"FROM FLOATING TO MONETARY UNION: THE ECONOMIC DISTANCE BETWEEN EXCHANGE RATE REGIMES"

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FROM FLOATING TO MONETARY UNION:

The Economic Distance between

Exchange Rate Regimes

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Abstract

The successful start of Economic and Monetary Union in Europe has prompted more research into the issue of exchange rate regimes and if there were any lessons to be drawn from the European experiment for other regions in the world. We review the relevant issues from an Optimum Currency Area perspective. The focus on issues relating to the suitability of switching to a common currency based on notions of economic distance and the correlation of aggregate economic shocks. The empirical evidence presented in this paper shows that the cost of monetary union declined substantially in some target countries while it appears to have risen in others. This leads to some interesting policy implications also for the new EU members.

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1. Introduction

The successful introduction of European Economic and Monetary Union (EMU) has not only stimulated debate over the choice of exchange rate regimes but has also prompted the question of whether still fewer currencies are economically desirable (e.g., Dornbusch 2001). Moreover, a sizeable literature has emerged (Eichengreen, 2002b, Hochreiter, Schmidt-Hebbel and Winckler, 2002, Wyplosz 2001a) that examines whether there are any lessons emanating from the European "Maastricht Model" for other regions such as the Americas, Australasia, Asia, Latin America, and the Caribbean (henceforth LAC) for exchange rate regime choice. Controversy remains regarding the relevance of Optimum Currency Area (OCA) criteria for deciding to form a monetary union on economic grounds. More recently, the traditional but essentially static OCA criteria have been supplemented with a dynamic version stressing the endogenous properties of these criteria in successful monetary unions (Frankel and Rose 1998) as well as adding "non-traditional" arguments to the original set of OCA criteria. We touch on these innovations in a survey-type discussion about the choice of exchange rate regimes. The real focus, however, is on the role of economic shocks and how they proliferate across countries as well as the role of business cycle synchronicity as these factors are key determinants for selecting an exchange rate regime. Hochreiter, Schmidt-Hebbel and Winckler (2002) present evidence that the benefit-cost balance in Europe is favorable for EMU not least because the size of idiosyncratic shocks has declined and business cycles have become more coincident. The empirical evidence presented in this paper shows that the cost of monetary union declined substantially in some target countries while it appears to have risen in others. Furthermore, we study the macroeconomic consequences of selecting alternative exchange rates in three regions (the Americas, Europe and the Antipodes) and, by way of counterfactual experiments, try to assess whether the countries under considerations actually did make the right choice.

In a sense then our study represents an assessment of the economic "distance" between types of exchange rate regimes. Indeed, we implement a straightforward measure of economic distance to evaluate the prospects for or against further monetary integration. The "Maastricht model", which offers a concrete road map for future monetary unions, also points to the need for binding fiscal rules and that a monetary union can be successfully implemented without first forming a political union. The political dimension of the EMU project, important as it is, is not discussed in any detail.

The paper is organized as follows. Section 2 sketches the "Maastricht Model" that lies behind Economic and Monetary Union in Europe and relates the criteria embodied in EMU to the regions considered in this study. Next, we selectively survey crucial determinants of an optimum currency area, with a focus on the Americas and the Antipodes, including the role of fiscal policy. In Section 4 we study the cost of a monetary union by measuring the economic distance between various regions. Section 5 implements a simple structural model that asks how alternative monetary regimes might affect output growth, inflation and their volatility for selected groups of countries (Austria, the Netherlands, Germany, Canada, the United States, New Zealand, and Australia) and report on counterfactual experiments to ascertain the consequences of actual monetary regime decisions. Section 6 concludes.

2. The Maastricht Model

The uniqueness of the Maastricht model for monetary union lies in the formal transfer of monetary sovereignty to a supranational monetary authority, the European System of Central Banks (ESCB), while fiscal policies by and large remain a national competence subject to the constraints set out in the Maastricht Treaty. "Maastricht" thus combines a monetary policy centralized at the euro area level, dedicated towards the area-wide objective of price stability, and fiscal policies that are predominantly geared to national interests. At the same time the Maastricht model specifies quantitative convergence criteria (contained in Protocol 6 of the Maastricht Treaty) as preconditions for the adoption of the euro and specifies binding fiscal rules constraining public deficits and public debt. These rules are centered on the Excessive Deficit Procedure – EDP – (Art. 104 Maastricht Treaty) and the Stability and Growth Pact – SGP – (Resolution of the European Council on the Stability and Growth Pact, Amsterdam 17 June 1997) as safeguards for sustained sound public finances. Article 99 (European Union Treaty – EUT) specifies procedures for fiscal policy coordination. The competent bodies for the surveillance of fiscal policies and fiscal policy coordination are the European Commission and the Council of Economics and Finance Ministers (ECOFIN) respectively.

