very close relationship, I see all the hours spent on exchanging ideas with my fellow governors, reflecting on facts and prospects, has progressively consolidated an element of intimate confidence that is a major asset for the present and future. […] We have intimately cooperated in ways that cannot easily be integrated into theoretical models. For example, there is a continuous exchange of information that helps all of us to better understand the nature of the crisis and its intricate international propagation patterns*".

other central banks, international institutions and other relevant agents include the opportunity cost of the time of the experts or policymakers that participate in meetings and seminars and the financial resources spent on those activities. In the absence of full decay in information transmission between nodes of a network (that is, the deterioration of the amount of information transmitted between two nodes of a network), the benefits of creating a link for agent $i$ include not only the learning from agent $j$, but also the benefits from $j$'s links to other agents, which generate network externalities.

In our analysis, however, we will take as given the network size and architecture in which a policymaking institution like a central bank carries out learning, for two reasons. First, the discussion of learning with endogenous network formation is beyond the scope of this chapter, as it would require a chapter-length treatment by itself. Second, in the application of these concepts presented in chapter IV, the networks under analysis were exogenous. For example, in the REDIMA project the network structure was exogenous, for a series of reasons described there which prominently include the exogenous (to the network) conformation of regional country integration groups (the Andean Community, MERCOSUR and the Central American Common Market) and their associated institutions.

Therefore, once a policymaking institution becomes part of a learning network, it can benefit from the experience of others in dealing with their policy problems to improve its own capacity to implement policies in an uncertainty-laden environment. In this way, international cooperation takes place for purely domestic purposes: improving learning about an uncertain environment in order to implement better domestic policies. However, as domestic policies are implemented after the adjustment of beliefs brought about by international cooperation, given the different types of uncertainty faced by policymakers, the informational externalities generated domestically provide further incentives for cooperation with other countries. Learning from others then provides the basis for policy cooperation.[26]

Such networks where countries voluntarily cooperate in order to learn exist in the real world, both in the developed countries of the Organisation for Economic Co-operation and Development (OECD), as well as in developing countries in Latin America and Asia. In addition to the REDIMA experience reviewed in detail in chapter IV, existing "cooperation for learning" initiatives include the work of the OECD Economic Development and Review Committee (EDRC) and that of the ASEAN+3 Economic Review and Policy Dialogue (ERPD), as well

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[26]   See figure I.1 from chapter I for a graphical description of this process.

as several more instances of technical dialogue at the regional level (including the activities of the Center for Latin American Monetary Studies in Latin America) and the international level (such as technical dialogue efforts by the Bank for International Settlements).

However, despite the fact that some of these networks have been operating for many years (like the OECD EDRC), there have been few advances in applying formal economic tools to the analysis of the issues at hand. In general, the absence of a suitable conceptual framework anchored in economic theory may have contributed to the limited advances registered in improving "cooperation for learning" to perfect it as a policy tool for widespread practical use. Both the OECD EDRC and the ASEAN+3 ERPD have been analysed informally, using the idea of "peer review" (Kawai and Houser, 2008; Thygesen, 2008) as the main motivation for the operation of those networks. Pagani (2002) defines peer review as "*…the systematic examination and assessment of the performance of a state by other states, with the ultimate goal of helping the reviewed state improve its policy making, adopt best practices and comply with established standards and principle*s". Peer review is a concept that can be (and has been) used in fields other than economics, such as education, health, the environment, energy and so on. It is a process carried out regularly, at pre-defined time intervals, where the performance of a country is compared against a commonly agreed benchmark, and where an interactive discussion between evaluators (which include the international or regional organization coordinating the process and carrying out much of the fact-finding and analytical work) and the evaluated country's officials is followed by a series of recommendations made by the former to the latter.

In the next section, we present a model that provides a framework for analysis of the process by which networks of policymakers can learn from each other.

## E.    A model of learning from others: Bala and Goyal (1998)

We will now present the results of the model of Bala and Goyal (1998) as presented by Goyal (2007). In appendix C, we expand this presentation introducing some notation that is useful for analysis of the model.[27] This model is useful for analysing learning from others about the optimal action to adopt by macroeconomic policy institutions, given the uncertain "state of nature".

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[27]    In appendix C, we only summarize the model. Those readers interested in its details, including proofs, should refer to the references.

Whenever national authorities implement a policy decision, the outcome of that decision is uncertain as it depends on the policy decision and on an unknown state of the world, assuming that the model of the economy used by the authorities is correct.[28] In this section, we will assume that the only uncertain element is the "state of the world" θ that connects the policy action with the outcome. While the implications of this for monetary policy are obvious, because for example the inflation response to a change in the policy interest rate is uncertain, they are also important for fiscal policy. For instance, the uncertain state of the world θ may determine the output outcome of a fiscal policy decision on the taxation level. The same model could be used to analyse how countries try to learn the unknown net "value" of a complex policy tool (such as the introduction of a new tax), assuming the structure of the economy and the state of the world are known.

At the beginning of time, nature chooses the state of the world θ, which is unobservable to each agent. Each policymaker, who is a member of a connected network, chooses an action *m in* each period. This choice results, given the unobservable state of the world θ, in an outcome ϖ. The probability of observing any specific outcome ϖ depends on the action *m* chosen and on the existing state of the world θ. In turn, this outcome ϖ generates a reward (or payoff) to the policymaker. In order to re-use the notation introduced in the Ghosh and Masson (1994) model discussed in appendix A, in this section *m* can be thought of as the value taken by the domestic monetary policy instrument,[29] while ϖ is the domestic inflation rate. The reward or payoff obtained by the central bank from observing inflation rate ϖ after using instrument *m* can be seen to be related to the *V* objective function introduced in equation (13) of appendix A.

As the true state of the world is unobservable, each policymaker needs to form beliefs about that state. Now, we can construct the utility function of each policymaker, which for each possible state of the world (see appendix C) is the summation of the reward (payoff) to each outcome, multiplied by the probability of that outcome occurring, given the state of the world and the choice of the policymaker. Then, the beliefs of the policymaker about the probability of each possible state of the world allows the former to weight each possible state θ. Given their beliefs, policymakers choose their actions *m* to maximize their utility functions.

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[28]   This is a key assumption that is implicit in most of the literature, and Bala and Goyal (1998) are no exception. Therefore, the model is useful for addressing uncertainty about the state of the economy, but not for all other aspects.

[29]   However, *m* here does not indicate the deviation from equilibrium values.

In each period, policymakers observe the outcome ϖ of their choice and the outcomes of the choices of all other policymakers within the network. They then use the information obtained to update their beliefs. That is, they learn both from their own actions and those of others about the true state of the world, so as to make better-informed decisions in the next period.

In this model, Bala and Goyal (1998) show that the beliefs of agents and their utility levels converge in the long run. They also show that learning in the long run can be optimal, given the true state of the world, if two conditions are met. First, at least some agents choose actions that allow beliefs to be updated ( informative actions). Second, the structure of the learning network needs to be such that the signals flowing from a few well-connected agents (called "the royal family" by Bala and Goyal, 1998) do not "swamp" other independent signals.

## F.    Discussion of the model

### 1.    Optimistic beliefs, speed of learning and its form

In the Bala and Goyal (1998) model summarized above and in appendix C, policymakers adopt the optimal action, given the unobservable state of nature θ, despite the existence of uncertainty in the long run. Therefore, this model suggests the answer to the second question posited at the beginning of section A: how to implement macroeconomic cooperation? The answer lies in fostering network connections between policymaking institutions, so as to maximize their capacity to learn.

Given "optimistic" prior beliefs,[30] an important point made by the model is that the structure of the learning network is crucial for ensuring that learning the optimal actions occurs in the long run. In particular, policymakers need to have a higher proportion of distinct sources of information, compared with common sources of information. This minimizes the probability of common sources of information without "optimistic" beliefs swamping information gathering by policymakers and affecting learning in the long run. For example, take

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[30]    As defined in appendix C, agents have "optimistic beliefs" if their prior beliefs led to a set of optimal actions that are within the set of optimal actions, given the true state of nature.

a supply-side inflationary shock that increases headline inflation in a small country. While economic theory points out the importance of maintaining private sector inflation expectations anchored by raising interest rates (Woodford, 2003), the degree and speed to which a central bank will be willing to increase interest rates will be linked to the beliefs held by the authorities about the degree of persistence of the shock. As a rule of thumb, a central bank will be less likely to raise interest rates "hard and fast" if the shock is expected to be of short duration, especially if there are no hard indications of long-term inflation expectations emerging among the general public. If the central bank asks an international organization about the point, the latter will provide its own view, built on its own beliefs about the degree of persistence of the shock. If those beliefs were not "optimistic", and if the central bank receiving the advice did not have other sufficient and strong sources of signals that could balance the advice received, learning that the shock was truly not persistent would not occur and interest rates might end up being raised too high.

Goyal (2007) also points out the possibility that there might be a trade-off between the speed of learning (facilitated by a large amount of commonly observed information) and the probability that all agents choose actions in the long run that are optimal given the true state of nature. This model, therefore, supports the idea of the usefulness of learning from others, especially when those other sources of information are distinct and bring about different perspectives that, combined, increase the probability that a policymaker will choose optimal actions in the long run.

While the model above presents a specific form in which beliefs are updated, using Bayesian updating in a systematic form, the real-world application of these ideas is probably much more complex. Sims (2002, 2007) and Brock, Durlauf and West (2003) study the way in which central banks address uncertainty using a combination of tools. Chief among them, Sims (2002) found that policymakers at central banks in industrial countries like the United States, United Kingdom and Sweden base their policy decisions on different sources of information, which include but are not limited to a core macroeconometric model. All these sources of information contribute to the formation of "judgement" by policymakers, which contributes to modern monetary policy processes. In light of this, a tool like "cooperation for learning" could contribute to improving the policymaking process either as part of the "smorgasbord" of information sources used by the institution or through a more formal decision-theoretic process solidly anchored in the incorporation of Bayesian methods for addressing model uncertainty (such as those proposed by Brock, Durlauf and West (2003) or Sims (2007)).

## 2.    "Peer review" and the model

The Bala and Goyal (1998) model can also explain how "peer review" processes work. Essentially, a peer review process involves a network of international organizations and country officials learning from each other in order to enable both evaluated and evaluator countries to conduct welfare-superior economic policies. The literature on "peer review" (such as Pagani, 2002; Kawai and Houser, 2008; and Thygesen, 2008) focuses on officials learning from others about the use of complex policy tools, leading to the creation of a common pool of beliefs about "best practices" of public policies. Uncertainty about the state of the world or the structure of the economy is not explicitly acknowledged. Notwithstanding the capacity of that model to include the learning aspect of peer review (called "peer learning" by Comley, 2008), there is another part of peer review processes that is absent in the cooperation for learning model: "peer pressure".

According to Pagani (2002), *"the effectiveness of peer review relies on the influence and persuasion exercised by the peers during the process. This effect is known as 'peer pressure'"*.[31] Peer pressure is the element that some of the peer review literature credits with the capacity of the peer review process to influence policymaking behaviour. However, as "*peer pressure is particularly effective when it is possible to provide both qualitative and quantitative assessments of performance*",[32] it might lose effectiveness in the presence of uncertainty and heterogeneity of beliefs. In particular, as the net value of a certain complex policy tool to a country is conditioned on the state of the world and the specific structure of the economy, if international organizations or country officials carrying out a peer review face uncertainty about those issues, the results of the review and the "peer pressure" associated with it may not sway the authorities if they see the result of the review as heavily conditioned on beliefs they do not share. Therefore, the capacity of "peer pressure" (including the practice known as "naming and shaming") to influence policymaking - even if countries agree on the relevant benchmarks against which performance should be measured - may depend on the reviewed having the same beliefs about uncertain variables as the reviewers. That would limit the effectiveness of "peer review" and its associated "peer pressure".[33]

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[31]    Pagani (2002), pp. 16.
[32]    Pagani (2002), pp. 16.
[33]    "*…peer review is not likely to be very effective in a purely intergovernmental setting. In the EU context, this difficulty was addressed by creating supranational institutions, like the Commission and later the European Central Bank, endowed with sovereign competencies within well-defined remits and subject to clear transparency and accountability obligations*", speech by Tommaso Padoa-Schioppa, Member of the Executive Board of the European Central Bank at the Bank of Korea, Seoul, 1 July 2003.

It should be stressed that, in order to be effective, "peer review" processes i require significant amounts of resources from the countries under review. In particular, the time of senior officials, answering questions and enquiries by the examiners, providing timely and accurate data and so on,[34] are essential to this process. Therefore, a "peer review" process without "peer pressure" but one that acknowledges the above-mentioned types of uncertainty can be seen as an advanced stage of the "cooperation for learning" model presented herein. In such an advanced version of the model, agents (officials) learn not only from analysing the policies, results and beliefs of other countries' officials when implementing policy, but also from the analysis of the reviewed country's policymaking problem by experts and officials from other countries.

## 3. Limitations of the model

Despite its usefulness, this model has several limitations. The first is that the state of nature is assumed to be constant during the learning process. If the learning process were to be long and slow in relation to the speed of change of the unobserved state of nature, convergence to optimal actions given the true *(ex post)* state of nature could be impaired. Therefore, more work needs to be carried out into learning when the state of nature is (rapidly) time-varying. In particular, the speed and (stochastic) characteristics of the change in the state of nature and the speed of learning are important variables that need to be empirically estimated to draw further conclusions about the ultimate convergence to optimal actions given the true (ex post) state of nature.

The second limitation of the model is that it assumes that the neighbourhoods of each policymaker are exogenously fixed. While this might be a valid assumption in some cases, as in the case of the REDIMA project described in chapter IV, it might not be adequate in others. In fact, as the Bala and Goyal (1998) model indicates that network structure can affect the speed and likelihood of complete learning in the long run, and if international organizations have a role to play in network creation, further work about endogenous net formation becomes imperative. In particular, endogenous network formation has important implications for the long-term sustainability of learning networks. In recent years there have been enormous efforts in the economic literature to model endogenous network formation (Jackson, 2004; Goyal, 2004 and 2007), but applied work still remains limited. Sobel and Stedman (2006), by briefly reviewing the experience of the Group of Seven countries with

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[34] This might include financial expenditures of the reviewed country to pay for on-site visits, participation in meetings and so forth.

macroeconomic cooperation between central bank and Ministry of Finance officials, implicitly pose the question of the size and composition of that group, which over the years evolved from the Group of Five and later included Russia (Group of Eight) and more recently gave birth to the Group of Twenty.

Advances have recently been made (see for instance Jackson, 2004; Goyal 2007, 2004; Galeotti, Goyal and Kamphorst, 2006; and Bala and Goyal, 2000), however, in the theory of network formation for learning. This work has focused on whether the dynamics of network evolution would ultimately lead to stable network structures, what these would structures be, and whether they would be efficient. While the literature has achieved some interesting results in terms of the network architectures that would emerge under alternative assumptions,[35] in general the conclusions of both the theoretical and applied literature on network formation are strongly conditioned by the assumptions made. For example, Bala and Goyal (2000) find that, in a model of one-sided link formation where the connection benefits are non-rival and where a player's payoffs are increasing in the number of other agents accessed and decreasing in the cost of maintaining links, the strict Nash network resulting from the model is either the empty network or a centre-sponsored star (where a central node is connected to all the rest and the central node is the only one with more than one link), where the central player of the star pays for all the links. Star networks minimize distances between agents and economize on the number of links. However, the authors also found that the introduction of a small amount of decay in the flow of information from one agent to another changed the structure of the equilibrium networks. For certain parameter values of the cost of forming links, Bala and Goyal (2000) show that the periphery-sponsored star is an equilibrium network in the presence of decay.

A third limitation of the model is that it does not account for the potentially heterogeneous quality of the signals received by the different players. In the model, each policymaker receives a signal of the same ex ante quality, but quality may also be heterogeneous. For example, the conditional density $\phi(\pi; m, \theta)$ could have a smaller or larger variance depending on the size of a certain parameter λ, reflecting the resources available to the policymaking institution that is learning, so that $\phi(\pi; m, \lambda, \theta)$. If that is the case, heterogeneous availability of resources at learning institutions may lead to heterogeneous quality of signals.

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[35]   Goyal (2007) shows that different values of the cost of establishing unilateral links between players may lead to star networks or the empty network. Changing the assumptions about the scale of information decay between nodes of a network and the heterogeneity of the values of the network and the cost of links across players also alter the outcome.

In the developed world, there is evidence that policymaking institutions in different countries are endowed with heterogeneous resources. For example, in their analysis of the research activities of European Central Banks in the period 1990–1999, Eijffinger, de Haan and Koedijk (2002) use survey data to find significant differences in the absolute and relative sizes of research departments among banks, as well as the journal articles produced by those researchers, qualitatively adjusted. While the measurement problems of this type of research may be severe,[36] in no small part due to the impossibility of using publicly available data for this type of study,[37] these studies indicate that the research capabilities of European central banks vary significantly.

Despite those limitations, the Bala and Goyal (1998) model provides an interesting tool for analysing the self-interested process by which policymakers may be willing to cooperate with others in order to address uncertainty about an uncertain (but identifiable) element, like the state of the world. Despite the many limitations of the model indicated here, however, Bala and Goyal (1998) present a good analytical starting point upon which future research can build to improve cooperation for learning among national macroeconomic policymaking institutions. In particular, the model presented here provides the economic background to cooperation for learning procedures like "peer review" (Pagani, 2002): more specifically, the particular aspect of peer review highlighted by Comley (2008), which he terms "peer learning". The author emphasizes the non-competitive nature of the gains that countries can reap from peer review, as the objective of the latter is "*…to help each other be successful in our own enlightened self-interest*"[38]. This element, essentially part of the "peer learning" concept presented by the Comley (2008), is central in any "cooperation for learning" effort. However, authors like Pagani (2002) or Kawai and Houser (2008) see the concept of "peer pressure" as an important part of the success of a "peer review" process , although the former is not necessary for a "cooperation for learning" network based on the analytic framework provided by the Bala and Goyal (1998) model.

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[36]   See Angelini (2003) for a criticism of the conclusions in the Eijffinger, de Haan and Koedijk (2002) article.

[37]   Banco de la República (2005) shows a rare attempt at comparing the relative sizes of central banks in Latin America with those of the European Union and other industrial economies. as that study looked at aggregate staff numbers, it gives little insight into the absorption capacity of central banks. This is because it does not separate research staff from the rest, in the presence of significant heterogeneity among banks in terms of their responsibilities, as shown by that study.

[38]   Comley (2008), pp. 118.

## G.    Fostering learning and cooperation: the role of international organizations

Above, we presented the framework of the learning model that shows how policymakers can use their connections to other policymakers to learn how to choose optimal actions, given an uncertain state of the world. We also showed that reduction in uncertainty, in turn, leads to better policies in each country. In this section, we will discuss potential roles for international organizations in fostering such a process of learning.

### 1.    Technical assistance: providing tools for effective learning

For a government institution to be able to implement macroeconomic policy, it needs to have sufficient adequate financial and human resources. As the availability of both is heterogeneous across countries, the capacities of different countries to absorb new knowledge (including new information) are also heterogeneous. Cohen and Levinthal (1990) analyse the ability of organizations to evaluate (or assess the value), assimilate and apply outside knowledge, which they call "absorptive capacity". They propose that absorptive capacity is related to the prior knowledge held by an organization. For example, the capacity of a central bank to quickly identify the type (in terms of supply or demand) direction, size and potential impact of an unexpected shock may depend on the institution's absorptive capacity. As indicated by Cohen and Levinthal (1990), the acquisition of knowledge is cumulative, and is stronger when the object of learning is related to what is already known by the agents.

Therefore, heterogeneity of available resources, especially embedded knowledge in a government institution's human capital (namely its officials) provides a justification for international organizations to help government institutions to fostering technical capabilities. The vehicle through which international organizations contribute to capacity-building is normally through technical assistance. A "classical" definition of technical assistance can be found in Blelloch (1957), who saw it as a complex effort of transferring ideas and best practices and adapting them to the specific needs of the receiving country.[39] Those earlier views of

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[39]    *"The deliberate transfer of technology from a developed to an underdeveloped community is an extremely difficult undertaking. In the vast majority of cases it cannot be accomplished simply by sending a competent expert to tell governments what to do. One needs, first of all, to know why the technique in question has not already been acquired and mastered. After all, plenty of exponents of most appropriate modern techniques are easily available even in the underdeveloped countries themselves. Underdeveloped countries are, generally speaking, not underdeveloped because they are too poor to hire competent experts, national or foreign, or because they are too ignorant to realize that the technique exists and would be useful to them. Their underdevelopment springs rather from far deeper causes, of a political or sociological nature"* Blelloch (1957), pp. 40.

technical assistance were more "supply-oriented" than later views such as the one in Mathiasen (1968): *"Technical assistance consists in the transmission of learning, knowledge and techniques or material and human resources in order to help those who receive it to solve specific problems in a more suitable manner in keeping with their needs"*.[40] Today, technical assistance is aimed at increasing the capacity of the recipient country institutions to better pursue their own policy objectives, clearly as a "demand-oriented" activity.