According to the Maastricht Treaty, price stability is considered a basic common good of the EU. Other economic policies while remaining under national competence must, in their implementation, take the price stability requirement into account. As far as fiscal policy is concerned, excessive fiscal deficits are to be avoided. Moreover, should they occur, these must be rectified as soon as possible (Art. 104 EUT). Thus, if there is an inconsistency between fiscal and monetary policy, it is not monetary policy that has to adjust to a given (excessive) fiscal policy as is the case in "unpleasant monetarist arithmetic" of Sargent and Wallace but rather it is fiscal policy that has to adjust as is stipulated in the EDP and the SGP. The Maastricht Model thus turns unpleasant monetarist arithmetic into unpleasant fiscal arithmetic. In other words, the Maastricht Model enshrines the notion of monetary dominance (Hochreiter, Schmidt-Hebbel and Winckler, 2002).

There has been a lengthy and controversial discussion regarding the wisdom and usefulness of the Maastricht convergence criteria.[3] The ones receiving the most criticism are the exchange rate criterion and, above all, the two fiscal convergence criteria. Regarding to the exchange rate criterion, supporters argue that participation in the ERM disciplines domestic policies, constrains exchange rate fluctuations while, at the same time, permitting policy flexibility. In particular, limitations on exchange rate movements helps meet other convergence criteria such as the interest rate criterion and, foremost, the inflation criterion. Critics, on the other hand, argue that the Maastricht Treaty itself is the disciplining factor for stability-oriented policies and that exchange rate stability ought to be the economic outcome of such arrangements and cannot be the outcome of enforced participation in a soft peg arrangement. Participation in the ERM might even be counterproductive because it might invite speculative attacks instead. This debate is politically relevant both in the context of the three current EU members still not having adopted the euro (Denmark, Sweden and the UK) and the 10 new EU members as of May 2004 required to eventually adopt the euro.

With regard to the fiscal convergence criteria of the Treaty, virtually all aspects have come under severe criticism. Academics and, in the context of the more recent prolonged cyclical weakness of the euro area economy, politicians from France and Italy especially have brought complaints against the SGP. Others, such as for example the Dutch and the Austrians, are equally adamant regarding the necessity of maintaining fiscal rules.[4] The fiscal criteria have been criticized as a nuisance, or even economically harmful,

[3] Protocol 6 of the "Maastricht Treaty"

(1) **Inflation criterion:** an inflation rate not more than 1 ½ % higher than those of the three best performing EU countries over the latest 12 months.

(2) **Fiscal convergence criteria:** These criteria restrict the government budget deficit and the government debt to certain levels. A country which wants to participate in the EMU may not have

– a government **budget deficit** higher than 3 % of GDP,

– a government **debt ratio** of more than 60 % of GDP or sufficiently fast approaching that level.

(3) **Interest rate criterion:** an average nominal long term interest rate that does not exceed by more than two percentage points that of the three best performing member states in terms of price stability.

(4) **Exchange rate criterion:** participation in the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS) within the normal fluctuation margin without severe tensions for at least two years.

[4] "The Dutch government has threatened to sue France for flouting the Maastricht Treaty, which underpins the euro. Austria's Finance Minister, Karl-Heinz Grasser, sums up the sense of injustice. 'We are punished through higher interest rates and have to pay the bill for the deficits of the big countries', he said recently." (*New York Times*, 21 September 2003, wk 5).

because they are alleged to prevent fiscal policy to play its role as a shock absorber. However, below we argue that once the medium term goal of a fiscal position in the SGP "close to balance or in surplus" is satisfied, there is enough inherent flexibility in the SGP to offset "normal" regional shocks. Eichengreen and von Hagen (1996) point out an additional danger arising from fiscal constraints within a monetary union composed of several sovereign states. Too much fiscal discipline can impede other, more flexible, attempts at coordinating stabilization policies. More importantly, the EU is not designed for wide-ranging union-wide tax transfers and so risk sharing at the fiscal level is rather limited. However, while such transfers on a EU wide level are not possible to any large extent (limit of taxation of 1.27% of EU-wide GDP), there exists a large and well-established transfer system at the level of national states. At the same time the net benefit of inter-union transfer systems is not clear. Kletzer and von Hagen (2001) argue that the welfare effects of such insurance schemes are ambiguous and thus, might even be unnecessary. Among the original 11 EMU members, as the date for Stage 3 of EMU approached, there was controversy about the extent to which some of the candidates fulfilled all of the Treaty conditions, above all the fiscal criteria. In the final analysis, however, the Treaty provided enough room for interpretation leaving out, on economic grounds, only Greece from the first euro wave. Greece, of course, has since joined the euro area in 2001.[5]