The more uncertain the environment faced by policy-makers, the more important it will be for government institutions to build capabilities to deal with uncertainty in policymaking. It can be argued that the globalization process, with its increased international mobility of production factors (especially capital) and associated rapid pace of technological change (including the increased sophistication of financial sectors worldwide), has added to the complexity of analysing the economic environment since that time. For example, Independent Evaluation Office (2007) shows the important changes resulting from globalization that affect exchange rates, such as a dramatic increase in international transactions in bonds and stocks, large rises in foreign exchange market turnover, growing stocks of foreign assets and liabilities held by agents, among others. Those developments have been faced by several Latin American public institutions responsible for macroeconomic policymaking with an enhanced investment in human resources, information, technology and others elements aimed at increasing their capacity to face an increasingly challenging economic environment. This can be seen, for example, in many central banks in the region.

In such a context, uncertainty about the economic environment and the complex relations between different parts of an economy (in other words, the structure of the economy), combined with increased domestic capacity to carry out policymaking, reinforces the need for specialized expertise from international organizations in order to add value to the policymaking efforts of countries via technical assistance. International organizations continue to play an important role in contributing to strengthening the capacity of government officials in charge of macroeconomic policy to carry out their duties, for example by diffusing existing academic and empirical research, by providing specific technical expertise which benefits from the existence of economies of scale in supplying it centrally, and by organizing training activities such as courses and seminars for public officials.

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[40]    Mathiasen (1968), pp. 205.

## 2. Signal provision

International organizations today, as we pointed out above, continue to have a key role to play in providing technical assistance and specialized expertise to government institutions. However, that is not equivalent to providing policy advice to government institutions, as the key element is that policy advice is contingent on the state of the economy and its specific structure.[41]

International organizations, like any other public or private agent, face pervasive uncertainty about the state of the world and the structure of the economies of those countries they work with. However, their policy advice still has to be based on beliefs about those uncertain elements. Therefore, the adequacy of policy advice will be closely linked to the accuracy of underlying beliefs, adjusted for the degree to which such advice is contingent on lack of accuracy of beliefs vis-à-vis the true state of the world and structures of the economy. This includes the cases where the value of advice is very sensitive to the accuracy of the beliefs about a country's structure and existing state of the economy, such as monetary policy advice during a financial crisis, where detailed knowledge about the former is essential. An example of the uncertainty faced by international organizations can be found in International Evaluation Office of the International Monetary Fund (2007), which found evidence of insufficient justification by IMF staff choosing one methodology over another in some exercises of assessing the level of the exchange rate.[42] It should be stated that different methodologies for measuring "equilibrium" real effective exchange rates often vary significantly according to the data used and assumptions made.[43]

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[41] Other authors have already acknowledged this fact: "*It is natural that authorities representing a country will have a much better appreciation of the specific circumstances of their country than the reviewers. This last point has become increasingly true given the shift in focus of macroeconomic peer review and surveillance. There is now a much greater understanding that macroeconomic analysis is not very useful without strong links to structural policy which drive the supply potential growth of the economy. The OECD's Economic Development Review Committee (EDRC) process prides itself on undertaking macro-structural analysis. This reflects the clear understanding that the interaction of macroeconomic and structural policies is the key to understanding an economy,*" Comley (2008), pp. 119.

[42] "*At times, the choice of methodology appeared arbitrary, casting doubts on the results and their usefulness. In selecting methodologies, more attention should have been given to the particular strengths and weaknesses of individual approaches, and to how these relate to the circumstances of the economy in question and existing measures of competitiveness*" pp. 21 – 22.

[43] See Montiel, P.J. and Hinkle, L.E. (1999), Exchange rate misalignment: concepts and measurement for developing countries, (New York, NY: Oxford University Press/World Bank, 1999) for a book-sized treatment of equilibrium exchange rates, and IEO (2007), Background Document 3.

In spite of the presence of uncertainty, international organizations can provide valuable signals about the state of the economy and its structure to policymaking institutions. The existence of a link between a government institution and an international organization allows the former to access the expertise and knowledge at the disposal of the latter. In particular, the wide geographic and subject coverage of international organizations, together with the availability of human and financial resources, allow them to potentially become important sources of ideas, compilation of international practices, interpretation of relevant economic theory, data collection and organization. All this makes them important nodes in any network as sources of informational signals.[44] In particular, the capacity of international organizations to design and carry out applied research that is relevant to a region or any group of countries may have special value, as the elaboration of such studies has certain public good characteristics.

The REDIMA project described in chapter IV witnessed several examples of this role of international organizations as providers of signals that complemented each other with those of other international organizations, academics and national government institutions. For example, when the Permanent Technical Group of the Andean Community decided to analyse the extent, sources and implications of budget rigidity in the sub-region, international organization officials and experts conducted studies of such rigidity in each of the countries using a similar methodology, as well as contributing to the discussion and analysis carried out by senior technical officials of the countries themselves. This effort was part of a longer-reaching effort to work at the national and regional levels to increase transparency about the existence of vulnerability to a reversal of the exceptionally favourable external conditions that the region experienced until 2007. In other stages of the process that led to the agreement by the officials of the Permanent Technical Group of the Andean Community on a set of common macroeconomic vulnerability indicators (described in chapter IV), international organizations such as ECLAC, the Latin American Reserve Fund, the Andean Financial Corporation and others also contributed to the effort.

However, one of the implications of the Bala and Goyal (1998) model is that certain nodes in a social network that are observed by many others (called a "royal family" by the authors) have the capacity

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[44]   It has been claimed that international organization researchers are especially well suited to carrying out research that synthesizes the theory and practice of the experience of several countries facing a similar problem, and that such a task is not carried out by academia due to lack of incentives. See World Bank (2006), "Evaluation of World Bank Research, 1998 – 2005", September 24, 2006, mimeo.

to send signals that may foster or hinder the discovery of the true state of the world (the value θ), due to their importance within the network when they are observed by many agents. Therefore, this implies that international institutions have to be extremely careful, as provision of the "non-optimistic" signals (based on incorrect beliefs given the underlying true state of the world) may have severe impacts, while provision of "optimistic" ones may go a long way towards helping the members of the network to learn.[45] Therefore, the existence of uncertainty faced by international organizations should foster their willingness to help policymaking institutions to obtain different views on the same policy issues when the latter are contingent on beliefs about the structure of the economy and its state at any given moment of time. It is on the basis of this understanding that ECLAC implemented the REDIMA project described in chapter IV.

Viewing the role of international organizations as providers of signals - in parallel with other national or regional institutions in a complex environment that requires as much information as possible to address uncertainty - may provide an answer to the problem identified by some international organizations about "lack of relevance" in their capacity to influence policy in complex issues, as reported by IEO (2007).[46] Interestingly, some of the same studies that have found a diminishing impact of international organizations in influencing policy on complex (state contingent and country specific) issues, found that country

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[45] About whether advice on exchange rate regimes provided by the IMF in the past was built on "right" beliefs, IEO (2007) says: "*When advice was given over the evaluation period, it tended to be in the direction of more flexible exchange rates. In particular, based on the last two staff reports through 2005, IMF staff were found to have advised countries to adjust their exchange rate regimes (including monetary frameworks) in 63 cases. In 51 of these, they advised in favour of more exchange rate flexibility, which was linked to a proposed switch to inflation targeting in 8 cases. For the 30 economies reviewed over the 1999-2005 period, explicit regime advice was given in 12 cases, mostly in the direction of enhanced flexibility. Although such advice may not be unreasonable, particularly in a medium or long-term context, greater flexibility may not always be desirable, and a particular view should not be taken for granted. What is striking is: the frequent lack of formal, country specific analysis backing such advice, which is likely to have limited the Executive Board's ability to judge the merit of staff's advice on a case-by-case basis*" pp. 22.

[46] For example, while analysing the impact of the International Monetary Fund on shaping countries' view on exchange rate policy, IEO (2007) found: "*…compelling evidence of a problem for the IMF came from interviews and survey perceptions of the institution's impact, or lack of it, in shaping major exchange rate decisions taken by member countries, especially in the advanced and large emerging market economies. While the problem was by no means universal, the IMF was too often considered by authorities to have provided little value added. Of those country authorities who reported having taken major policy decisions on exchange rate issues during 1999-2005, 43 percent regarded IMF advice as instrumental, while 38 percent saw it as marginal and the remainder saw no impact or no discussion at all*" pp. 9 – 10.

authorities looked for advice and information from different sources,[47] matching the implications of the model of international cooperation for learning presented above, and the experience of the Macroeconomic Dialogue Network (REDIMA) project presented in chapter IV.

## 3.    Creating and supporting networks: addressing market failure

The third way in which international organizations can contribute to fostering learning and macroeconomic cooperation is through the creation of networks of officials from policymaking institutions and experts (and subsequent support to their operation). Both roles, fostering creation and supporting operation of "cooperation for learning" networks, are explained by the existence of market failures that hinder the "natural" (or self-enforced) appearance and correct operation of those networks, in the following way.

First, the network-creation role of international organizations is justified by the existence of informational issues (prominently including asymmetries) in the ex ante determination by policymaking institutions of whether or not to participate in a certain "cooperation for learning" network. At the moment of deciding whether to join a "cooperation for learning" network, the authorities of a policymaking institution will probably approach the decision in terms of the expected cost-benefit of the operation. The expected costs are often perceived as being more easily estimated: they include the opportunity cost of time of government officials participating in the network's activities, travelling expenses to participate in meetings and seminars, the cost of obtaining and preparing documents and data and so forth. On the other hand, the ex ante expected benefits of joining the network may be more difficult to calculate. Such benefits ultimately depend on hard-to-measure (and potentially, time-varying) variables like the seniority of officials representing other countries, the level of commitment of those officials to the learning and exchange activities of the network, the quantity and quality of the know-how to be shared by other institutions' officials, the future availability of resources by those officials (will continuity in participation be maintained), among many others. Therefore, an

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[47]    For example see IEO (2007): "*In all country groups, the authorities reported that they sought advice from sources other than the IMF. Some countries hire consultants and seek help from other governments, while several senior officials spoke favourably, for example, of their contacts with the Bank for International Settlements (BIS) and the Organisation for Economic Co-operation and Development (OECD), where they appreciated the discussions with peers*", pp. 11 – 12.

important informational asymmetry may exist between expected costs and benefits of participating in a cooperation for learning network.[48]

There may be additional challenges to address, even if the ultimate benefits were expected to be positive and larger than the costs. First, the costs and benefits may not be easy to measure even ex post, so the expectation ex ante of facing difficulties in validating ex post costs and benefits of participating in the network may deter a rational, risk-averse policymaker from participating ex ante, as he may not be able to prove ex post the rationality of his action. Second, the ex ante expectation of encountering lags of uncertain duration from the incurring of participation costs and the obtaining of benefits (lags that may not even be stable over time) might act as a deterrent for officials who heavily discount the future (due to political economy reasons, for instance). Third, poor countries may face binding financial constraints on participating in learning networks, despite favourable ex ante expected cost-benefit prospects that would make participation welfare-improving.

Second, the long-term network support role of international organizations is justified by the "public good" nature of some of the operational issues that any "cooperation for learning" network needs to address in order to operate adequately. Among these operational issues we find the organization of meetings (including their agendas) of the network, the realization of specific research studies to increase the quality of the learning process of the network, and the identification of experts (and their products) that could contribute to the strengthening of the quality of the learning process. Chapter IV provides a detailed account of the experience of the REDIMA project with these issues and the role played by ECLAC in providing these "public goods" in coordination with regional institutions like the Secretariat of the Andean Community and the Secretariat of the Central American Monetary Council.

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[48]   A potential member institution's decision problem can be modelled as that of participating in the "cooperation for learning" network if the expected utility of participating, calculated ex ante $E_t(U)$, is larger than some minimal participation constraint $\psi$. The expected utility of participating can be represented by $E_t(U) = E_t\{\sum_{t=0}^{T} \beta^t[b_t(x) - c_t(y)]\}$ where t is time, $\beta^t$ is the discount factor, $b_t(x)$ are the benefits in each period of participating in the network, a function of a series of random variables represented by the vector x, including those mentioned in the main text, and $c_t(y)$ are the costs in each period of participating in the network, which are a function of the vector of random variables y.

Therefore, in a context of under-connection to a "cooperation for learning" network due to market failure, the appearance of an external actor might be welfare enhancing if it overcomes the mentioned negative incentives to link-building. As shown in chapter IV for the case of Latin America, the operation of the REDIMA networks and the official Macroeconomic Work Group of Central America, Panama and the Dominican Republic and the Permanent Technical Group of the Andean Community showed the importance of the contributions of regional and international organizations like United Nations Economic Commission for Latin America and the Caribbean, the Inter-American Development Bank, the International Monetary Fund, the Andean Development Corporation to macroeconomic cooperation. There are examples in other regions, such as the Economic Development and Review Committee of the Organisation for Economic Co-operation and Development and the Economic Review and Policy Dialogue of the ASEAN+3 Group. Both examples are also briefly reviewed in chapter IV.

To conclude this section, it is necessary to highlight the need for further theoretical and empirical research on the topics of network formation in order to support future efforts by international organizations fostering macroeconomic "cooperation for learning" processes. In particular, further work is needed to identify which factors influence the structure of macroeconomic policy networks and which network structures are efficient and stable. That is, further work is needed to incorporate endogenous network structures. Among the potential factors to consider indicated by the theoretical literature we find decay in the flow of information, heterogeneity in the costs and benefits of linking to the network, opaqueness in the ex ante estimation of the values (and costs) of linking to the network, heterogeneity in link strengths and so forth.

Chapter IV

# A case study of "cooperation for learning": the Macroeconomic Dialogue Network (REDIMA) project

## A.    The dynamics of the "state of the world"

Before entering into the description of the REDIMA experience of macroeconomic "cooperation for learning", we will briefly highlight[1] the economic environment or "state of the world" in which macroeconomic cooperation efforts were conducted.

In particular, we will summarize the key elements of the economic context in Latin America during the period, which determined the agenda of work for "cooperation for learning" at the sub-regional level. As indicated in chapter III, attempts by policymakers to address uncertainty about the current and future states of the world, the structure of the economy and the net value of complex policy tools are the basis for economic interest in "cooperation for learning" efforts. The fact that

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[1]    This section only highlights some salient features of the macroeconomic situation in the region during the period. As there is substantial heterogeneity among countries and in different parts of the period (for instance, due to political changes), a detailed review is beyond the reach of this chapter. For more details, see the flagship publications of ECLAC (*Preliminary overview of the economies of Latin America and the Caribbean* and *Economic Survey of Latin America and the Caribbean*) and of the IMF (*Regional Economic Outlook: Western Hemisphere* (available since 2006) and *World Economic Outlook*) covering the region in the 2005 - 2008 period, as well as IADB (2008), which also analyses macroeconomic developments in the region during the period.

Latin America is a region vulnerable to terms-of-trade shocks and capital inflow shifts, and given that the future evolution of these are subject to substantial uncertainty, provides ample incentives for applying the "cooperation for learning" model presented in chapter III to this region.

The period between the start of 2005 and the first half of 2008 can be roughly divided into two relatively distinct sub-periods, according to the external conditions experienced by Latin America as a region. The developments that we will now briefly review have been documented in much more detail by the different international organizations monitoring the region,[2] so here we will only highlight some salient points.

## 1.    The first period: boom in commodity prices

The first identifiable sub-period extends between 2005 and mid-2007. During this period, as shown in figure IV.1, both MERCOSUR and (especially) Andean countries experienced high and increasing terms of trade. Central American countries, however, registered a decline in their terms of trade. These developments were due to the increases in the international prices of commodities exported by South America (foodstuffs, metals and petroleum) during the period. Figure IV.2 shows the evolution of the prices of some of those products between 1980 and 2009, indicating the extent of the commodity price boom experienced by South America, especially metal- and energy-exporting Andean countries. One of the main reasons behind the deterioration in the terms of trade of Central America during the period shown by figure IV.1 was its dependence on imported energy, especially petroleum.

It is well documented that an important part of the improvement in public finances in South America was due to the upturn in economic growth and in windfall revenues obtained from the increase in the export prices of commodities like minerals, foodstuffs and energy (ECLAC, 2007a, 2007b, 20088). This favourable shock to the prices of commodities resulted in a surge in the fiscal revenue of countries exporting such commodities, especially ones with large public sector participations in those businesses. Chief among those benefited were the Andean countries, which are net exporters of energy and minerals.

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[2]    For example, see ECLAC's periodic flagship publications *Economic Survey of Latin America and the Caribbean* and *Preliminary Overview of the Economies of Latin America and the Caribbean*, available at www.eclac.org; and the IMF periodic flagship publication *World Economic Outlook*, available at www.imf.org.

Figure IV.1
TERMS OF TRADE IN LATIN AMERICA, 1999-2009
*(Index 2000 = 100)*
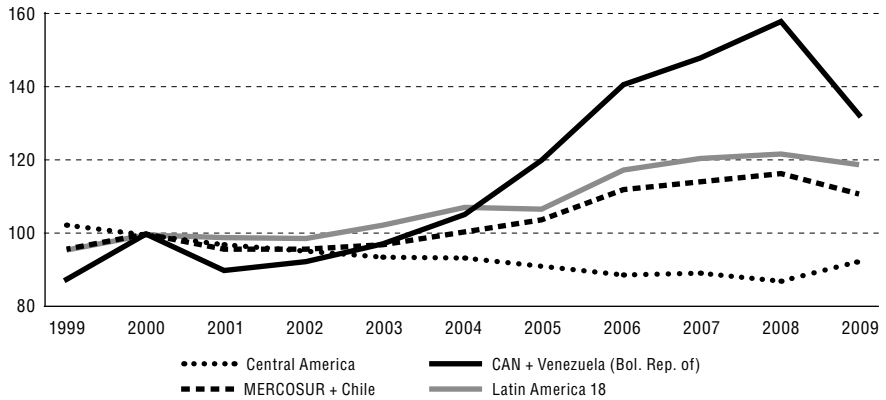


Source: Author's compilation, based on ECLAC data.
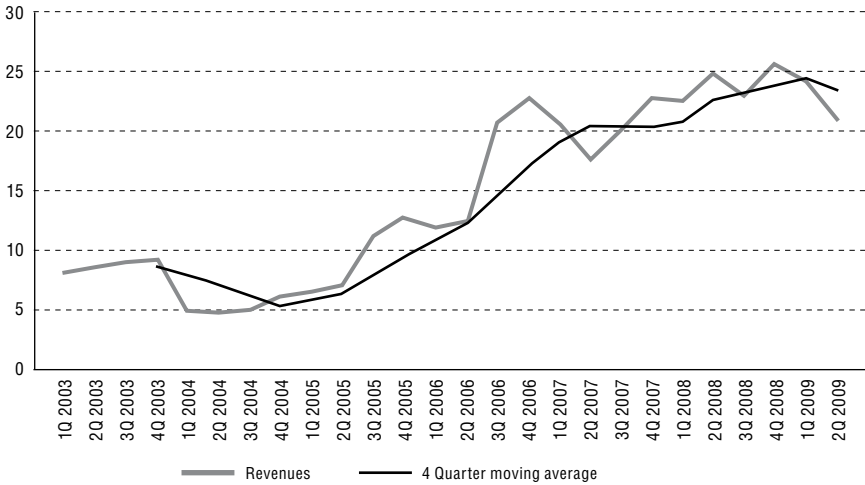
Figure IV.2
SELECTED COMMODITY PRICES, 2005-2009
*(Index 2000 = 100)*
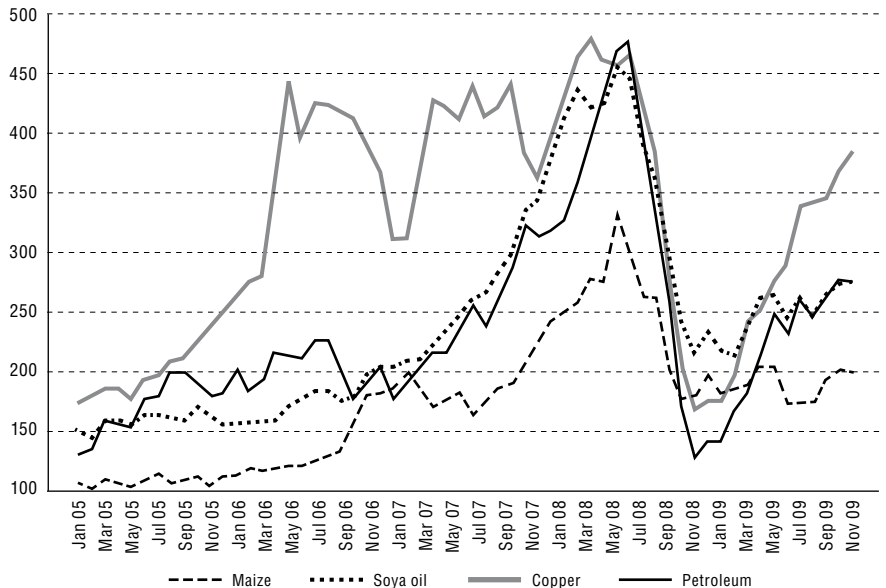


Source: Author's compilation, based on ECLAC data.