Let us now examine the extent to which the regions considered in this study would have complied with the Maastricht convergence criteria in the year 2000, thereby enabling them to qualify for entry into a Maastricht Treaty inspired monetary union in 2001. Tables 1 and 2 provide the relevant information for Australia, New Zealand, Canada, the euro area and LAC respectively. Table 3 repeats the exercise for selected EU accession countries.

As one can see from Table 1, on almost all counts, the first of these three mentioned candidate countries satisfy the Maastricht convergence criteria with the exception of the exchange rate criterion. Currently, Australia, Canada, and New Zealand are classified as having freely floating exchange rates, according to both *de jure* and *de facto* classification schemes. Moreover, although all of these central banks are *de facto* independent from their respective governments, only New Zealand has *de jure* autonomy.

[5] Denmark and the UK relied on their opt-out clause, while Sweden did not meet the exchange rate criterion. In addition, Sweden has still to fulfill the requirement that the Sveriges Riksbank be financially independent (cf., ECB Convergence Report 2002: 43 ff), available at www.ecb.int.

Table 2 replicates the Maastricht Model for selected LAC countries.[6] One is immediately confronted with a variety of data-related problems. First, financial markets in the Southern cone are not as fully developed as in Europe or North America. Consequently, the interest rates used here are short-term money market rates and not the 10 year government bond rate. Second, there are considerable difficulties in obtaining reliable and comparable public debt figures. The problem is compounded by the fact that the division between domestic and foreign debt is likely to be of relatively greater importance for the LAC countries than for the other countries considered here. Nevertheless, the available data reveal that while there have been dramatic improvements in the area of disinflation, nominal interest rates remain high. The available public debt and deficit data do not appear alarming but they fail to capture the accumulated history of poor fiscal policy, as the Argentine experience highlights, as well as the frequent bouts of high inflation in the region.

The picture is also quite mixed for the countries in central and eastern Europe which will accede to the European Union on May 1, 2004 (Table 3). While most are still doing well regarding the public debt criterion, the majority of them still have some, and in some cases, a long way to go before being able to fulfill the Maastricht deficit criterion. Moreover, countries such as Hungary or Poland have shown cycles of fiscal consolidation and fiscal lapses, making any projections rather difficult. Just as has been the case for incumbent EMU members, the budget deficit criterion will most likely be the most difficult convergence criterion to be achieved. Interestingly, most recent developments in the fiscal area have prompted the governments and central banks in some of the accession countries to become more cautious regarding the likely date of the introduction of the euro.

As far as the inflation and interest rate criteria are concerned, again, there are significant differences and data problems with regard to interest rates. A prima facie conclusion is that the majority of the accession countries under consideration is still some way off to fulfill these criteria. Finally, with regard to the exchange rate criterion, naturally, no country can currently fulfill it because of the two year ERM II participation requirement. In addition, these countries' exchange rate regimes currently cover the whole spectrum from currency board arrangements (Estonia and Lithuania) to freely floating rates (Poland). While it is clear that free floats, managed floats without a central rate to the euro (Slovenia and Slovakia), and pegs to currencies other than the

[6] Argentina, Bolivia, Brazil, Paraguay, and Uruguay belong to Mercosur. Chile and Mexico do not.

euro (Latvia) are incompatible with ERM II membership, the compatibility of the other regimes will be assessed on a case-by-case basis.

As has been noted above, membership in the ERM was deemed vital to meet other convergence criteria, especially the inflation criterion. Interestingly, the candidate countries from North America and the Antipodes opted for a floating exchange rate within an inflation targeting strategy and their economic performance is broadly similar and likely superior, to that of their EMU counterparts. Mundell (2000a) has pointed out, and this view coincides with critics of this particular convergence criterion, that the pursuit of price stability at large, rather than stubborn adherence to a chosen exchange rate regime, should be policy makers' objective. At the same time, the convergence in inflation rates that emerges from Table 1 supports Mundell's contention that wider monetary unions are feasible in the future.