As an example, in figure IV.3 we observe the large increases in public revenues in the Plurinational State of Bolivia due to hydrocarbon sales (including natural gas). Similarly, in Ecuador, hydrocarbon revenue of the Non-financial Public Sector went from 5.8% of GDP in 2003 to 16.8% of GDP in 2008.[3]

Figure IV.3
HYDROCARBON REVENUES OF THE CONSOLIDATED PUBLIC SECTOR OF THE PLURINATIONAL STATE OF BOLIVIA, 2003-2009
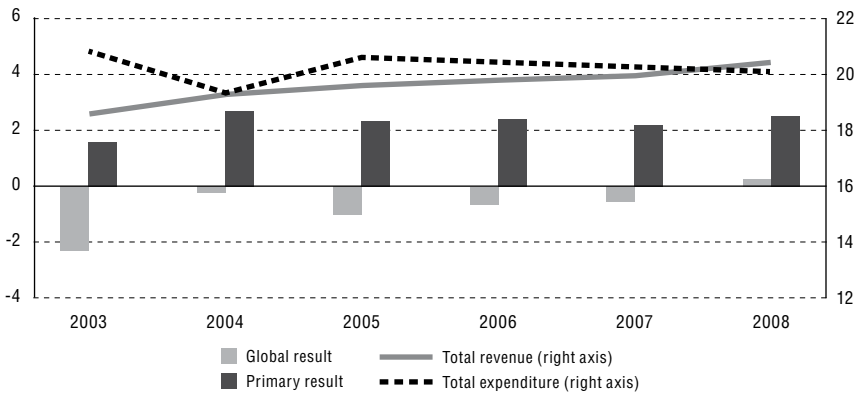*(Percentage of GDP)*



Source: Author's compilation, based on data from the Central Bank of Bolivia.

The evolution of public finances in South America during the period can be seen in figures IV.4, IV.5 and IV.6, with figure IV.4 showing the average evolution of revenue, expenditure and results of the central governments of MERCOSUR countries (excluding associated partner Chile), figure IV.5 showing those of the Andean Community countries (excluding the Bolivarian Republic of Venezuela, which was a member until 2006) and figure IV.6 showing those of Central America, Panama and the Dominican Republic. At the beginning of the commodity price boom, the growth of public revenue was outstripping public expenditure in South America, but it quickly caught up, especially due to rapid expenditure increases in some countries. For this reason, while fiscal

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[3]   The Ecuadorian government took several measures to increase its share of the petroleum rents during the period, including changes in contracts, legal changes and so forth. See the coverage during the period in the *Preliminary overview of the economies of Latin America and the Caribbean* and *Economic Survey of Latin America and the Caribbean,* periodically published by ECLAC.

results initially improved, they soon stabilized. In particular, faced with the probability of a potential slowdown or decline in commodity prices funding the boom, different voices started to warn about expenditure growth, especially as expenditure increased rapidly from 2007 onwards.

Figure IV.4
FISCAL POLICY IN MERCOSUR: SIMPLE AVERAGE OF
COUNTRY RESULTS, 2003-2008
*(Percentage of GDP)*



Source: Author's compilation, based on ECLAC data.

Figure IV.5
FISCAL POLICY IN THE ANDEAN COMMUNITY: SIMPLE AVERAGE OF
COUNTRY RESULTS, 2003-2008
*(Percentage of GDP)*
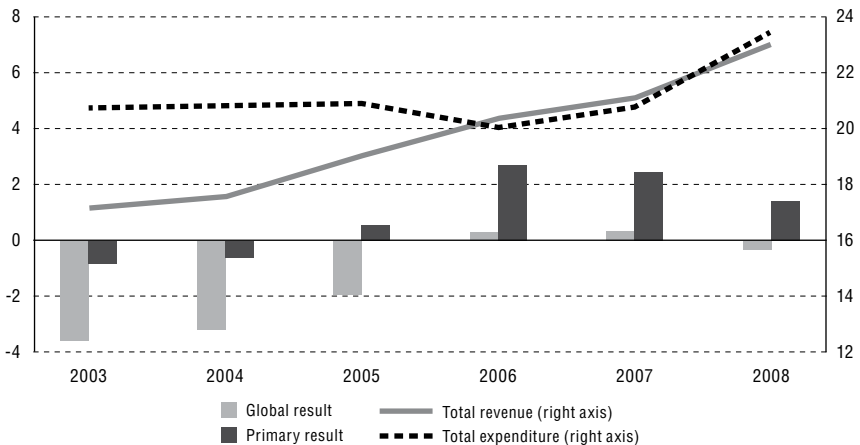


Source: Author's compilation, based on ECLAC data.

Figure IV.6
FISCAL POLICY IN CENTRAL AMERICA, PANAMA AND THE DOMINICAN REPUBLIC:
SIMPLE AVERAGE OF COUNTRY RESULTS, 2003-2008
*(Percentage of GDP)*



Global result        Total revenue (right axis)
Primary result       Total expenditure (right axis)
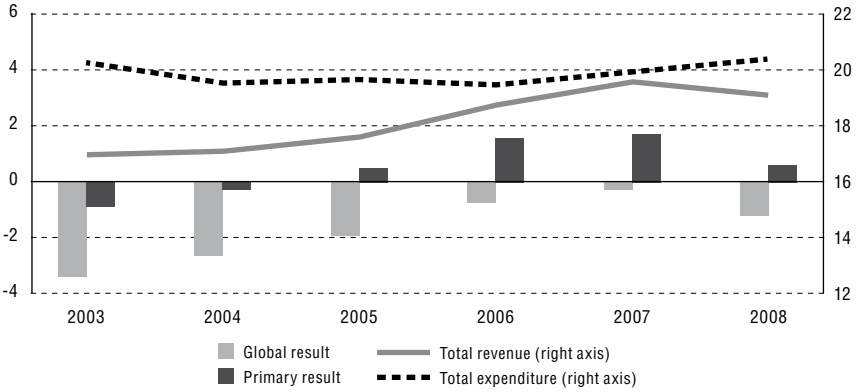
Source: Author's compilation, based on ECLAC data.

At the time, there was considerable uncertainty about the future "state of the world", in the form of the future prices of commodities, including long-term levels for their prices. While some agents believed that there were new "structural" elements supporting higher demand for commodities (such as the emergence of China as a global manufacturing powerhouse and large importer of commodities) and therefore, permanently higher long-term prices,[4] others had some reservations about the existence of a structural shift in the prices of commodities and about the size of such a shift, if it existed. For example, Hamilton (2008) carried out an empirical study of crude petroleum prices and did not find any evidence of the existence of scarcity rents before 1997, but found it plausible for the period after that date due to fundamentals like the slow growth rate of extraction and the large increases in demand from developing countries like China. As an interesting example of the uncertainty faced by economic agents during the period under discussion, the Economist Intelligence Unit in those days produced the projections about the spot prices of petroleum and copper shown in figures IV.7 and IV.8.

Both figures show the same pattern: first showing underestimation of price increases and then showing underestimation of price decreases. For example, take figure IV.6, which shows projected paths for WTI petroleum spot prices. The projection published at the beginning of the first quarter of 2008, using data from the last quarter of 2007, projected
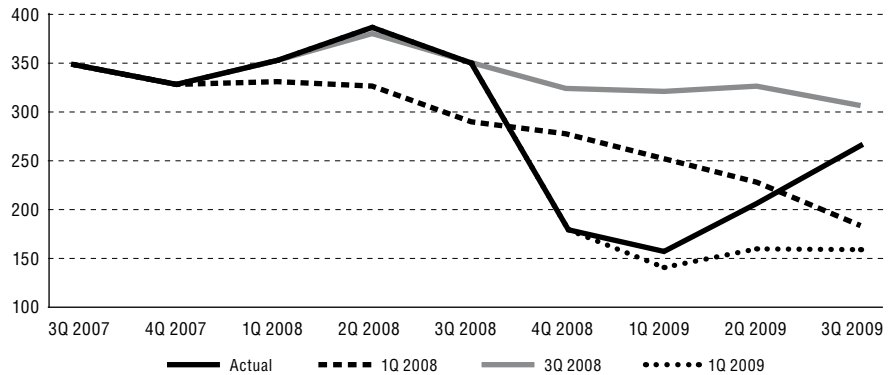
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[4]    See IADB (2008), pp 9.

Figure IV.7
WEST TEXAS INTERMEDIATE PETROLEUM SPOT PRICES:
DATA AND PROJECTIONS, 2007-2009
*(US dollars per barrel)*
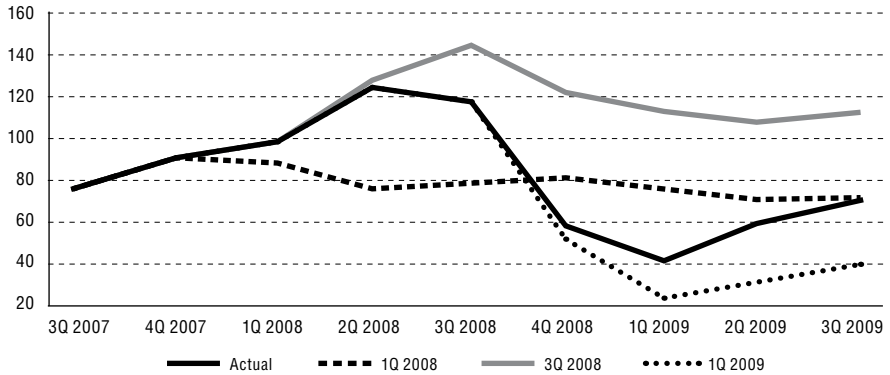


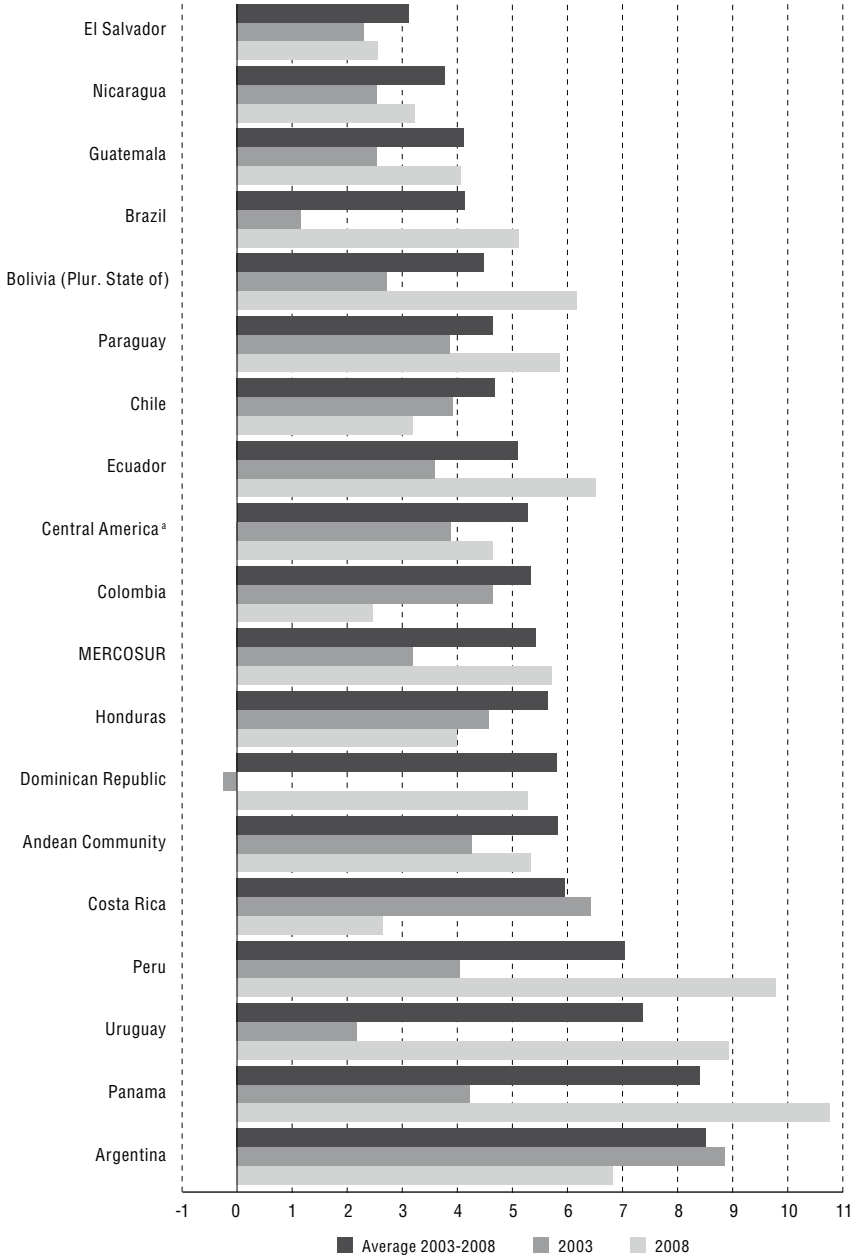Source: Author's compilation, based on Economist Intelligence Unit data.

Figure IV.8
REFINED COPPER CASH PRICES AT THE LONDON METAL EXCHANGE:
DATA AND PROJECTIONS, 2007-2009
*(US cents per pound)*



Source: Author's compilation, based on Economist Intelligence Unit data.

petroleum prices to fall slightly from the levels of the last quarter of 2007 and stay stable at those levels during 2008, falling slightly in the first half of 2009. They did not forecast the 36.7% increase in prices that effectively took place between the last quarter of 2007 and the second quarter of 2008. After those rises took place, the forecast published at the beginning of the third quarter of 2008 expected prices to increase to more than 140 dollars per barrel on average in the fourth quarter of 2008, and to fall in

Figure IV.9
LATIN AMERICA YEARLY GDP GROWTH RATES, SELECTED COUNTRIES, 2003-2008
*(Percentages)*



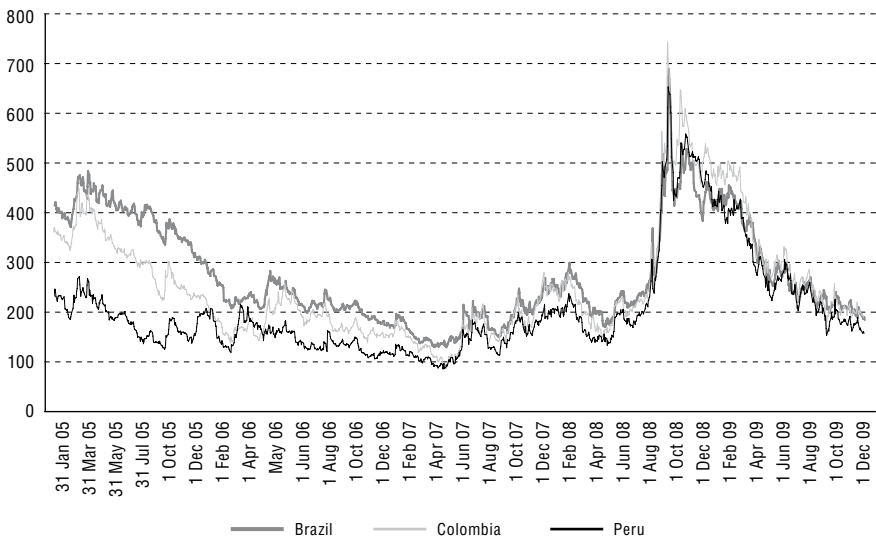Source: Author's compilation, based on ECLAC data.
a  The Central American average includes Panama but not the Dominican Republic.

2009 but staying well over 100 dollars per barrel. However, the forecast published at the beginning of the first quarter of 2009 show that prices fell from the average high of the second quarter of 2008 onwards, by much more than projected just two quarters before.

Economic growth in South America during the period also benefited from the favourable evolution of commodity prices and the favourable external financial conditions. Figure IV.9 presents the growth rates of Latin American countries during the commodity boom period, showing that twelve countries out of the group of nineteen shown in the graph registered on average a growth rate above 5% in the 2003-2008 period. Figure IV.10 shows the EMBI+ indexes for the region during the period, an indication of the favourable external financial conditions that prevailed until the onset of the financial crisis in 2008 and the subsequent increase in the cost of funding for Latin American countries.

Within this context, it clearly emerges that both monetary and fiscal policymakers in the region had significant incentives during the period to monitor commodity prices and the economic environment (the "state of the world") in general, as there was substantial uncertainty.

Figure IV.10
DAILY EMBI+ INDEXES OF SELECTED SOUTH AMERICAN COUNTRIES, 2005-2009



Source: Author's compilation, based on J.P. Morgan data.

As indicated by Rigobón (2008), policymakers in theory have several possible ways in which they can "insure" against variability in public revenue. In order to partially insure themselves in the face of future "state of the world" uncertainty, some countries exercised fiscal restraint during boom times, thereby increasing the inter-temporal sustainability of fiscal policy and reducing vulnerability to negative future shocks. In particular, Chile used its sovereign copper stabilization fund, together with its structural balance rule, to accumulate resources for future use during a downturn in the price of copper. In several countries,
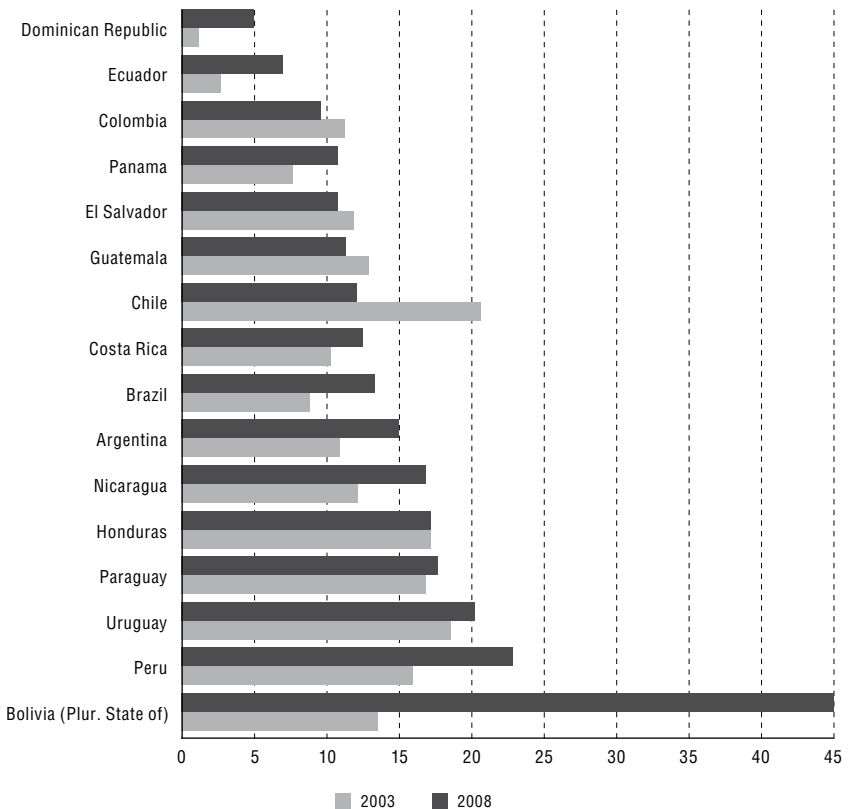
Figure IV.11
CENTRAL GOVERNMENT GROSS DEBT LEVELS, 2003-2008
*(Percentage of GDP)*
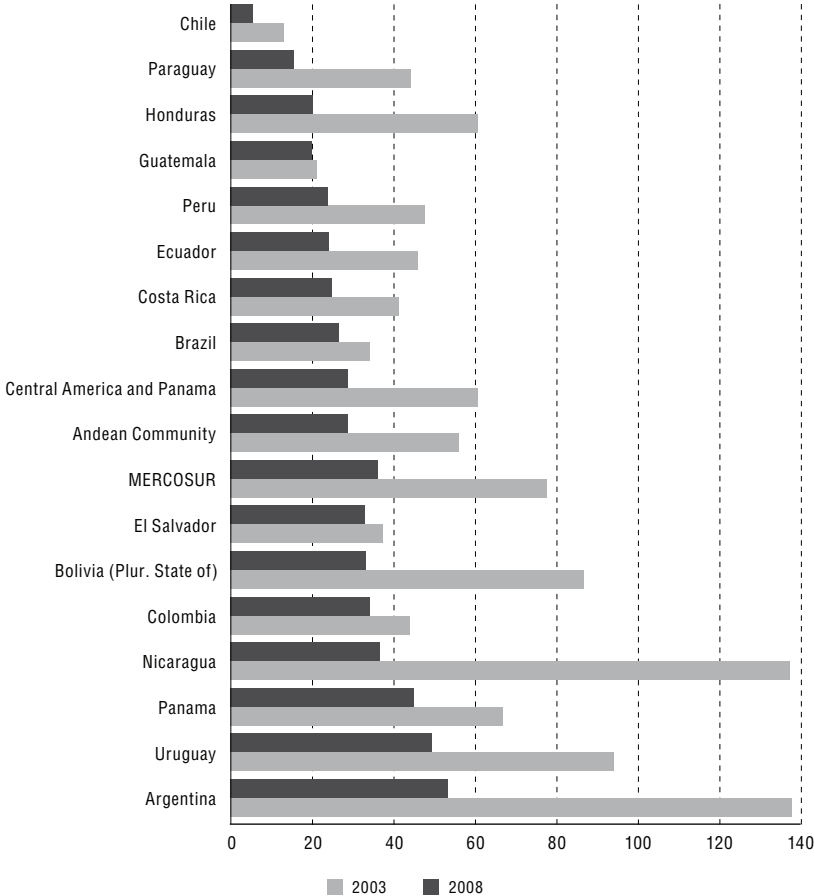


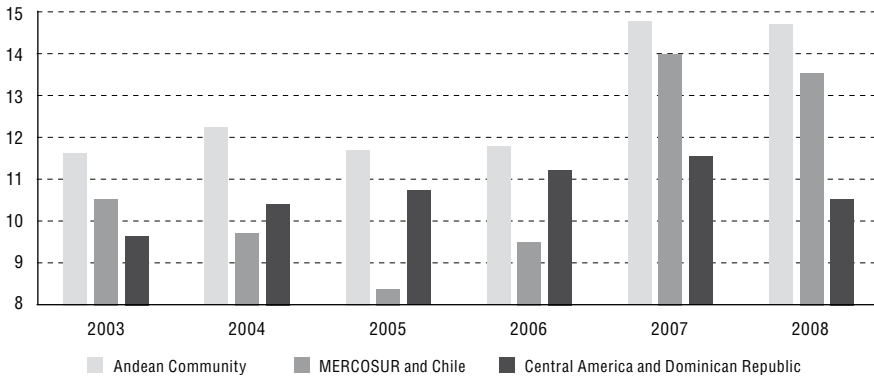Source: Author's compilation, based on ECLAC data.

fiscal surpluses combined with economic growth (and, in some cases, exchange rate appreciation and in others, debt forgiveness programmes) led to reductions in debt/GDP ratios, as shown by figure IV.11. In the third place, several central banks in the region accumulated international reserves. For example, that was the case of Brazil, which registered large capital inflows and current account surpluses, as well as Peru, where an important part of the financial system is vulnerable to exchange rate risk due to the level of dollarization of the financial system. Accumulation of reserves during the period can be seen in figures IV.12 and IV.13. Lastly, some Latin American countries (notably, the Plurinational State of Bolivia

Figure IV.12
NET INTERNATIONAL RESERVES, 2003-2008
*(Percentage of GDP)*



Source: Author's compilation, based on ECLAC data.

Figure IV.13
INTERNATIONAL RESERVES BY TRADE GROUPING, 2003-2008
*(Percentage of GDP)*



Source: Author's compilation, based on ECLAC data.

and Peru)[5] that closely monitor the behaviour of capital inflows (as they might be more vulnerable to "sudden stops" (Calvo, 1998) due to balance sheet effects) reduced their vulnerability during the period using de-dollarization of financial institutions' liabilities.

## 2.   The second period: supply-side inflation and real exchange rate appreciation

The second identifiable sub-period started in around the latter half of 2007 and lasted until mid-2008, when the global financial crisis exploded in earnest. This second period can be characterized by a large increase in supply-side inflation across the region which took place in parallel with the advent of the sub-prime crisis in the United States and increasing signals of economic growth deceleration in industrial countries, followed by the successive appearance of losses in financial institutions around the world.

While commodity prices increases until the first half of 2007 had not had a large inflationary impact, price increases in food, energy and construction materials at that time started to have a serious inflationary

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[5]   The two most dramatic examples of this process of de-dollarization during the period are the Plurinational State of Bolivia and Peru. In Bolivia, adding up sight deposits, savings deposits, fixed term deposits and other obligations of the financial sector, while in December 2002 dollar deposits constituted 92.3% of the mentioned aggregate, by June 2008 they were 53.4%. In Peru, the dollarization of the liquidity of the financial sector was 52.3% in December 2002, and had reduced to 27.5% of the total by June 2008.

impact on the region, as shown by the regional consumer price indexes shown in figure IV.14. In Latin America, the sub-region that was probably the worst affected was Central America, as it had not benefited from a terms of trade improvement, as the countries were net importers of commodities suffering large price increases, such as petroleum and maize. The inflationary shock experienced by Central America and the

Figure IV.14
12-MONTH VARIATION IN THE CONSUMER PRICE INDEX, 2005-2009
*(Percentages)*



······· Andean Community        ────── Central America, Panama and Dominican Republic
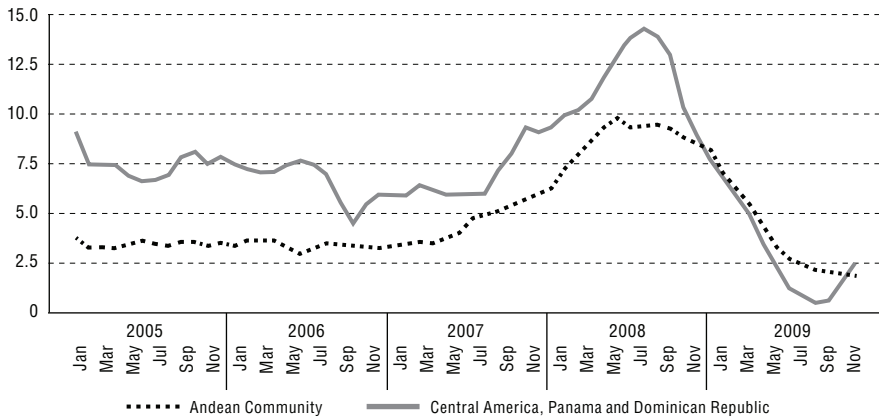
Source: Author's compilation, based on ECLAC data.

Dominican Republic[6] during the period was particularly worrisome for policymakers, as monetary policy was perceived by some agents in the region to be an insufficient tool to face the inflationary supply shock. There were at least two reasons for this. In the first place, Central American countries that had experienced significant real effective exchange rate appreciation (like Costa Rica and Guatemala) feared that that aggressive contractionary monetary policy might result in the further appreciation of the nominal exchange rate, by attracting capital inflows at a time of significant weakness of the United States dollar. As shown in figure IV.15, countries in the region had experienced real effective exchange rate appreciation in recent years. Second, the region has two dollarized countries that do not have a monetary policy: El Salvador and Panama, and two others with limited capacity to use monetary policy as an anti-inflationary tool, namely Nicaragua and Honduras.

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[6]    In this chapter, we will group the Dominican Republic together with Panama and the rest of Central America. Although the Dominican Republic is geographically part of the Caribbean, it belongs to various cooperation and integration groups (such as the Central American Monetary Council) with the above-mentioned countries.

Figure IV.15
REAL EFFECTIVE EXCHANGE RATES: SELECTED CENTRAL AMERICAN COUNTRIES,
2005-2009
*(Index 2000 = 100)*
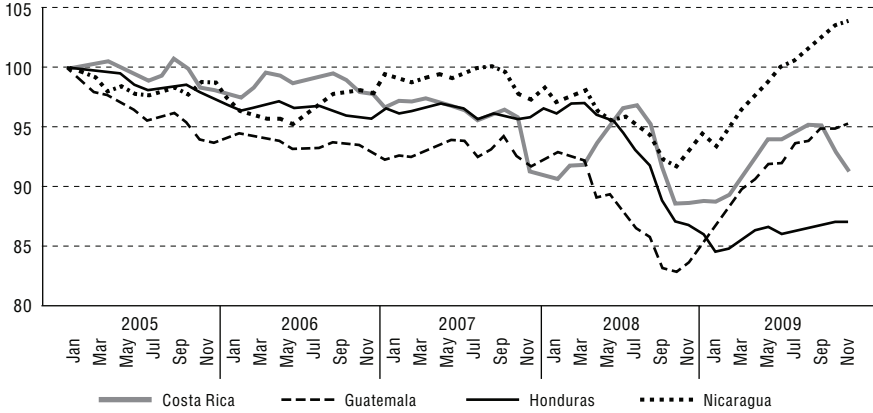


Source: Author's compilation, based on ECLAC data.

However, fiscal policy was not a very appealing alternative for countries in Central America and the Dominican Republic to use as an anti-inflationary tool, as the fiscal space existing in the sub-region was very limited:

- tax revenue as a percentage of GDP was low in comparison with other countries in Latin America and elsewhere as shown by figure IV.16,

- the unsatisfied demand for public expenditure was large, as several countries in the region have high poverty rates, including the Heavily Indebted Poor Countries (HIPC) Honduras and Nicaragua; and

- a study sponsored by REDIMA (Cabrera, 2009) covering Costa Rica, Guatemala and Honduras found that the degree of budget rigidity[7] in these countries (and possibly others, according to discussions in relevant REDIMA meetings) was very high.

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[7]    Budget rigidity is defined by Echeverry, Fergusson and Querubín (2005) as "…*the impossibility for policymakers to change the composition or size of the budget in the short run (whether it be on the revenue or expenditure side) due to the existence of constitutional or legal protection for certain revenues and/or expenditures of the government.*", pp. 4.

Figure IV.16
CENTRAL GOVERNMENT TAX REVENUE, 2003-2008
*(Percentage of GDP)*
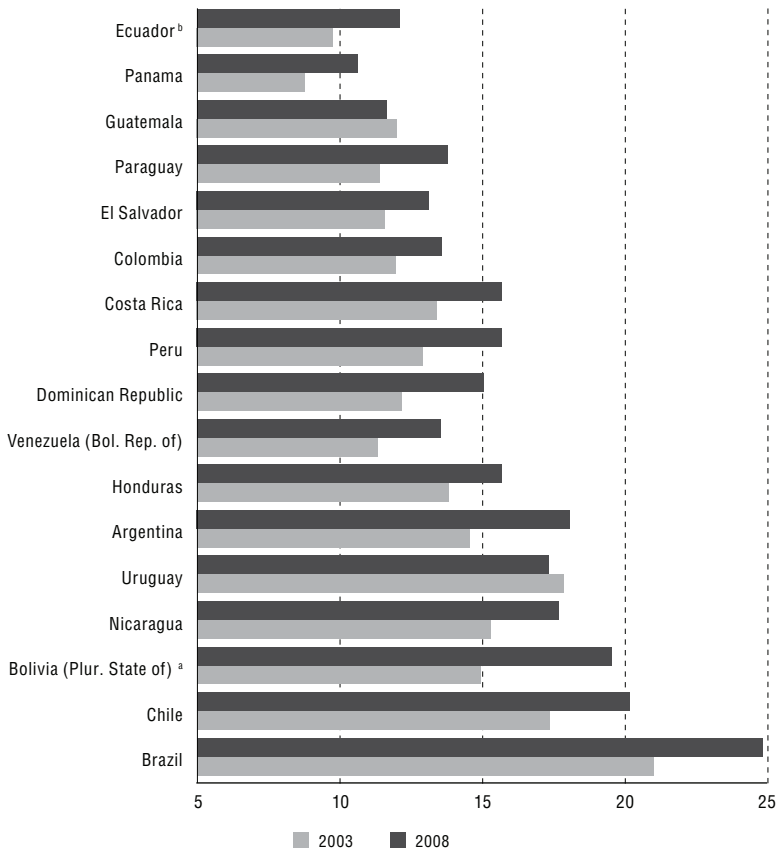


Source: Author's compilation, based on ECLAC data.
[a] General government.
[b] Public Sector.

All this resulted in the very few degrees of freedom for using fiscal policy as an effective anti-inflationary tool, even overlooking well-known caveats in the economic literature about that use of fiscal policy (such as long lags in decision/implementation, the introduction of distortions resulting from subsidies and so on).

In this period, which was marked by the exogenous inflationary shock, uncertainty was also an extremely important element in analysing policy alternatives to deal with this shock. In the first place, as the persistence of the shock was at the time very uncertain, the authorities of

some central banks were cautious about whether to adopt an aggressive monetary contractionary stance without knowing whether the shock would lead to just a temporary price increase or to an increase in the inflation rate, especially in cases where the exchange rate had already appreciated substantially in the past. In the second place, the uncertainty about the future of commodity prices continued unabated (see figures IV.7 and IV.8). This combined with uncertainty about the structure of the economy in different countries. For example, it was not clear how big the contraction in monetary policy should be to rein in inflation expectations and what effect that would have on economic growth, international competitiveness and in terms of social impact such as unemployment and poverty.

This second period, marked by inflation, concluded with the explosion of the global financial crisis in mid-2008.

## B.   Applying theory: a real-world "cooperation for learning" experience

Chapter III of this book presented the "cooperation for learning" approach to international macroeconomic cooperation. This approach is based on the idea that, in an uncertain environment, policymaking institutions from different countries can benefit from regular cooperation by learning from one another so as to implement welfare-superior macroeconomic policies.

As explained in that chapter, the objective of "cooperation for learning" is not to address the existence of real spillovers among countries carrying out macroeconomic policy8 spillovers arising from international trade linkages or the interconnectedness of financial markets). Rather, "cooperation for learning" aims to help countries to attain their own macroeconomic policy objectives independently of the existence (and strength) of real-world cross-country spillovers (in terms of international trade or capital flows). "Cooperation for learning" takes advantage of the existence of informational spillovers that arise when policymakers carry out macroeconomic policy in a context of uncertainty about the structure of the economy, the current and future states of the economy, the net value to policymakers of a complex policy tool (such as tax reform) and so on.

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[8]   Internalization of spillovers via joint policymaking is one form of addressing spillovers, as described in chapter II.

This chapter deals with the practical application of the concepts presented in chapter III. Specifically, this chapter reviews the work carried out between 2005 and 2008 by the Macroeconomic Dialogue Network in Latin America (REDIMA).[9] The description and analysis of this experience provides an interesting real-world case study of the actual implementation of an international macroeconomic cooperation effort based on the idea that learning from others can help policymaking institutions operating under conditions of pervasive uncertainty (about the "state of the world" now and in the future; about the structure of the economy, including the correct theory, models and parameters to use to model it; about the net value of complex policy tools that could be employed and so on), in order to improve the capacity of Latin American countries to attain their own macroeconomic objectives. We also include a brief reference to other "cooperation for learning" networks tin both developed and developing countries, which points towards the potential universality of the approach to international cooperation using learning networks.

## C.   The emergence of sub-regional links for macroeconomic cooperation in South America and REDIMA I

At the beginning of the new millennium, South America witnessed the formation of two sub-regional official groups composed by senior technical-level officials from Ministries of Finance and central banks,[10] centred around existing trade blocs. These groups were created around regional integration initiatives like the Andean Community or MERCOSUR, as strong international linkages (mainly through trade) can lead to spillovers of domestic macroeconomic policies on other countries. As regional blocs were especially concerned with fostering trade among their members, it was natural that monitoring groups would be created around them. In the cases of MERCOSUR and the Andean Community, these groups were originally created to monitor whether countries in both sub-regions met macroeconomic targets (especially fiscal results and debt levels) set by the authorities (in other words, to carry out macroeconomic surveillance). These groups were also created to contribute to the efforts of member countries in each sub-region to meet their national objectives of fiscal sustainability and monetary stability in a context of uncertainty,

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[9]    REDIMA stands for REd de DIálogo MAcroeconómico, literally, Macroeconomic Dialogue Network in Spanish.

[10]   In the case of the Permanent Technical Group (GTP) of the Andean Community, the group also included officials from economic planning entities.

especially due to changing international conditions.[11] The specific mechanism that would be used to attain the latter objective, though, was left unspecified.

In MERCOSUR a group of technical officials under the name of Macroeconomic Monitoring Group (GMM in Spanish) was created in April 2000 to elaborate and monitor a common methodology for the harmonization of fiscal statistics.[12] The following year, during the 5th meeting of the Council of Ministers of Finance, central banks and institutions responsible for economic planning of the Andean Community held in June 2001, a similar group called Permanent Technical Group (GTP in Spanish) was created, and also started monitoring macroeconomic conditions in the area and the meeting of regional macroeconomic targets for debt, fiscal results and inflation.[13]

As described by Ghymers (2005), these developments were illuminated by (and in the case of GTP emerged from)[14]the implementation of the initial phase of the REDIMA project, which started in 2000 and ended its activities in late 2003.[15] This project was jointly funded by ECLAC and the European Commission. According to Ghymers (2005), the objective of the project was to enable coordination in the Latin American macroeconomic area in, in order to foster macroeconomic convergence and regional integration. The tools used to achieve that objective were dialogue forums at the sub-regional level (MERCOSUR, Andean Community and Central America) to increase the flow of information among member countries.[16]

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[11]   This objective appears almost word-for-word in the official document explaining the objectives of MERCOSUR's Macroeconomic Monitoring Group. See http://gmm. mecon.gov.ar/pdf/pres-gmm-esp.pdf. Similarly, in the Central American Monetary Accord signed by the countries in 1999, Article 2 includes among the objectives of the Accord to: "… ñ) *Act in a coordinated way in international monetary relations and foster financial cooperation with other regional and international entities; and o) Maintain a permanent information and consultation system with the purpose of harmonising the means of action and instruments of monetary, exchange rate, financial and credit policies, as well as the methodologies and ways of calculating statistics and economic-financial indicators*". See www. secmca.org/Docs/inf_Juridica/REGIONAL/AcuerdoMonetario.pdf.

[12]   See the group's website for more on its past work, including the minutes of past meetings, at http://gmm.mecon.gov.ar/.

[13]   See the yearly publications of the period 2003 – 2007 of this macroeconomic monitoring process in the Andean Region at www.comunidadandina.org/economia/.

[14]   See Ghymers (2005), pp. 149 – 151 and the references therein.

[15]   The official closure of the project came later, with the publication of Ghymers (2005).

[16]   "*The resulting work [of REDIMA] was expected to create a climate of trust among different experts, generating a community-based culture and synergies through better communication and understanding among policy makers*", Ghymers (2005), pp. 146. The author presents a complete review of the motivations that led to the creation of REDIMA, the resources available, and the work carried out in the region.

The idea of improving information flows was based on the (implicit) belief that one of the main problems that hindered coordination in Latin America was informational. According to this view, an increase in the understanding by all players about the motives, objectives and constraints of different players, by reducing uncertainty, could help coordination (Heymann, 2001).[17] It must be noted that this view of the advantages of dialogue as a tool for facilitating macroeconomic coordination also appears in a significant part of the international coordination literature.[18]

The first phase of REDIMA involved three important achievements. First, it introduced a methodology for conducting macroeconomic dialogue at the sub-regional level; second, it was instrumental in the creation of the official Permanent Technical Group (GTP) of the Andean Community in 2001; and third, it contributed to the establishment of the monitoring mechanisms of the macroeconomic convergence targets in the Andean Community. In this way, the first stage of REDIMA constituted a key foundation upon which subsequent work leading to "cooperation for learning" in Latin America would be based.

Overall, these early efforts were mainly focused on addressing existing or potential channels for the transfer of real-world spillovers within a sub-region and caused by macroeconomic developments such as exchange rate movements. These initiatives were also keen on contributing to the improvement of dialogue mechanisms at the technical level between countries in the region, as the latter was seen as an important initial step for advancing towards further macroeconomic cooperation initiatives and regional integration. During the period, there were other fora for macroeconomic dialogue in the region, including the activities of the Center for Latin American Monetary Studies in Latin America and dialogue efforts by the Bank for International Settlements and the Inter-American Development Bank.

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[17]    Although neither Ghymers (2001) nor Ghymers (2005) make explicit the model of coordination underlying the work of REDIMA I, they refer to REDIMA as a tool capable of allowing Latin American countries to "escape a prisoners' dilemma" of policy "lack of coordination". Cárcamo-Díaz (2005) looks into other theoretical possibilities in order to analyse the work of REDIMA using non-cooperative game theory.

[18]    For example, Meyer et al. (2002) indicate that dialogue at international forums can potentially help countries playing a repeated game (which due to the "folk theorem" of repeated games, has multiple equilibria) to coordinate on the "cooperative" outcome. Cárcamo-Díaz (2005) suggests that macroeconomic dialogue, as "cheap talk", can help national authorities to coordinate on a Pareto-improving Nash Equilibrium in a static game of multiple equilibria like the *Stag Hunt* game.

## D.    Focus on regional "cooperation for learning": REDIMA II

By the end of 2003, when the first stage of REDIMA was completed, Latin America was starting to feel the effects of the incipient boom in the international prices of commodities exported by the region, in a context of easy international money. This contrasted sharply with the previous years, marked by low growth and high volatility in the region.

In parallel to these developments, policymakers (especially at central banks) and academia began to pay increasing attention to the study of macroeconomic policymaking under uncertainty (Greenspan, 2004; Sims, 2002 and 2008; Brock, Durlauf and West, 2003). Around that time, ECLAC started working on the implementation of a further deepening of the REDIMA network, to be called REDIMA II, in the belief that the project had significant possibilities in terms of its capacity to simultaneously foster regional cooperation and contribute to improved domestic policymaking.

The second phase of the project (REDIMA II) started in December 2004 and finished in September 2008.[19] The objective of the second phase of REDIMA was to foster dialogue and technical cooperation among policy-experts and senior technical officials directly involved in policymaking from Ministries of Finance and central banks of Latin American countries.

In particular, the project expected to chalk up two accomplishments. First, REDIMA II aimed to build and strengthen links among Latin American government institutions in the macroeconomic area, in order to facilitate policy cooperation within the framework of regional integration. As shown in chapter III, international organizations have an important role to play in subsidizing the establishment of costly informational links among national institutions, as there is substantial ex ante uncertainty about the true values of those links.

Second, and acknowledging the importance of uncertainty in the conduct of policy, the project also aimed to:

- help participating institutions to construct better policy analysis frameworks;

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[19]    This second phase of the project had two components: in addition to the macroeconomic dialogue component created during the first phase, a smaller statistical component focused on statistical cooperation and technical assistance activities that were carried out in order to strengthen domestic capabilities and to support economic analysis. In this book, we will refer exclusively to the macroeconomic component, as the focus is on the implementation of a macroeconomic cooperation as a learning tool initiative.

- provide instruments for the design and evaluation of macroeconomic policies (especially those with regional implications); and

- help countries improve the conduct of their macroeconomic policies in terms of meeting their own policy objectives (such as low inflation and sustainable fiscal policy).

This closely follows the roles identified by chapter III for international organizations in terms of fostering "cooperation for learning" networks among policymaking institutions in the macroeconomic area.

## E.    The tools used by REDIMA[20]

In order to attain its objectives, The REDIMA project employed four tools: link subsidies, coordination services, direct information and analysis provision, and identification of third-party information and analysis for the network to access. We will now discuss each of them.

### 1.    Link subsidies

The first tool used was the formation and strengthening of informational links among central banks and Ministries of Finance in Latin America. This was done by means of an informal network of senior technical economists from each institution.

The informal REDIMA network of the Andean Community and Central America gathered twice a year while the project was operating, and the MERCOSUR group gathered once a year. Additionally, the three groups gathered together once a year in a plenary meeting.

By subsidizing links to "cooperation for learning" networks, REDIMA addressed one of the market failures that might hinder the "natural" development of such networks, as identified in chapter III. This refers to the uncertainty faced by policymaking institutions when deciding on whether to participate or not in a "cooperation for learning" network.

The project financed[21] the explicit cost of the participation of one institutional representative from each Ministry or central bank in the periodic meetings of REDIMA. The meetings of the REDIMA Andean

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[20]    From now on, references to REDIMA will mean the Second Phase of REDIMA (REDIMA II, Dec 2004 – Sep 2008).

[21]    Specifically, the project paid the plane ticket and provided a lump-sum to cover the expenses of the officials participating in the meetings.

Community and REDIMA Central America networks complemented the work carried out by the official macroeconomic monitoring groups of the Andean Community (GTP) and, later, Central America (GTM),[22] and were closely coordinated. As meetings of the REDIMA network and the official groups took place on consecutive days, the project also subsidized the operation of both official groups.[23]

It must be noted, however, that REDIMA at most paid only some of the cost of each institution's link to the learning network. National institutions and other participating international or regional organizations also paid part of the costs of the links to the network. In particular, the time spent by senior officials preparing for the meetings, travelling and participating in them was very costly to the participating institutions in terms of the opportunity costs of their time. This was especially so for those institutions with less available qualified human resources, as is often the case in poorer, smaller countries. As Guilmette (2007) indicates, the visible cost of international meetings like those for the learning networks of REDIMA is only a small fraction[24] of the total costs of such a meeting.

During the implementation of the project, the provision of link subsidies may have been particularly relevant to ensure the participation of the Ministries of Finance of Heavily Indebted Poor Countries (HIPC) like the Plurinational State of Bolivia, Honduras and Nicaragua, due to limited availability of financial resources. For officials from the Ministries of Finance of other countries, subsidies may have helped to limit the negative impact that the complex internal administrative procedures may otherwise have had on the participation of representatives from those institutions.

## 2.    Coordination services

The second tool used to bring about "cooperation for learning" was the provision of coordination services. The ECLAC staff assigned to the project coordinated the organization of the REDIMA network's meetings. In two sub-regions, Central America and the Andean Community, ECLAC worked closely with the regional institutions fostering official

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[22]   In the case of MERCOSUR, the work of the official Macroeconomic Monitoring Group (GMM) and the informal REDIMA network remained separate, in spite of some GMM members also having membership of REDIMA. One of the reasons was the latter's focus on statistical harmonization during most of the period of operation of REDIMA.

[23]   There were large economies of scale involved.

[24]   In annex 1 of chapter 4 of his book, the author provides a back-of-an-envelope estimation of the total cost of such meetings at the OECD and finds that "hidden" costs are often many orders of magnitude larger than explicit costs like plane tickets, venues and so forth.

macroeconomic cooperation in each sub-region. In Central America, REDIMA partnered with the Secretariat of the Central American Monetary Council (SCMCA), while in the Andean Community, REDIMA worked closely with the General Secretariat of the Andean Community (SGCAN). The close integration between the agendas of REDIMA with those of the official groups (namely, the GTM and GTP) was a key element in the learning results obtained by the project.

Agendas were constructed based on feedback from the members of each sub-regional group, and from the requests by the authorities (Ministers of Finance and presidents of central banks) to the official Permanent Technical Group (GTP) in the case of the Andean Community. At the end of each sub-regional meeting, every member of the network proposed what they considered to be the most important topics for future analysis, and based on the popularity of the different proposals and the technical feasibility (in terms of time, resources and so on) of addressing them, they were included in the work agenda. Topic discussion often extended over multiple meetings. The topics for the yearly plenary meeting were picked from those that were simultaneously of interest to two or more of the sub-regional networks.

The demand-led nature of the work of the network coordinated by ECLAC was a key element of REDIMA, for two reasons. First, in a learning network the members need to be willing to learn, to use the new information obtained from the network in their own learning processes. For this reason, *a priori* the more closely aligned the group's agenda is to its member institutions' learning interests, the more likely it is that learning will take place. Second, given the existence of imperfect or costly information transmission costs within policymaking institutions,[25] and given that the rank in the institution's hierarchy of its representative may be (and most likely is) endogenous,[26] the relevance of a learning agenda may significantly contribute to securing the participation in the REDIMA network (and in the official meetings of the sub-regional monitoring and discussion groups) of country officials senior enough to be involved in the policymaking process. In summary, the ex ante likelihood that learning will take place is influenced by a relevant agenda directly and indirectly via the endogeneity of the rank of the participating institutions' representatives.

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[25]  This may be due to aspects such as limited codifiability of knowledge and inefficient and ineffective internal channels of communication within governments.

[26]  If the authorities perceive that meeting attendance will not sufficiently advance their own objectives, they may send somebody with less expertise or closeness to policymaking in order to reduce the opportunity cost to the institution of sending a representative to the meeting. There is plenty of anecdotal evidence to suggest this is so in many countries in the region.

During the execution of the project, in order to maximize their policy relevance, agendas[27] closely followed the uncertainty created by the economic environment in the different sub-regions of Latin America, as well as perceived national (and regional) challenges. There are examples of this in both the Andean region and in Central America.

A first example is the interest that the Andean Community REDIMA group (and the official Permanent Technical Group (GTP))[28] started to show, from the second half of 2006, in analysing the potential situation of the region's countries in the face of a potential turnaround in the extremely favourable terms of trade (described in section A.1 of this chapter). This work naturally complemented the ongoing macroeconomic monitoring work carried out by the group, focusing on economic conditions in the region. That interest led to discussions and analysis during the series of four meetings from October 2006 onwards on the degrees of freedom of the fiscal authorities to conduct fiscal policy in the event of a turnaround in the favourable external conditions, and on the extent to which the economies of the Andean countries were vulnerable. Different facets of this issue were analysed by the group, including the degrees of rigidity of the budgets of the countries in the region (which were found to be very high), the potential risk posed by contingent liabilities, the advances in changing the composition of foreign debt, and other sources of vulnerability and potential remedies, dependent on the evolution of the external and internal environments in the region's countries. It must be noted that, as shown above, the future evolution of the region's terms of trade was uncertain, and that the latter continued to rise rapidly in 2006, 2007 and 2008. With hindsight, these efforts by the Andean REDIMA group can be interpreted as a learning effort to address future changes in the state of the economy in a forward-looking way , based on the collective belief that the concurrently observed boom in commodity prices might not persist in the long term.

A second example is the interest shown by the Central American REDIMA group in fostering closer coordination between central banks and Ministries of Finance within each country. In this case, the interest

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[27]  For details on the agendas of the meetings of different REDIMA groups, see www.eclac. org/redima.

[28]  The agendas of the meetings of this technical group containing the topics analysed can be found at www.comunidadandina.org/economia/convergencia.htm#Grupo%20 T%C3%A9cnico%20Permanente.

of the group on this topic emerged in the second half of 2007, as the sub-region started experiencing a very negative terms of trade shock due to the increase in the commodity prices of products imported by the region, such as food and energy. In a context of the limited capacity of several countries in the region to rely exclusively on monetary policy to counter the negative impacts of imported inflation,[29] the need for coordination of monetary and fiscal policy was clear to see. Additionally, the emerging problems in the financial sector of the United States (the region's larger trading partner) due to the sub-prime crisis also stimulated interest in monetary and fiscal policy coordination via another channel: the capacity of the sub-region's central banks to accept large losses (due to continued exchange market intervention or due to their role as lender of last resort). From mid-2007 onwards, during two regular meetings of the REDIMA group and the official GTM and an ad-hoc seminar, the group worked on analysing ways to improve monetary and fiscal policy coordination in the countries in the region.

## 3.    Direct information and analysis provision

The third tool used by the project was more redolent of the regular work of international organizations. As a direct response to the willingness of each sub-regional network to address specific macroeconomic policy topics, ECLAC carried out original applied and empirical research on the topics on the different agendas of the REDIMA sub-regional networks. More specifically, the project produced a number of research studies specifically designed to illuminate the discussion and analysis of the different networks, including estimations of fiscal rigidity in seven countries, analysis of the perspectives of coordinating fiscal policy for the construction of multinational transport infrastructure projects in South America and estimates of exchange rate misalignment in the Southern Cone. By sponsoring these studies and the participation of experts carrying them out in the meetings of the network, REDIMA provided expert signals about uncertainty-laden topics in order to enrich the quality of the analysis carried out by the learning network.

This "knowledge development" role (Gilbert, Powell and Vines, 1999) played by ECLAC with REDIMA is common to several (if not most) international organizations working in supporting economic

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[29]    This was particularly marked for those countries in the region without an independent currency (such as El Salvador, Panama and Ecuador) or whose monetary policy was subordinated to objectives other than inflation control like that of exchange rate anchor.

development[30]. According to Krueger (1998), this role of international organizations encompasses the wide spectrum of activities that range from the collection and dissemination of statistics to the research and analysis of specific issues, in particular the connection between the "scientific" and the policy aspects of economic issues of policy relevance.

## 4.    Identification of third-party inputs

The last tool employed by REDIMA was to leverage ECLAC's own connections to national, regional and international institutions, academia and the private sector, in order to secure the access by the REDIMA networks to third-party information and analysis on the topics subject to a learning process. That meant that REDIMA members not only discussed ECLAC's documents, analysis and policy proposals, but also profited from the participation in different meetings of assorted experts on the different subjects. This included government officials experienced in dealing with the topics under discussion, academics who could contribute to the learning process by the REDIMA members and experts from other institutions (mainly international organizations). Special efforts were made to coordinate with other institutions carrying out research, technical assistance and monitoring efforts in Latin America, especially in order to maximize the number of opinions and analysis available to the participating institutions in each sub-region. In this way, the "cooperation for learning" effort of REDIMA addressed the potential "royal family" effects of learning networks described in chapter III.

In practice, this involved maintaining close contact with experts from other national, regional and international organizations with valuable expertise on the topics under discussion. Interestingly, the contact between ECLAC and officials from central banks and Ministries of Finance within sub-regional networks facilitated the participation of officials from national policymaking institutions in other sub-regional groups. The significant amount of relevant expertise on specific policymaking subjects accumulated by these officials (such as the implementation of inflation targeting schemes and the measurement of contingent liabilities), especially state-contingent experience, was found to be very valuable to the members of other sub-regional

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[30]    The justification provided by those authors for international organizations playing this role is the strong "public good" character of development research, due to their belief in the existence of significant economies of scale in its potential use: "*Knowledge about what constitutes good development policies is to a large extent generic rather than country-specific; what works well in one country will, at least to some extent, work elsewhere. Knowledge of this kind has aspects of a public good, requiring a global solution to the provision problem*" Gilbert, Powell and Vines (1999), pp. F615.

networks. As an example, the Central Bank of Colombia twice sent experts to the discussion of key monetary policy topics for Central America, such as the conduct of monetary policy in an environment of significant exchange rate appreciation pressures, as well as the practical implementation of measures to reduce within-government uncertainty and foster closer coordination in the implementation of macroeconomic policy within a country.[31]

Therefore, the technical discussions were solidly anchored on a combination of endogenously generated studies in those areas closer to ECLAC's expertise, together with the diffusion of the work carried out by other experts, including those coming from other international organizations, academics, the private sector or national authorities from both within and outside Latin America. Following Cohen and Levinthal (1990), the idea was to not only provide signals emanating from ECLAC's technical knowledge about the macroeconomic policy issues of interest to the countries, but also to provide ECLAC's knowledge about who else could provide additional views on the issues at hand in order to increase the capacity of learning of the countries in each sub-region.[32]

## F.    Implementation challenges and responses

During the implementation of the REDIMA project, several significant implementation hurdles were encountered. This section briefly reviews two of those implementation challenges and how the project responded to them. The first challenge was caused by the imperfect nature of internal communications within participating policymaking institutions in the "cooperation for learning" network, while the second one related to the social nature of the learning network, in particular, the heterogeneity of the members of the network in terms of their personal characteristics.

### 1.    Imperfect internal communication within policymaking institutions

While the economic literature on networks assumes that building relationships that lead to communication between nodes/ participants (see Bala and Goyal, 2000 and others reviewed in Goyal, 2007) is sufficient for those agents to learn, this ignores the reality that institutions are complex entities that differ from the "single

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[31]   This is especially important for countries like Colombia, which have independent central banks and follow an inflation targeting scheme.

[32]   This is what Cohen and Levinthal (1990) call "*the knowledge of who knows what and who can help with what problem*", pp. 133.

rational agent" assumed by the traditional model of international macroeconomic policy coordination reviewed in chapter II.[33] In practice, the issue of information transmission within each node of a learning network (namely a central bank or a Ministry of Finance) also needs to be analysed and addressed. This is so due to the multiplicity of agents who interact within each institution, and is important because internal communication failures and inadequate absorption capacity within an institution may hamper the learning process of policymaking institutions. As has long been acknowledged by the development literature (such as Keenleyside, 1952),[34] the institutional characteristics of public institutions are essential for learning to take place.

The issue of imperfect internal communication makes the hierarchical seniority of the participants of learning networks relevant. One could think that the further from decision-making an official from a policymaking institution is, the higher the risk that at least part of the learning resulting from the official's participation in a learning network will not influence policymaking in the short run.[35] That may be due to the increase in the length of the path that knowledge (part of which is not easily codifiable) needs to travel, and the increased likelihood that adding length to the communication path makes full transferability of knowledge more difficult. Also, as noted by Thygesen (2008) for the case of the "peer review" process of the Economic Development and Review Committee of the OECD, for learning to occur, all the countries have to collaborate by assigning adequate senior officials capable of actively participating in the process. This is necessary for each country to be able to match the resources committed by other countries participating in the

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[33] See chapter II. Note that the issue under discussion is NOT the lack of coordination among distinct policymaking institutions. Instead, we refer to the knowledge and information flows that are transmitted within a given (one) institution.

[34] Keenleyside (1952) clearly enunciates the need for adequate public administration, which is as a key component of the absorptive capacity of an institution: "*…of all the characteristics of national underdevelopment, administrative inadequacy is the most prevalent, the most difficult to overcome and the least likely to be recognized, or if recognized, to be admitted, by the governmental authorities concerned*" pp. 345; "*Experience is making it increasingly apparent that in many of the underdeveloped nations the failure to organize and adequate system of public administration is the first and one of the greatest of the handicaps that must be overcome by those who are engaged in the constructive task of helping nations to help themselves to overcome the impediments that have held them back in the gradual progression of men and states towards a higher level of economic activity and of social welfare*", pp. 347.

[35] Arguably, even if no learning takes place in the short run, participating officials may be enriched by the experience and benefit from it in several years time as they climb up the hierarchy. However, we prefer to focus on shorter-term impacts of the learning experience.

process.[36] On the other hand, one can also think that the opportunity cost for senior officials of participating in learning activities increases with seniority, as they are responsible for increasing amounts of supervision and decision-making within their own institutions. That means that, in the face of unexpected events that prevent their participation in the meetings of the learning network, senior officials may not be able to participate regularly in cooperation for learning activities. Therefore, one can think that ex ante there might be a trade-off between the advantages and the costs of setting up a cooperation network that works with senior officials.

Acknowledging this trade-off, REDIMA focused from the beginning on linking together the senior technical-level officials from the central banks and Ministries of Finance of each sub-region of Latin America rather than policymakers themselves. There were several reasons for focusing on technical officials. First, Ministers of Finance and presidents of central banks often delegate the design and implementation "nuts and bolts" of policies to their senior technical-level officials, concentrating instead on top level decision-taking, setting strategic directions and purposes of the policies to be implemented, as well as obtaining necessary political support for initiatives. It is often on the design and implementation details of a complex policy instrument (and its analysis) that a substantial difference can be made in terms of economic impact by learning from other experiences or incorporating new concepts and ideas. Examples of this are the technical efforts being carried out by the central banks of Costa Rica, the Dominican Republic and Guatemala to implement inflation targeting schemes. Second, Latin American policymakers such as Ministers of Finance and presidents of central banks have often only a limited capacity to invest the necessary amounts of time that technical exchanges and discussions require, given the profuse (and sometimes pressing) demands on their time, while the restrictions are often less binding in the case of technical-level senior officials.

Further, the challenge posed by internal communication difficulties brings to the spotlight the problem posed by frequent changes (volatility) in the officials participating in the activities of the learning network. In the presence of communication imperfections, large volatility in participants may hinder the learning process by their institutions, as

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[36]  "…member countries have to continue to take the OECD peer reviews process seriously by providing experienced national policy officials to serve as Economic and Financial counselors at the OECD, i.e. as well-informed participants in the peer review process, to match the very considerable expertise brought by the authorities of the country under examination" Thygesen (2008) pp. 145. The same can be said about international organization officials participating in the process.

communication of knowledge within their policymaking institution might become more difficult. These problems have also been identified by Guilmette (2007)[37] as affecting multinational networks. As there are some indications that, in many Latin American countries, Ministers of Finance change more frequently than other technical-level senior officials in the Ministry of Finance, this provides another reason to focus on senior technical officials rather than policymakers as agents of learning within policymaking institutions.

In any case, even if senior technical-level officials are *a priori* believed to be less "volatile" in their participation in meetings than policymakers, the need to reduce the volatility of the former remains essential. In the presence of costly transitions between different officials (due to limited capacity to transfer accumulated knowledge), there are advantages of continuity in the dialogue and technical exchanges, which benefit from the lower volatility of the technical-level authorities. In REDIMA, to address the issue of officials' participation volatility, authorities were asked to designate a person (and a substitute) to fulfil the role of representative of the respective institution in REDIMA. In almost all cases[38] in the Andean Community and Central America, the same person represented his/her institution in both REDIMA and the corresponding official sub-regional dialogue and monitoring group. The idea was to try to minimize the turnover of representatives, due to the costs of changing representatives in terms of the continuity in the flow of information within the participating institution. We believe this measure to have been relatively successful in reducing turnover,[39] although the latter was certainly not eliminated.

Ideally, a two-tiered system could be optimal, with the lower tier constituted by senior technical officials like those participating in the REDIMA network and the official GTP and GTM groups, and the upper tier constituted by both informal and formal networks of policymakers. An appropriate division of labour between both tiers would ensure the maximum amount of overall learning.

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[37]   "*Thirdly, country representatives constantly change as they are promoted or moved within their own bureaucracy. This creates discontinuities and needs for constantly re-explaining things to newcomers*" pp. 37.

[38]   There was only one exception.

[39]   In general, however, the turnover rate of representatives from central banks was substantially lower in all regions that the turnover rate of representatives from Ministries of Finance.

## 2.    The social nature of the networks and node heterogeneity

The economic theory of networks focuses on network shape, size, structure and so on, in order to analyse the dynamics of the learning process of a certain network. Leaving aside the multiplicity of agents and internal communication problems within institutions, it should be stressed that, in a "cooperation for learning network" where learning takes place in a social network, nodes are human beings, and they are a heterogeneous group. Therefore, *a priori* it is likely that exogenous differences between nodes (namely the personal characteristics of officials) will influence the real-world capability of a network to foster learning.

Guilmette (2007) emphasized the social nature of learning networks: "*Networks are clearly more than simply technical linkages. As social arrangements they depend for their success on durability on members who commit to one another on a personal level for joint exchange, action and learning. […]. Networks act as forums for social exchange and build shared ownership of ideas or products. They allow members and users to interact directly with one another, and to reconsider how they think or what they do as a consequence of this interaction*".[40] Simple observation of many meetings suggests the importance for the effectiveness of a learning network of exogenous factors like the personality of the officials named by the authorities to represent them (for instance, are they naturally curious, participative, eager to learn/share experiences, good speakers/listeners and so on?), and their level of expertise.[41]

Although an adequate analysis of the influence of individual (human) node characteristics in a social learning network is clearly beyond the scope of this chapter,[42] as such heterogeneity may be an important factor when actually implementing "cooperation for learning" initiatives, acknowledging the existence of this issue led to the REDIMA project adopting certain practices regarding the organization of meetings.

In the first place, there are indications that increasing the capacity of country officials to actively participate during REDIMA meetings' debate (both as speakers or commentators) served to increase the quality of the participation and probably influenced the degree of preparation for the meeting by officials. This was fostered by managing the agenda accordingly. For example, the number of participants was kept small

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[40]    Guilmette (2007), pp. 45.
[41]    Although the level of expertise is expected to be correlated with the seniority of technical officials, there is always bound to be some degree of heterogeneity among different officials.
[42]    Especially given my total ignorance of group psychology and other relevant areas of knowledge.

in relation to the amount of time available, so that everybody could participate actively and all participants appeared as part of the agenda in every meeting (committing them to preparing their participation before the meeting), among other pro-participation practices.

In the second place, the human nature of nodes leads to another challenge: how to align conflicting incentives faced by the country officials participating in the activities of the learning network. In particular, senior technical officials have a dual role as key elements for learning within national institutions, and as official representatives of their institutions. In their first role, officials have an incentive as technical experts to freely exchange views, information, opinions and analysis with their counterparts from other countries and institutions. In their second role, officials have an incentive as representatives of the institution (and the country) to limit their "taking of positions" to conveying the official view of those issues where that view exists.[43] This may be exacerbated in those cases where cooperation initiatives were formed around regional integration initiatives, due to the potential for trade-related tensions among member countries. Sobel and Stedman (2006) also found that increases in the number of people and institutions involved into the meetings of Ministry of Finance and central bank officials of the Group of Seven, and the existence of "official" groupings unrelated to technical exchange and learning, all affected the nature of the participation by officials, and not necessarily in a positive way.[44]

In order to separate one role from the other, the sub-regional REDIMA meetings (unlike the official GTP and GTM meetings, where official minutes were kept and later circulated to the authorities) were always carried out behind closed doors and without official records. The reason was that this allowed the representatives of each institution to engage in technical debate about the different issues under analysis without concern about potential negative consequences of making public the details of the discussion of the different technical issues. In our repeated requests for feedback from the REDIMA members (via periodic

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[43]  There are two possible reasons for this. First, the public views of representatives of an institution constitute information that might be used by other agents (in particular, the private sector) to update its beliefs about government intentions, achievements and so on, thereby making the management of public information an important policy tool (for expectations management, a critical issue in the conduct of forward-looking monetary policy.; see Woodford, 2003). Second, for socio-political reasons, the authorities of certain institutions might not be able to see that an official (no matter how senior) has views that might reflect negatively on the authorities. Both reasons might serve as deterrents for officials to abstain from making public views that deviate from the "official line".

[44]  "*As a result, many people are in the room, which tends to lead to more scripting and less candor among top officials. European efforts to coordinate positions in the G-7 with other EU states can further complicate informal exchanges*" Sobel and Stedman (2006), pp. 13 para 1.

surveys), we found time and again that participants valued this feature of the REDIMA network significantly, as it allowed true technical debate and opinion sharing that led to more effective learning.

The potential downside of not keeping minutes from the REDIMA meetings in terms of reduced transparency was neutralized by the complementary nature of the informal REDIMA network work and the official GTP and GTM groups, as the latter kept minutes and distributed them to the authorities. In this way, the previous informal discussion among peers during REDIMA meetings contributed to the depth and relevance of the official minutes of the GTP and GTM.

## G.    Results

The policy results of REDIMA, like those of other learning and technical assistance[45] initiatives: "*… are qualitative in nature and therefore difficult to quantify*".[46] Specifically, the results that are difficult to quantify include the policymaking impact of the technical analysis, discussion, sharing of beliefs about the "state of Nature" (current and future), sharing detailed technical information and debating on the different technical macroeconomic issues discussed by the sub-regional REDIMA networks.[47] What is difficult to ascertain about policy results is:

- How much learning took place as a result of the operation of the network?: in other words, how much the "cooperation for learning" experience influenced actual policymaking by participating institutions?

- What was the welfare impact of those policy changes that were influenced by the learning process resulting from participation in the network?

Answers to these questions are extremely difficult (or impossible) to obtain or even estimate other than qualitatively.

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[45] For example, in discussing the impact of the OECD work on national policy, Kildal (2003) states that: "*…the OECD committees may produce ideas and policy analyses that seep into member states' national policy debates without leaving clear traces of their original source. Even if the OECD does not have a direct impact on national social policy development, it is influential in a more indirect way, which makes it rather problematical to draw any firm conclusions about the significance of the OECD for national policies*", pp. 15.

[46] IMF (2005), pp 7, referring to the value added of the Regional Technical Assistance Centers.

[47] The qualitative surveys periodically carried out into the work of the REDIMA project, as well as the close following of the work of the network by senior officials (for example, as indicated by speeches of authorities, their participation in REDIMA events and letters to the donor and ECLAC expressing interest and satisfaction) are additional indications of these difficult-to-measure positive results.

Having said that, there is evidence that both the GTP of the Andean Community and the GTM of Central America during 2007 and 2008 set an agenda of theoretical and empirical analysis aimed at supporting the elaboration and implementation of better macroeconomic policies in the countries of the sub-region by using a learning approach. The work of these sub-regional groups, to different degrees, appears to have increased the capacity of countries to evaluate technically different policy instruments, needs, conditions (for which the availability of comparable statistical information is very important) and alternatives for the adoption of better policies at the domestic level. There was also an understanding that these would also help to make the region more stable and, therefore, increase the likelihood of closer integration and macroeconomic cooperation. Indications of these results appear in the publication of increasingly sophisticated and updated analysis and information,[48] although the measurement of impact of these groups on actual policymaking remains difficult.

Furthermore, we can identify two additional concrete positive results of the work of REDIMA, which will be reviewed next. The first result is the fostering of the institutions of "cooperation for learning" in Latin America, while the second refers to a concrete fiscal policy result of the learning network in the Andean Community.

## 1.    Network creation and strengthening

ECLAC's implementation of the second phase of REDIMA was a key contributor, working together with the Secretariat of the Central American Monetary Council, to the creation of the official Macroeconomic Work Group (GTM) of Central America, Panama and the Dominican Republic, which was a group composed of senior technical officials from the central banks and Ministries of Finance in the region. In particular, the informal REDIMA network and the Monetary Policy Committee of the Central American Monetary Council[49] were the platforms upon which the official GTM group was built. In 2007, the Council of Ministers

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[48]   For example, see the publication "Convergencia Macroeconómica" of the Andean Community, at www.comunidadandina.org/economia/convergencia.htm#Grupo%20 T%C3%A9cnico%20Permanente.

[49]   Made up of senior technical officials from the central banks of the sub-region, according to Article 32 of the Central American Monetary Accord of 1999: "*The Monetary Policy Committee will study and provide recommendations on the matters relative to the harmonisation, coordination, convergence and unification of macroeconomic policies of the Central American countries in general and of monetary, credit and exchange rate policies in particular*". See www. secmca.org/Docs/inf_Juridica/REGIONAL/AcuerdoMonetario.pdf.

of Finance of Central America, the Dominican Republic and Panama and the Central American Monetary Council sanctioned the creation of the Macroeconomic Work Group. The creation of this group opened up the possibility for the monetary and fiscal authorities in the region to benefit from the establishment of an institutionalized learning network that can technically help to improve the capacity of the region's countries to implement better macroeconomic policies.

In this network creation role, REDIMA addressed a market failure identified by the economic literature and described in chapter III. If potential participating institutions are ex ante uncertain about the net benefits of linking to a learning network, they may be averse[50] to committing resources to that end. International institutions have the capacity to subsidize initial network creation, reducing the problem of ex ante uncertainty about link value for each policymaker in a node of the network. We believe that REDIMA carried out that role in Central America with the creation of the Macroeconomic Work Group as a learning network. In the Andean Community, REDIMA played a similar network creation role with the pre-existing Permanent Technical Group by contributing to its transformation into a learning network, in as much as the only previous role of the group was mainly macroeconomic monitoring.[51]

To describe in more detail the learning networks that emerged from the work of REDIMA, it is useful to look at the case of the Andean Community. Figure IV.17 shows a stylized graph of the network structure of the sub-regional REDIMA network in the Andean Community. Triangles are central banks, diamonds are Ministries of Finance and circles are regional institutions that participated in most or all meetings of the network: ECLAC, the Secretariat of the Andean Community, the Latin American Reserve Fund and the Andean Financial Corporation. The changing group of experts from academia, international organizations and so on, who participated in the activities of REDIMA, should also be included in this figure, as (generally temporary) links were established with them.

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[50] For example, the ex ante subjective expected value of the net benefits may be low or have a very large variance.

[51] Alternatively, it could be considered that REDIMA worked by increasing the strength of the links between the members of the Permanent Technical Group so as to make them strong enough to allow them to learn from others. The literature of network formation where link strength is endogenous is still very much at the frontier of economic thought. For a recent paper on the topic that looks at homogeneous agents and perfect monitoring, see Bloch, F. and Dutta, B. (2008), "Communication Networks With Endogenous Link Strength", *Games and Economic Behavior* (2008 in press), doi:10.1016/j.geb.2008.03.007.

Figure IV.17
STYLIZED REPRESENTATION OF A REDIMA SUB-REGIONAL NETWORK
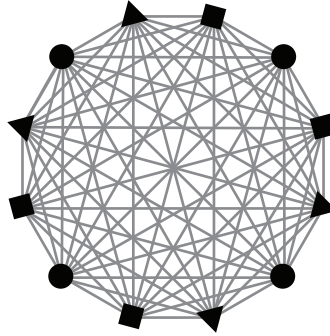


Source: Author's compilation.
Note: Circles are international or regional organizations; triangles are central banks and diamonds represent Ministries of Finance.

Figure IV.17 presents only a stylized representation of the learning network structure reflecting the "complete network" nature of links (Goyal, 2007) during meetings coordinated by ECLAC and its regional partners.[52] Note that the links of the network can be characterized as allowing the flow of information in both directions, therefore the most correct characterization of the sub-regional Andean REDIMA network was one of two-sided links.[53] As for the important question of who was the "sponsor" (i.e. who paid for the cost of establishing/maintaining the links among participants), while all the participating institutions generally incurred the opportunity cost of the time of their senior officials as a large part of the cost of maintaining the links, financial costs, such as ensuring the participations of many experts, were borne by the REDIMA project, and this was made possible thanks to the financial support of the European Commission. A similar characterization can be made for the Central American REDIMA network, and the official GTP and GTM networks in the Andean Community and Central America, respectively.

As the structure of the network was that of a "complete network", as shown in figure IV.16, it should be highlighted that attendance at a REDIMA/official meeting by one representative of a participating policymaking institution allowed the generation of links by all $n$–1 agents. Therefore, non-attendance[54] by participants imposed a cost on all

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[52]   As most information exchange took place during meetings, we present that structure in figure 11.
[53]   See Goyal (2007), chapter 9, for more on network building for two-sided link networks.
[54]   Assuming, of course, active participation in the learning process.

members, by reducing the maximum possible informational spillovers available from the process. This, of course, might lead to a self-fulfilling prophecy if left unchecked: if fewer members attend, the network is worth less and therefore fewer members are likely to attend in the future, in a negative feedback process. of the same applies to the seniority of the participants. For this reason, substantial effort was dedicated to ensure participation in all meetings by the most and the most adequate participants.

To conclude this section, a few words are in order on the topic of network formation.

The economic literature has recently dedicated a significant amount of attention to the analysis of network formation with both one-sided and two-sided link formation. For example, Jackson (2005) presents a detailed survey of models of network formation. However, network formation was not an important topic for the REDIMA II project, as network composition and shape were **exogenous**. Sub-regional REDIMA groups in both MERCOSUR and the Andean Community followed the membership of the official macroeconomic surveillance/monitoring groups mentioned above. As we have mentioned, those surveillance/monitoring groups, in turn, were constructed around existing sub-regional integration efforts like MERCOSUR and the Andean Community. However, the rationale for group (network) composition, that is, what institutions should be included in a macroeconomic cooperation for learning effort and how countries should be grouped, remains a very important point to be addressed in future work, especially to enquire deeper into the universality of the "cooperation for learning" approach.

Among the questions remaining are to what degree does heterogeneity among participating institutions (in terms of structural characteristics) foster or hinder learning. Latin American countries present a series of structural similarities in their economies (such as their heavy reliance on commodity exports, relatively low trade openness versus relatively high financial openness (Singh et al, 2005)) that often result in similar challenges at the macroeconomic policy level. This similarity in the "structure of the economy" may strengthen the possibility of country officials learning from the success and failures of structurally similar countries in conducting macroeconomic policy, in particular when addressing changes in the economic environment ("the state of the world") or introducing policy changes involving complex policy instruments. However, there may also be learning advantages from heterogeneity. For example, economies that are structurally more different (including exposure to different shocks) might look at the same "state of the world" from very different angles, and arrive at different,

but complementary signals that jointly may be more informative than more similar signals. Additionally, structural differences may lead different countries to acquire expertise with different types of complex policy tools that may later be of interest to others.

In the REDIMA Project, yearly plenary meetings were aimed at widening the possibilities for learning of country officials by increasing the pool of participating institutions to include all of Latin America. Another important advantage of larger plenary meetings was that the same costly signal (such a research paper commissioned from a well-known expert) could reach a wider set of nodes in a plenary meeting than in a sub-regional one. Notwithstanding the above, there are some indications that those meetings did not endogenously generate the same spirit of "ownership" among network members [55] as some of the sub-regional groups achieved. There are many reasons that may explain this, including the fact that the agendas by necessity had to be less tailored than in the case of the sub-regional groups, and this might have reduced the interest of the individual institutions for whose policymaking-related learning processes the chosen topic was of less interest or at least had a lower priority than others.

## 2.    Concrete policy results of learning

REDIMA, working together with the Secretariat of the Andean Community, contributed to the learning process by the Permanent Technical Group of the Andean Community that led to the introduction in 2008 of a series of "macroeconomic vulnerability indicators," in their yearly monitoring process of the macroeconomic evolution of the region's countries.

Macroeconomic monitoring, among other benefits, is believed to increase transparency in the conduct of macroeconomic policy.[56] This occurs because the macroeconomic monitoring process involves:

a)    presenting in an organized form the latest statistical information about the evolution of fiscal and monetary policy, as well as the evolution of macroeconomic variables that are influenced by them directly (such as inflation) or indirectly (such as employment);

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[55]    This was indicated by the degree of participation of all the delegates, their preparation, comments and so on.

[56]    For a discussion of the reasons for the increased trend towards transparency in the conduct of monetary policy and its effects, see Dincer, N.N. and Eichengreen, B. (2007), "Central Bank Transparency: Where, Why and With What Effects?" National Bureau of Economic Research Working Paper 13003, March 2007.

b)     explaining the factors believed to have led to the observed results of the different macro policies implemented, including the relevant empirical evidence;

c)     comparing the policies and results obtained against national and regional targets (if they exist)[57] or against other benchmarks.

In a context of uncertainty about the future policy actions of the government and with a forward-looking conduct of monetary policy, transparency is an important pillar of modern policy-making.

In both MERCOSUR and the Andean Community, countries carry out macroeconomic monitoring at the official sub-regional groups: Macroeconomic Monitoring Group and Permanent Technical Group, respectively.[58] In the Andean Community, in the period 2004 – 2008 this process benefited from three measures that increased the transparency of the whole effort. First, each country's ex post report about macroeconomic convergence was evaluated by an economist not belonging to the public sector, which is a priori less inclined to automatically approve the official view. Second, these reports were also monitored by one international institution (ECLAC) and two regional institutions (the Latin American Reserve Fund and the Andean Financial Corporation). Third, the countries' official reports and the opinions of the other monitors are all published both online and in print in a yearly publication by the Secretariat of the Andean Community.[59]

During the years 2005, 2006 and 2007, macroeconomic monitoring by the Permanent Technical Group (GTP) and related institutions (see above) repeatedly highlighted the region-wide impact of the extraordinary improvement in the terms of trade experienced by the Andean countries during the period. Concurrently, interest started growing among REDIMA CAN/GTP members about the need to analyse the potential macroeconomic implications of that and related phenomena (such as large capital inflows into countries like Colombia and, later, Peru). An early seminar and discussion in 2005[60] between REDIMA CAN/GTP members and experts from international organizations and the private

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[57]   In the Andean Community, the three existing targets for convergence established by the authorities are that the inflation rate should remain in single figures; that the deficit of the Non-Financial Public Sector should not exceed 3% per year, and that the external and internal debt of the consolidated public sector should not exceed 50% of GDP. The first target was introduced in 1999 and the other two in 2001.

[58]   In Central America, the Monetary Policy Committee of the Central American Monetary Council (and not the Macroeconomic Work Group) also performs macroeconomic monitoring, although with less emphasis on fiscal variables than the other two sub-regions.

[59]   See www.comunidadandina.org/economia.htm.

[60]   II REDIMA CAN meeting and VI GTP meeting, 10 November 2005, Santiago, Chile.

sector (notably including experts from two of the world's largest rating agencies) focused on the relationship between perceived "country risk" and macroeconomic policy.

Later,[61] analysis moved towards the limitations in the capacity of the region's countries to conduct fiscal policy, which in turn led REDIMA to carry out a study on fiscal rigidity for each of the Andean countries. In particular, the very high degree of fiscal rigidity in the Andean countries was found to be limiting the capacity of fiscal policy to act in a counter-cyclical way. At that time, the group started to look at the relationship between macroeconomic volatility and fiscal vulnerability: few countries in the region had institutionalized mechanisms allowing them to save in the upward stage of the cycle to generate fiscal space to deal with cycle downturns without affecting public expenditure. For this reason, the group started to work[62] towards introducing improvements in the region's capacity to face a potential negative shock that reversed the past favourable increases in terms of trade and related public revenue.[63]

As work progressed, it increasingly became clear that the complexity of the issue was beyond the implementation of quick solutions, but it was decided to reduce vulnerability by increasing the transparency of macroeconomic policy by means of strengthened the monitoring mechanisms and discussing with regional authorities in the region the advisability of making further advances in the area at the national level. Therefore, the country members of the GTP, with the support of the associated international institutions, and profiting from the learning network put in place by REDIMA to profit from international knowledge and experience, started[64] to analyse a series of vulnerability indicators for the Andean Region to be included in the mandatory monitoring carried out yearly by the GTP. After significant work about which indicators to include, which methodology was to be used to measure it, and significant debate about the feasibility of implementing common methodologies,[65] the GTP decided[66] to present the series of indicators and their methodologies to the authorities for inclusion in the national

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[61]   IV REDIMA CAN meeting and VIII GTP meeting, 24 October 2006, Santiago, Chile.

[62]   V REDIMA CAN meeting and IX GTP meeting, 20 and 21 June 2007, La Paz, Plurinational State of Bolivia.

[63]   Public income and the prices of non-renewable export commodities are closely linked in many Latin American countries, especially in the Andean region. See Jiménez, J.P. and Tromben, V. (2006), "Fiscal policy and the commodities boom: the impact of higher prices for non-renewables in Latin America and the Caribbean", *ECLAC Review* No. 90, December 2006.

[64]   VI REDIMA CAN meeting and X GTP meeting, 1 November 2007.

[65]   For example, not all countries in the region estimate public exposure to contingent liabilities (notably, Colombia estimates some of them).

[66]   VII REDIMA CAN meeting and XII GTP meeting, 2 and 3 June 2008, Lima, Peru.

Convergence Action Plans elaborated yearly by the countries starting in 2009.[67] As increases in transparency might strengthen the incentives of countries to pursue intertemporally-sustainable fiscal policies, especially when fiscal revenue (and expenditure) are contingent on the "state of nature" (in this particular case, the international prices of commodities).

In reaching the desired set of indicators, the methodology to be used and other operational details, the exchange of opinions among countries in the region with more experience with the use of specific indicators and the other countries was crucial. In particular, as "*most individuals evaluate an innovation not on the basis of scientific research by experts, but through the subjective evaluations of near peers who have adopted the innovation*".[68]

International organizations also did their best to provide expert opinions to country representatives and to bring about the experience accumulated by providing technical assistance in the fiscal policy area to others. All in all, the experience followed the framework of "cooperation for learning" in a network presented in chapter III.

By the second half of 2008, the global economic crisis and its effects on Latin America had become the focus of attention of the monetary and fiscal authorities in the region. For this reason, during the 10th meeting of the Advisory Council of Ministers of Finance, Central Banks and Officers in Charge of Economic Planning of the Andean Community, held in Lima, Peru, on 24November 2008, policymakers debated the subject and decided that:[69] 1) given the uncertainty generated by the international financial turbulence, the GTP could contribute to each country's effort to seek out macroeconomic policy alternatives according to their own development objectives; 2) member countries must strengthen communication channels among themselves, so as to better follow developments around the world (the "state of nature"), and the effects of policy actions adopted by other countries or groups of countries. In other words, the role of the official technical group was to contribute to each country's improved policymaking by using "cooperation for learning" to address uncertainty about the "state of the world" and about the net value of complex policy instruments.

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[67] For references about the indicators, methodology and reasons for their introduction, see Andean Community (2008).

[68] Rogers (2003), pp. 36.

[69] See the Declaration presented by the group at www.comunidadandina.org/prensa/notas/np24-11-08.htm.

Subsequently, on 10 December 2008, the Andean countries approved Decision 704 of the Andean Community, officially[70] adopting 12 macroeconomic vulnerability indicators, which will be included in the yearly Convergence Action Programmes prepared by each country, and will be monitored by the GTP.

In summary, this experience of the REDIMA CAN/GTP shows that fostering exchanges between senior technical officials about their experiences in designing and implementing macroeconomic policies can be important for increasing the capacity of these institutions to discover the net value of innovative complex policy tools in an uncertain environment. In this case, the learning experience led to the introduction of better means of monitoring *ex ante* macroeconomic vulnerability and increasing the transparency of the conduct of policy vis-à-vis the private sector.

## H.    Other macroeconomic learning networks

As REDIMA was designed with the idea of implementing in a group of developing countries the concepts of "cooperation for learning" presented in chapter III of this book, its interest as a case study is clear. However, REDIMA is not the only attempt by international or regional organizations to foster increased economic dialogue and learning among countries on macroeconomic policy issues. We will now briefly review two other "cooperation for learning" initiatives: the Economic Development and Review Committee of the Organisation for Economic Co-operation and Development and the Economic Review and Policy Dialogue group of ASEAN+3 nations. Rather than carrying out a thorough review of the work of those two groups, the focus here will be on understanding the work of both groups in the light of the conceptual framework of "cooperation for learning" presented in chapter III, and drawing comparisons with the experience of REDIMA presented in this chapter.

A third interesting case, not reviewed here, involves the cooperation work carried out by officials from the central banks and Ministries of Finance of the Group of Seven countries. Sobel and Stedman (2006) present a short review of the evolution of the work of that group, from a focus on trying to foster the "traditional approach" to macroeconomic policy coordination into a dialogue and cooperation role that shares

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[70]    See Decision 704 of the Commission of the Andean Community, published in Official Gazette No. 1680 of 10 December 10 2008. In February 2010, the Commission decided to expand this set of indicators. See Decision 731, published in Official Gazette No. 1801 of 5 February 2010. Both are available online at www.comunidadandina.org/normativa/dec/decnum15.htm.

several characteristics with the "cooperation for learning" experience of REDIMA, where the addressing of common issues surrounded by pervasive uncertainty provides the motor of the process and an important part of its value added for participating policymaking institutions.[71]

## 1. The Economic Development and Review Committee of the OECD

The Economic Development and Review Committee (EDRC) of the Organisation for Economic Co-operation and Development (OECD) is a group of officials representing the 30 OECD member governments and the European Commission. It is responsible for examining the economic trends and policies of each OECD member country, assessing the performance of the country against a certain benchmark and, based on that, supplying economic recommendations (OECD, 2007). The process by which the Committee accomplishes its objectives is known as a "peer review" process (Pagani, 2002; OECD, 2007; Thygesen, 2008).

Each OECD country is reviewed every 18 months. The OECD Secretariat prepares a draft survey of a country, which is then examined by the EDRC, led by two EDRC members, in consultation with the examined country. The results of the survey are later published as a review of the country's economy. Originally, at the time of the creation of the OECD in 1961, the economic surveys focused mostly on the short-term macroeconomic situation. Today, the surveys try to identify the links between structural policies and the macroeconomic performance of the country. Pagani (2002) contains a detailed review of the peer review process carried out by the EDRC.

In chapter III, we proposed that the "peer learning" part (Comley, 2008) of a "peer review" process,[72] acknowledging the existence of uncertainty affecting macroeconomic policy, can be explained using the "cooperation for learning" model of Bala and Goyal (1998). In particular, in a "peer learning" process that acknowledges the existence of uncertainty, countries can not only learn about complex policy tools (and thereby, complex policy choices) from observing the actions and results obtained

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[71] In the words of Sobel and Stedman (2006): "…*economic policy discussions in the G7 have evolved over time to focus to a greater extent on informal exchanges of views. The role of peer pressure has softened. Policy-makers focus for all intents and purposes on keeping their own economic houses in order. But even if the potential for explicit macroeconomic coordination has diminished, policy-makers are acutely aware of the interactions among their economies. Multilateral surveillance remains a useful process, and policy-makers benefit from discussing economic performance and sharing and debating policy approaches*", pp 14.

[72] The "peer pressure" (Pagani, 2002) component of "peer review", however, is not part of "peer learning".

by others, but can also learn by having others analyse ex ante potential choices of the country under analysis. It was also mentioned that such a process can be costly, as it requires a significant amount of cooperation and resource dedication by all the countries involved. Importantly, for the peer learning process to be useful to the country examined, the peer review has to acknowledge that any policy tool is conditional on the state of the world and the structure of the economy of the country under analysis. Therefore, taking steps to address uncertainty about those is essential for the benchmarking exercise of peer review to have any meaning.[73]

The operation of this group shows differences with the work of REDIMA and of the official GTM and GTP groups. In Latin America, there is no clear evidence that any cooperation group/learning network has been capable of reaching such an advanced stage where country officials not only learn from others in order to address uncertainty about the state of the world and about the net value of complex policy tools, but also from others carrying out a survey of its own policy alternatives. There may be several reasons for this, including the high cost of such exercises, especially in the presence of very limited highly qualified technical personnel in some countries; the lack of commonly agreed benchmarks against which performance can be measured; severe data problems that limit the quality of the assessments (even if the authorities allowed country officials to share the available data), among others.[74]

For comparison, the Permanent Technical Group (GTP) of the Andean Community carries out a less-advanced monitoring process. The countries' authorities agreed on a series of macroeconomic targets for convergence, and the monitoring process consists of a yearly "plan of action for convergence",[75] followed later by a yearly self assessment by the countries that is commented upon by a non-official economist (from the private sector or academic) and by the representatives from the other countries' officials and regional and international institutions. The reports are later published by the Andean Community as part of a volume.[76] However, there is no direct involvement of other countries' officials in the monitoring progress and potential policy choices analysis.

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[73]  As Comley (2008) puts it: "*…the good peer reviewer does not jump to the conclusion that a particular policy is bad and should be changed without carefully considering the country-specific context*" pp. 120.

[74]  One problem that may affect particularly neighbouring countries that are members of an integration bloc was pointed out by Comley (2008) for the case of Europe: the incentive compatibility of information revelation. That is, if the information provided during a peer review process can be used elsewhere to the detriment of the country revealing it (for example, sanctions), *ex ante* countries may be loath to reveal it.

[75]  Programa de Acción de Convergencia (PAC) in Spanish.

[76]  See www.comunidadandina.org/economia.htm.

In the light of the above-mentioned reasons that limit the current capacity of Latin American learning networks to advance towards a peer learning process that addresses uncertainty, less-demanding cooperation for learning initiatives like REDIMA may be more viable in the short term.

## 2.    The Economic Review and Policy Dialogue of the ASEAN + 3 Group

The *Regional Economic Review and Policy Dialogue* process (ERPD) of the Association of Southeast Asian Nations[77] plus China, Japan and South Korea (ASEAN + 3) is a process by which the Finance Ministers of the ASEAN+3 meet annually,[78] and their deputies together with the deputies of central banks meet twice a year. The process was set up in May 2000 during the second meeting of Finance Ministers of the ASEAN+3 group and, according to Kawai (2005), their first surveillance meeting was held in April 2002. According to that author, "*The purpose of this process [the ERPD] is to strengthen policy dialogue, coordination and collaboration on the financial, monetary and fiscal issues of common interest. Its primary focus is on global, regional and national economic monitoring, macroeconomic risk assessment and management, and banking and financial system conditions*".[79] Chief among the work of the group seems the assessment and monitoring of the "state of the world", both current and in the near future.[80]

According to Kawai and Houser (2008), unlike the EDRC of the OECD, the ERPD of ASEAN+3 does not have a dedicated international organization periodically reviewing the performance of the countries in the group, comparing them against a benchmark and suggesting potential policy actions. Neither do country officials formally review the economic behaviour of other countries nor provide recommendations about policy changes to the latter. However, and in a similar way to the REDIMA Project and the GTP and GTM official groups meetings during the duration of REDIMA, the ERPD of ASEAN+3 benefits from the participation of external experts who present their views on specific topics and exchange opinions with deputies from Ministries of Finance and central banks.

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[77]    ASEAN is made up of Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.

[78]    In the year 2000, however, they met twice.

[79]    Kawai (2005), pp. 43.

[80]    "*At the ERPD session, they [finance and Central Bank deputies] exchange their views on global, regional and individual country economic developments, various types of risks affecting the regional economies, and several policy options*" Kawai and Houser (2008), pp. 75.

The conceptual framework of a "cooperation for learning" network presented in chapter III seems particularly suited to the reality of the ERPD of ASEAN+3, where the group can benefit from a cooperation process that can help it to address uncertainty and implement superior macroeconomic policies. However, advancing beyond learning from others, even with the commitment to building strong network links, may be difficult. In addition to problems that have limited the capacity of Latin American sub-regional groups to advance towards a "peer review" process like the one of the EDRC of the OECD, including data problems,[81] the ASEAN+3 group is also much more heterogeneous than any Latin American sub-regional group in terms of economic size, structure, political governance, language, per capita income and so forth.

Lastly, there are also some interesting similarities and differences worth highlighting in terms of the experience of the ERPD of ASEAN+3 and that of REDIMA and the official groups GTP and GTM in Latin America. One similarity is that a working two-tiered "cooperation for learning" process has not yet appeared in either region. Second, unlike the ERPD, REDIMA introduced in Latin America a network structure specifically designed to benefit from the expertise of specialists from academia and other international organizations in addressing the different types of uncertainty. As indicated above, experts from other international organizations, extra-regional government officials, academics and private sector experts were often active participants of the learning process of the REDIMA network. To this end, REDIMA benefited from the guidance provided by the conceptual framework presented in chapter III to model cooperation, as well as from its evolution it over time, based on the project's experience. Lastly, we described in section G.2 how the REDIMA network deliberately tried to address the conflicting roles of government officials' participation in the network, as experts and as official representatives of the country. These efforts contrast with the findings of Kawai and Houser (2008) about the ERPD of ASEAN+3, where *"…discussions could be more frank, with officials freely debating their own and other countries economic problems, vulnerabilities and policy options to ensure good policies for the region as a whole"*.[82]

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[81] In ASEAN, there may also be data availability limitations. For example, several lower income countries are not participants in the IMF Special Data Dissemination Standard.

[82] Kawai and Houser (2008), pp. 75.

# I.    Long-term sustainability of "cooperation for learning" networks

From the analysis of the experience of "cooperation for learning" networks such as REDIMA, the ERPD of ASEAN+3 and the EDRC of the OECD, questions emerge about the factors behind the long-term sustainability of learning networks. In the presence of a network's operational costs (including link maintenance costs or the costs of generating informative signals), the sustainability over time of "cooperation for learning" networks depends on the strength of the incentives of participating national institutions and international organizations involved in the learning process, as well as on the scale of any obstacles to the operation of the learning process. In Latin America, the main hurdles are posed by political economy issues.

First, let us discuss the incentives of national policymaking institutions. As indicated in chapter III, in the presence of ex ante uncertainty about the cost-benefit balance of establishing links to a "cooperation for learning" network for a national institution, especially in a financially-constrained developing country, subsidies can play an important role in establishing those links. One important question is the degree to which the perceived benefits of the network will be sufficient to justify national institutions' expenditure in maintaining network links, in other words the national central banks and Ministries of Finance paying the full cost (including financial costs of attending meetings) of their own links. The answer to that question, which is ultimately empirical and country- and time-specific, depends, inter alia, on 1) the perceived effect of uncertainty on policymaking, and 2) the capacity of the network to add value by effectively helping policymakers better implement policy in an uncertain environment. In this chapter, we have referred several times to the latter point, but less to the first one. However, the perception of the importance of uncertainty for policymaking is also essential for the long-term sustainability of a learning network: if policymakers do not consider addressing uncertainty an important part of the policymaking process (or worthy of receiving scarce resources) , the sustainability of the network might be compromised. This indicates that international organizations interested in strengthening "cooperation for learning" networks should continue supporting research and the diffusion among policymaking institutions about the risks posed by uncertainty for policymaking, in addition to their work supporting "cooperation for learning" networks.

Now, what about the incentives of international organizations? Even if national institutions pay the full costs of links to the network (in the absence of link subsidies), we have suggested in chapter III and in

this chapter that the signal-provision and technical assistance roles of international institutions also play an important role in "cooperation for learning" networks.[83] In particular, as the benefits of establishing a link between the network and signal sources like international institutions are *ex ante* uncertain, probabilistically heterogeneous among players, and of non-rival consumption, there are the usual free-riding incentives that make it difficult to see any national institution part of the network financing such links. Also, the lower the "decay" of the information transmitted through such a link, the less interest any non-central node of a network (such as a national institution) will have in financing it, as others may be more likely to free-ride. Therefore, the existence of those links in the long-rung and the generation of network-specific signals by international organizations may depend on the latter's interest in paying for them.

Therefore, ascertaining long-term institutional incentives for international organizations to actively link to a "cooperation for learning" network and contribute valuable informational signals and other content is an important component of the long-term usefulness of the network for the learning process. Having said that, there is evidence that international organizations often have incentives to do so. Some international organizations are interested in having their experts participate in learning networks for their own learning purposes, for instance to learn more about the beliefs and information available to others about the state of the world, the net value of complex policy tools, or even about what policy areas national policymakers are interested in as part of their own policymaking processes.[84] For example, IMF excluded expenditures corresponding to learning participation in networks in their recent decision[85] to charge countries for some types of technical

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[83]  This is not only the case of REDIMA or of Latin America: "*The OECD Secretariat supports the process by producing documentation and analysis, organizing meetings and missions, stimulating discussion and maintaining continuity.*" pp. 6.

[84]  From an industrial organization point of view, interest by international organizations in the "interests" of country officials and policymakers can benefit the latter if it increases the supply of research, information, analysis and so on provided to the network by international organizations. Additionally, if international organizations "compete" for scarce policymaker attention/time/interest, the former might value the capacity of obtaining a clearer indication of where potential demand for the institution's services lies (for instance research, advice, lending).

[85]  "*It [the charge] will not apply to TA [Technical Assistance] activities that are not part of a specific TA project performed for a recipient (such as TA-related outreach and general research and policy work, as defined by the Fund's output structure). This includes: (i) Fund staff participation in general donor and TA-provider meetings, seminars and conferences, which is necessary for continued policy development and to ensure that staff keeps abreast of advances in their fields of expertise […]*" footnote 7, pp. 3 of IMF (2008), "Policy for Country Contributions for Capacity Building – Supplement", October 3, 2008. Available at www.imf.org.

assistance. Additionally, an additional potential reason why international organizations might want to finance links and provide signals lies in the increase in their capacity to diffuse applied research and ideas at a lower cost (due to the existence of network effects).

Finally, even if the incentives of international organizations and country officials are aligned in their interest in cooperating for learning purposes, political economy obstacles may affect the usefulness of the network for learning purposes and reduce its long-term sustainability. In particular, persistent radical differences in the approaches to economic development of different countries within a network (for example, due to ideological differences among the authorities of different countries or different socio-political binding constraints faced by the authorities), institutional deficiencies, internal conflict or political instability in some countries are some of the reasons why cooperation at the senior technical level might not lead to stronger effects on learning at the time of applying macroeconomic policies.

# Appendices

Appendix A

## The Gosh and Masson (1994) model

The Ghosh and Masson (1994) model has the following characteristics. First, there are two agents/countries: the home country and the foreign country, where the latter is denoted by an asterisk. Second, each country produces only one good that is an imperfect substitute for the other country's good. Third, prices and wages are predetermined in the current time period. Fourth, random shocks are assumed to be independently and identically distributed with a zero mean and a constant variance. Fifth, parameter values are assumed to be the same for both countries. These parameters are also assumed to be commonly known by all players and constant. Therefore, there is no uncertainty in this model other than value of the random shocks, whose distribution functions are assumed to be commonly known. The authors express all variables (except for the interest rate) in logarithms and they represent deviations from equilibrium values.

Output in the home country y is assumed to be a function of the real interest rate $i - p_{+1} + p$, of income of the foreign country $y^*$ and of the real exchange rate $e + p^* - p$, so that:

$$y = -\delta(p - e - p^* + \gamma y^*) - \sigma[i - (p_{+1} - p) + u] \qquad (1)$$

$$y^* = \delta(p - e - p^*) + \gamma y - \sigma[i - (p^*_{+1} - p^*)] + u^* \qquad (2)$$

Both $u$ and $u^*$ are shocks to aggregate demand.

The money demand functions (in inverted form) are:

$$i = \xi y - \varepsilon(m - p) + v \qquad (3)$$

$$i^* = \xi y^* - \varepsilon(m^* - p^*) + v^* \qquad (4)$$

Where $v$ and $v^*$ are transformed velocity shocks.

Ghosh and Masson (1994) introduce a modified Phillips curve where domestic output prices are an increasing function of the level of output and of the variation in the real exchange rate. It is assumed that output prices in the current period are predetermined, so that an inflationary shock only affects next period's prices:[1]

$$p_{+1} - p = \psi y - \vartheta \Delta(p - e - p^*) + w \qquad (5)$$

$$p^*_{+1} - p^* = \psi y^* + \vartheta \Delta(p - e - p^*) + w^* \qquad (6)$$

The fourth element of the model is the arbitrage condition that links home and foreign interest rates so that any interest rate differential is compensated by an expected change in the nominal bilateral exchange rate:

$$i = i^* + e^e_{+1} - e \qquad (7)$$

The authors assume rational expectations, conditional on the currently available information, so that $e^e_{+1} = E(e_{+1})$. They also assume that if in the absence of disturbances the expected future policy value of the money supply is zero, then the expected real exchange rate $e^e_{+1} + p^*_{+1} - p_{+1}$ is zero. Variables are expressed in deviations from equilibrium values (i.e. zero stands for equilibrium). So, substituting $e^e_{+1} = p_{+1} - p^*_{+1}$ into the arbitrage condition (7) results in:

$$i = i^* + (p_{+1} - p^*_{+1}) - e \qquad (8)$$

The current price level is pre-determined, so it can be normalized to zero.

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[1]    In order to ensure that the IS curve is downward sloping in interest rate – income space, the authors assume for the parameters $\xi$ and $\psi$ that $\xi > \psi$.

Ghosh and Masson (1994) obtain the reduced forms for output of the model:

$$y = \alpha m + \beta m^* + q \qquad (9)$$

$$y^* = \alpha m^* + \beta m + q^* \qquad (10)$$

with parameters alpha > 0, beta > or < 0, and[2] shock $q$.

The parameters $\alpha$, $\beta$ and $q$ of the reduced forms of equations (9) and (10) are:

$$\alpha = \frac{1}{2}\left\{\frac{\sigma\varepsilon}{1-\gamma+\sigma(\xi-\psi)} + \frac{(2\delta+\sigma\vartheta)}{(1-2\vartheta)(1+\gamma)+(2\delta+\sigma)(\xi-\psi)}\right\} > 0$$

$$\beta = \frac{1}{2}\left\{\frac{\sigma\varepsilon}{1-\gamma+\sigma(\xi-\psi)} - \frac{(2\delta+\sigma\vartheta)}{(1-2\vartheta)(1+\gamma)+(2\delta+\sigma)(\xi-\psi)}\right\} > \text{or} < 0,$$

The reduced forms for inflation are:

$$\pi = (p_{+1} - p) = \phi m + \eta m^* + s \qquad (11)$$

$$\pi^* = (p^*_{+1} - p^*) = \phi m^* + \eta m + s^* \qquad (12)$$

Where $s$ and $s^*$ are inflationary shocks, and the parameters[3] phi > 0 and eta >0 or <0.

The parameters $\phi$, $\eta$ and $s$ of the reduced forms of equations (11) and (12) are:

$$\eta = \psi\beta - \frac{\theta(1+\gamma)}{(1+\gamma)(1-2\theta)+(2\delta+\sigma)(\xi-\psi)} > 0 \text{ or} < 0, \text{ and}$$

$$s = \psi q + \theta\frac{(1+\gamma)[(v-v^*)+(w-w^*)]-(\xi-\psi)(u-u^*)}{(1+\gamma)(1-2\theta)+(2\delta+\sigma)(\xi-\psi)} + \frac{(w+w^*)}{2}$$

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[2]   The sign of β depends on the responses by home demand *y* to a change in foreign monetary policy. In particular, the real exchange rate elasticity of demand δ and the foreign income elasticity of demand γ. While an increase in δ reduces β, and increase in γ increases it, so the net effect is ambiguous. In many neoKeynesian models (like McKibbin, 1996), however, the transmission multiplier has a negative sign.

[3]   About the sign of η, Ghosh and Masson (1994) say: "*A foreign monetary expansion appreciates the home country's exchange rate thus reducing inflation at home. If the foreign monetary expansion has a negative effect on home income, then it necessarily reduces home inflation. Only if the transmission effect of monetary policy on income is positive is the transmission effect on inflation ambiguous*", pp. 24.

The authors assume that policymakers in both countries aim to minimize inflation and to maintain output at its full employment level. As pointed out, variables are in logs and in deviations from equilibrium. That leads to the following objective functions:

$$V = Max - \frac{1}{2}(y^2 + \omega\pi^2) \qquad (13)$$

$$V^* = Max - \frac{1}{2}(y^{*2} + \omega\pi^{*2}) \qquad (14)$$

Ghosh and Masson (1994) assume that the following condition is valid for the parameters in the model: both multipliers of domestic monetary policy on domestic output and inflation are positive ($\alpha > 0$ and $\phi > 0$), while the signs of $\beta$ and $\eta$ are potentially ambiguous but assumed to be smaller in magnitude than the domestic multipliers, but the authors assume that $\beta\phi > \alpha\eta$ (and $\alpha + \beta > 0$).

Assume now that both countries face a symmetric inflationary shock $s = s^* \neq 0$. As the shock is not zero, the policymakers face a policy conflict between inflation and unemployment. If each country behaves in a non-cooperative way, it maximizes its own policy function with respect to its monetary instrument, $m$ or $m^*$ while taking as given the behaviour of the other country. This leads to the following reaction functions of both the home and foreign countries:

$$m_{reaction} = \frac{-[(\alpha\beta + \omega\phi\eta)m^*_{reaction} + \omega\phi s]}{\alpha^2 + \omega\phi^2} \qquad (15)$$

$$m^*_{reaction} = \frac{-[(\alpha\beta + \omega\phi\eta)m_{reaction} + \omega\phi s]}{\alpha^2 + \omega\phi^2} \qquad (16)$$

The intersection of these two linear reaction functions occurs at the non-cooperative Nash Equilibrium level of $m$ and $m^*$ of:

$$m_{noncoop} = m^*_{noncoop} = \frac{-\omega\phi s}{\alpha(\alpha + \beta) + \omega\phi(\phi + \eta)} \qquad (17)$$

Therefore, given the assumed values of the parameters, a symmetric positive inflationary shock ($s > 0$) leads to a monetary contraction in both countries.

Now, in order to compare with the Pareto-optimal solution obtained by a benevolent social planner, assume that the latter maximizes an objective function that is a weighted average of the objective functions of each country:

$$V_{planner} = \chi V + (1 - \chi)V^* \qquad (18)$$

where the weight χ is assumed to be $1 \geq \chi \geq 0$.

Now, assuming that the weight $\chi = 0.5$, putting (9), (10), (11), (12), into (13) and (14), then those into (18) and maximising (18) with respect to $m$ and $m^*$, we obtain the optimal level of $m$ and $m^*$ in a "cooperative" (Pareto-optimal) solution for a symmetric monetary shock:

$$m_{coop} = m^*_{coop} = \frac{-\omega(\phi + \eta)s}{(\alpha + \beta)^2 + \omega(\phi + \eta)^2} \qquad (19)$$

Comparing both equilibrium levels of $m$ and $m^*$, we observe that $m_{noncoop} < m_{coop}$ if and only if $\beta\phi > \alpha\eta$, which the authors assumed to be true. Therefore, for those parameter values, when there is an adverse inflationary shock the response of the authorities leads to a level of $m$ and $m^*$ under the non-cooperative Nash equilibrium that is more contractionary than the level that would be chosen by a benevolent social planner maximizing joint welfare. Ghosh and Masson (1994) show that the equilibrium level of $m$ in the cooperative solution ($m_{coop}$) leads to a Pareto-superior level of welfare $V$ in comparison with the level of welfare $V$ associated with the equilibrium level of $m$ in the non-cooperative Nash equilibrium ($m_{noncoop}$).

As mentioned in section II.II, a special case is when a government cares only about one target (such as inflation) for its sole instrument, monetary policy. In such a case, the home country has an objective function $V = Max - \frac{1}{2}(\pi^2)$ (20), the foreign country an objective function $V^* = Max - \frac{1}{2}(\pi^{*2})$ (21), the reaction function of the home country becomes $m_{reaction} = \frac{-(\eta m^*_{reaction} + s)}{\phi}$ (22). Together with the symmetric reaction function of the foreign country, Ghosh and Masson (1994) obtain the equilibrium level of m in the non-cooperative Nash equilibrium, which is $m_{noncoop} = m^*_{noncoop} = \frac{-s}{(\phi + \eta)}$ (23). Replacing (23) into (11) and (12) and those equations into (20) and (21) gives us the welfare levels.

$$V_{noncoop} = V^*_{noncoop} = -\frac{1}{2}(\frac{-s\phi}{(\phi + \eta)} + \frac{-s\eta}{(\phi + \eta)} + s)^2 = -\frac{1}{2}(-s + s)^2 = 0 \quad (24)$$

This simple case where a government only cares about inflation is also useful to prove[4] that, if governments ignore externalities altogether on other countries, the result in terms of welfare may be worse than under the non-cooperative Nash equilibrium.

If the home (foreign) country is myopic and ignores the effect of the other country's monetary stance $m^*$ ($m$) on its own optimal monetary policy stance, the home (foreign) country will assume that the foreign (home) country will maintain its monetary stance at the pre-shock level $m_0$ ($m_0^*$) even after the occurrence of an inflationary shock, so that the "myopic" level of $m$ ($m^*$) when the country faces an inflationary shock $s$ is

$$m_{myopic} = \frac{-(\eta m^*_0 + s)}{\phi} \quad \text{or, since } m_0 = m_0^* = 0 \text{ (as } m \text{ and } m^* \text{ are}$$

expressed in deviations from equilibrium), we can write

$$m^*_{myopic} = m_{myopic} = \frac{-s}{\phi} > \frac{-s}{(\phi + \eta)} = m_{noncoop} = m^*_{noncoop} \text{ if } \eta > 0$$

so that a foreign monetary expansion reduces inflation at home (e.g. via an appreciation of the exchange rate).

The welfare level of the myopic result is then:

$$V_{noncoop} = V^*_{noncoop} = -\frac{1}{2}(\frac{-s\phi}{\phi} + \frac{-s\eta}{\phi} + s)^2 = -\frac{1}{2}(\frac{\eta}{\phi})^2 s^2 < 0$$

which is lower than the welfare under the non-cooperative Nash equilibrium.

In summary, the model shows that:

a)   for some parameter values, the cooperative response (i.e. joint maximisation) to a symmetric adverse inflationary shock is welfare superior to the non-cooperative (Nash) response, as the latter leads to a more contractionary monetary policy stance than the level that would be chosen by a benevolent social planner maximizing joint welfare; and

b)   if policymakers ignore existing spillover effects from their policymaking altogether, the welfare outcome after the occurrence of a symmetric adverse inflationary shock may be worse than even the non-cooperative Nash equilibrium outcome.

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[4]   In the case where the government has other targets, like the output gap, the superiority of one alternative over another depends on the relative sizes of the parameters.

## Appendix B

# Additive and multiplicative uncertainty in the Ghosh and Masson (1994) model

In order to see the effect of additive uncertainty on welfare of the non-cooperative Nash Equilibrium, Ghosh and Masson (1994) assume that a symmetric inflationary shock $s$ has two components: $s^O$ and $s^U$, where $s^O$ is observed before the present period's monetary policy is chosen, and $s^U$ is observed afterwards. $s^U$ is assumed to have a zero mean and a variance of $\sigma_s^2$.

Assuming that both home and foreign countries only care about inflation, they have target functions $V = Max - \frac{1}{2}E(\pi^2)$ (25) and $V* = Max - \frac{1}{2}E(\pi*^2)$ (26) respectively. Replacing with (11) and (12) into (25) and (26) and maximizing with respect to $m$ and $m*$ and rearranging we obtain the non-cooperative Nash equilibrium levels of $m$ and $m*$:

$$m_{noncoop} = m*_{noncoop} = \frac{-s^O}{(\phi + \eta)} \qquad (27).$$

Replacing into (25) and (26) leads to the welfare levels

$$V_{noncoop} = V*_{noncoop} = -\frac{1}{2}E(\frac{-s^O\phi}{(\phi+\eta)} + \frac{-s^O\eta}{(\phi+\eta)} + s^O + s^U)^2 = -\frac{1}{2}E(s^U)^2 = -\frac{1}{2}\sigma_s^2 \quad (28)$$

This demonstrates how additive uncertainty about a common inflationary shock in a country may result in a non-cooperative Nash equilibrium of the coordination game that is Pareto-inferior to the equilibrium without uncertainty.

Let us now briefly show the effects of introducing multiplicative uncertainty into the model. Ghosh and Masson (1994) assume that the policy multipliers $\alpha, \beta, \eta, \phi$ are random variables with means $\mu_\alpha, \mu_\beta, \mu_\varphi, \mu_\eta$ and variances $\sigma^2_\alpha, \sigma^2_\beta, \sigma^2_\varphi, \sigma^2_\eta$. The distributions are assumed to be common knowledge to both players. In this case, it can be shown that the reaction functions of both countries are, respectively:

$$m_{reaction} = \frac{-(\mu_\phi\mu_\eta m*_{reaction} + \mu_\phi s)}{\sigma_\phi^2 + \mu_\phi^2} \qquad (29) \text{ and}$$

$$m*_{reaction} = \frac{-(\mu_\phi \mu_\eta m_{reaction} + \mu_\phi s)}{\sigma_\phi^2 + \mu_\phi^2} \quad (30)$$

Both reaction functions intersect at the non-cooperative Nash equilibrium level of $m$:

$$m_{noncoop} = m*_{noncoop} = \frac{-\mu_\phi s}{\sigma_\phi^2 + \mu_\phi^2 + \mu_\phi \mu_\eta} \quad (31)$$

At the non-cooperative Nash equilibrium, the welfare level is

$$V_{noncoop} = -\frac{1}{2}E(\Pi)^2 = -\frac{1}{2}\{[E(\Pi)]^2 + \sigma_\Pi^2\} = -\frac{1}{2}[(\mu_\phi m + \mu_\eta m* + s)^2 + \sigma_\phi^2 m^2 + \sigma_\eta^2 m*^2] \quad (32)$$

By replacing with (11) and (31) into (32), and differentiating with respect to the variances of the policy multipliers (i.e. $\sigma_\phi^2$ and $\sigma_\eta^2$), we can show that increases in the uncertainty of the policy multipliers lead to equilibrium levels of policy associated with lower levels of welfare.

Appendix C

# The essentials of the Bala and Goyal (1998) model

We will first define the decision problem of each individual member of society.

Suppose that time is discrete, indexed by t = 1, 2, … and that there are $n \geq 3$ agents in a society. Each agent chooses an action from finite set $S_i$, while each individual has the same choice set, so that $S_i = Sj = A$ for every two agents $i$ and $j$. The action taken by individual $i$ in period $t$ is indicated by $m_{i,t}$. Assume that $\Theta$ is a finite set of possible states of the world, with $\theta \in \Theta$ being the state of the world chosen by nature at the beginning of time. Importantly, this state of the world $\theta$ is assumed to remain **fixed** for all $t$. When the state of the world is $\theta \in \Theta$ and the agent chooses action $m \in M$, he observes outcome $\pi \in \Pi$ with conditional density $\phi(\pi; m, \theta)$. The latter can also be understood as the probability of observing outcome $\varpi$ under action $m$ in state $\theta$ (if the outcome space $\Pi$ is finite. Outcome $\varpi$ results in the reward for the agent given by $r(m, \pi)$.[5] All $n$ Agents are assumed to have the same preferences, hence they have same reward function $r(m, \pi)$ for each of them.

No agent knows the true state of the world. They start the process with a set of prior beliefs about the different possible states of nature $\theta \in \Theta$. For each individual $i$, his prior belief is $\mu_{i,1}$, while the set of priors[6] is indicated by $P(\Theta)$. It should be noticed that Bala and Goyal (1998) do not limit the agents to having identical prior beliefs. This presents one important difference with the social learning literature[7] based on fully rational agents surveyed in Chamley (2004), where prior beliefs about

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[5]   To be specific, Bala and Goyal (1998) assume that $\Pi$ is a non-empty, separable metric space; assume that the distribution of observations $\pi$ conditional on actions $m$ and state of the world $\theta$ can be represented by the density $\phi(\pi; m, \theta)$ with respect to a measure $\Gamma$ defined on the Borel subsets of $\Pi$; and assume that for each action $m \in M$, reward $r(m, \pi)$ is bounded and measurable in $\Pi$.

[6]   Bala and Goyal (1998) assume that beliefs are interior, so that $P(\Theta) = \{\mu = \{\mu(\theta)\}_{\theta \in \Theta} /$ for all $\theta \in \Theta$, $\mu(\theta) \geq 0$, and $\sum_{\theta \in \Theta} \mu(\theta) = 1\}$.

[7]   According to Gale and Kariv (2003), the model of Bala and Goyal (1998) discussed here *"is a model of social experimentation, in the sense that it generalizes the problem of a single agent experimenting with a multi-armed bandit to a social setting, rather than social learning: agents learn by observing the outcome (payoff) of an experiment (choice of action) rather than by inferring another agent's private information from his action. A model of social experimentation is quite different from a model of social learning. In a model of social experimentation, there is an informational externality but there is no informational asymmetry"* pp. 343.

the state of nature are identical for all agents, and learning is concerned with inferring the private information conveyed by private signals to agents, via observation of their actions, rather than the outcomes of their actions. Assuming that prior beliefs about the state of the world are heterogeneous is much more realistic in macroeconomic policymaking.

An agent's one-period expected utility $u(m, \mu)$ from adopting action $m$, given belief $\mu$ is

$$u(m, \mu) = \sum_{\theta \in \Theta} \mu(\theta) \int_{\Pi} r(m, \pi) \phi(\pi, m; \theta) \ d\pi$$

An individual $i$ chooses each period an action $m$ that maximizes his one-period expected payoffs, given his beliefs $\mu$ at that point in time. This leads to a set of actions $B(\mu)$ that are one-period optimal[8] given existing policymakers' beliefs. $\delta_\theta$ is defined as the (point mass) belief on the state θ. For each policymaker $i \in N$, we can find a selection from the one-period optimality correspondence $B$, $b_i : P(\Theta) \to M$ in which case $B(\delta_\theta)$ is the set of optimal actions if the true state is θ. For example, in period 1, Central Bank $i$ chooses action $m$ to have value $b_i(\mu_{i,1})$, which is optimal given his prior beliefs about the state of the world. Bala and Goyal (1998) and Goyal (2007) assume that agents are myopic, in the sense that they ignore the possibility of strategic experimentation (See Bolton and Harris, 1999).

At the end of period 1, each policymaker $i$ observes outcome $\varpi$ resulting from his action. But the policymaker not only observes his own actions and outcomes, but also those of a subset of other agents, his neighbours.

Who are the neighbours of $i$? Each policymaker $i \in N$ is identified with a distinct node of a network, while a link between two policymakers $i$ and $j$ is indicated as $g_{ij} \in \{0,1\}$. There is a (directed) path from policymaker $j$ to agent $i$ if either both agents are directly connected (i.e. $g_{ij} = 1$) or there are a set of individuals $j_1, j_2, ..., j_m$ different from $i$ and $j$ so that $g_{ij_1} = g_{j_1 j_2} = ... = g_{j_m j} = 1$. Assume that $N_i^d(g)$ is the set of agents with whom individual $i$ has a direct link in network $g$. This set of agents is the group of *neighbours* of $i$. Another important concept of a network is whether it is *connected*. A network $g$ is connected if there is a path between any pair of agents $i$ and $j$. Goyal (2007) restricts the analysis only to connected networks, following Bala and Goyal (1998).

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[8]    Assume $B : P(\Theta) \to M$ is the one-period optimality correspondence, then we can write $B(\mu) = \{m \in M \ / \ u(m, \mu) \geq u(m', \mu)$ for all $m' \in M\}$.

Policymaker $i$ uses all the information obtained from playing action $b_i(\mu_{i,1})$ and obtaining $\pi$, as well as the information obtained from observing the actions and outcomes of those actions obtained by all his neighbours is information that is useful to update his prior belief $\mu_{i,1}$ and obtains his belief for period 2, $\mu_{i,2}$. If we indicate the action of policymaker $i$ in period $t$ as $C_{i,t} = b_i(\mu_{i,t})$ and the outcome he obtains from applying it (i.e. the signal obtained from the outcome space containing all possible rates of inflation observed), his belief for period 2 will be indicated by

$$\mu_{i,2}(\theta / g) = \frac{\prod_{j \in N_i^d(g) \cup \{i\}} \phi(Z_{j,1}; C_{j,1}, \theta) \mu_{i,1}(\theta)}{\sum_{\theta' \in \Theta} \prod_{j \in N_i^d(g) \cup \{i\}} \phi(Z_{j,1}; C_{j,1}, \theta') \mu_{i,1}(\theta')} .$$

Then the process starts again in period 2. The quality of the signal received is related to the stochastic dispersion of the conditional density $\phi(\pi; m, \theta)$.

While the choice of actions by the neighbours of policymaker $i$ provides information not only about their past experience, but also about the past experiences of their own neighbours, a fully optimizing agent $i$ would try to obtain information about agents observed only by neighbours from the actions chosen by the latter. However, Bala and Goyal (1998) and Goyal (2007) model agents as using a "bounded Bayesian" learning algorithm". While agents update their prior beliefs with Bayes rule using the information obtained from his experiment and those of neighbours, no information is extracted from the actions of neighbours about the latters' observed actions of their neighbours. The reason for this assumption lies in the complexity of forming beliefs assumed by those who model agents as fully optimizing, especially when the number of agents in a network is large[9]. This is another important difference to other social learning literature (see Chamley, 2004 and Gale and Kariv, 2003).

Goyal (2007) constructs the probability space and presents the construction of posterior beliefs of agent $i$. These posterior beliefs are optimal given the information generated by actions, and actions themselves are an optimal reply to agents' beliefs. As time moves ahead, Bala and Goyal (1998) use the Martingale Convergence Theorem to show that the beliefs and utilities of individuals converge in the long run. They also show that every agent will get the same long-run utility in a connected society, due to local information transmission.

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[9] Another complicating factor is the possibility that network structure is not perfectly known by all agents.

The question that emerges is whether learning agents will choose the optimal action and obtaining the maximum obtainable utility in the long run, given the state of the world. According to Goyal (2007), that depends on two issues.

First, for the optimal action to be learnt, beliefs need to be restricted so that not everybody has prior beliefs that make optimal those actions $m$ that are uninformative. An uninformative action $m$ is one action where $\phi(\pi; m, \theta)$, the probability of observing outcome π under action $m$ in state θ (if the outcome space $\Pi$ is finite), is independent of state θ. This is an important point, because if every agent $i$ chooses an uninformative action, actions will no longer reveal information about the true state, and posterior beliefs will be equal to priors, thereby ending the learning process.

Second, the structure of connections in the economy is also important for obtaining optimal learning. In particular, a certain number of common signals sent by agents observed by every other agent, if negative, can swamp positive information that is available locally to an agent about a certain action. Bala and Goyal (1998) refer to this set of commonly observed agents as a "royal family". However, if the proportion of local ties is large with respect to ties to common agents, the spread of positive information is also large and the probability that common negative information will block learning decreases. In particular, what is important is that for learning to be optimal, agents whose immediate neighbourhoods are distinct are very important. Goyal (2007) uses the concept of "local independence" to describe agents with distinct neighbourhoods[10]. Policymaker $i$ has optimistic prior beliefs $\mu$ if the set of optimal actions given his priors is within the set of optimal actions when the true state is $\theta_1$, that is, $B(\mu_i, 1) \subset B(\delta_{\theta_1})$. Using both elements, Goyal (2007) proof that in a connected society, increasing the number of locally independent optimistic agents increases the probability that all players choose an optimal action in the long run.[11]

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[10]   Therefore, two agents are locally independent if.

[11]   Goyal(2007) in Theorem 5.3, pp. 99  indicates that the probability of choosing an optimal action in the long run can be made arbitrarily close to 1.

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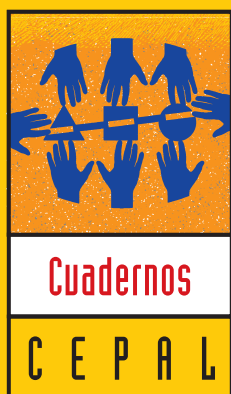
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