We would argue that the data presented indicate that, according to the Maastricht model, some of the countries under consideration could form a monetary union. Let us now consider how OCA theory fits into this picture.

3. Crucial Aspects of Optimum Currency Areas: Selected Issues

3.1. Background

The literature on Optimum Currency Areas (OCA) generally originates with the pioneering work of Mundell (1961). Though there have been several important contributions since (e.g., Tavlas 1993, and Isard 1995 are surveys of the literature) interest in this topic has resurged of late as countries take stock of the economic consequences of existing exchange rate regimes and debate whether groups of otherwise sovereign nations form an OCA[7], especially for the countries under investigation in this study.

Prompted by the European experience, economists have been weighing the microeconomic benefits and costs against the macroeconomic ones with little conclusive evidence suggestive of the absolute advantage of such an arrangement.[8]

Among the benefits is the reduction in transactions costs. The most visible manifestation of such benefits is when individuals no longer have to carry or exchange several different currencies. Other benefits include the creation of large regional trading blocks, both as a means of ensuring a sufficiently strong voice in international trade negotiations and rule setting. Of course, monetary integration is not a necessary condition for the creation of trading blocks (e.g., as with NAFTA). However, monetary union eliminates the role of the exchange rate in the calculus of benefits and costs of trading across borders.

The principal costs of single currency arrangements can be summarized under the broad heading of loss of sovereignty over economic (and, possibly, political) affairs. Moreover, the European experience suggests that creating a single monetary policy is not enough and that, eventually, fiscal policies must also be harmonized coordinated in some sense.

While history has proved to be a critical catalyst that permitted national or regional concerns to be emasculated by some overarching European vision, it is far from obvious that these same elements are present in most other regions

[7] Also witness the discussion on OCA in the context of the current EU enlargement round covering 10 countries in central and Eastern Europe (e.g. de Grauwe and Askoy, 1999 or Eichengreen and Ghironi 2001), as well as the Mercosur region about which more is said below.

[8] Except perhaps for EMU, if only because the political motives were so compelling.

of the world where a form of monetary union is being contemplated. In several regions of the world there are a varied set of forces pressing for changes in the exchange rate regime. In North America and the Antipodes, as we shall see below, there is a sense that while the downward drift in the nominal exchange rate (vis-à-vis the US) persisted this was interpreted as symptomatic of some underlying structural problem that can only be repaired via currency unification.[9] Nevertheless, unlike several LAC countries, the other potential candidates for monetary union discussed in this paper have well-developed financial markets, and strong and well-functioning fiscal and monetary institutions. We return to this issue below.

Hargreaves and McDermott (1999) find that a currency union for New Zealand might be desirable relative to merely 'pegging' its exchange rate. Yet, while both regimes reduce macroeconomic flexibility, only the former produces sufficient (transactions) cost savings. It is interesting to note that while countries such as Canada, Australia, New Zealand, and the Eurozone are "independently floating", at least according to IMF definitions, Latin American countries have adopted exchange rate arrangements that fit into *all* of the IMF classifications.[10] As a result, Rojas-Suarez (2002) argues that trade integration will be hampered and the risks of exiting a Free Trade Agreement of the Americas (FTAA) will be greater. Orr (1999), in contrast, concludes that the benefits of maintaining policy flexibility probably outweigh the benefits from small gains in trade volumes, and from the reduction in transactions costs that stem from a monetary union. The reason is that New Zealand is a small open economy that is especially vulnerable to unexpected shocks from various parts of the globe. Moreover, there is no evidence that the growth in trade has been hampered by the adoption of floating rates, at least in the industrial world. Grimes, Holmes and Bowden (2000), underline the microeconomic benefits

[9] Arndt (2002) surveys the two sides of the debate over monetary integration in North America with special emphasis on the evidence, or lack thereof, for the notion that nominal exchange rate depreciation can precipitate a productivity slowdown with a consequent drop in the standard of living. Interestingly, notions of a productivity deficit seem to have vanished during 2003 in the three candidate countries listed in Table 1 in the wake of an extraordinarily rapid appreciation of their respective currencies, especially vis-à-vis the U.S. dollar.

[10] Prior to the end of 2002, 8 countries had no separate legal tender, 1 country had a currency board since demised, 13 countries had some kind of pegged currency (with/without bands or a type of crawling peg), 4 countries adopted a managed float, and 6 had independently floating currencies. An issue relevant to the main arguments in the present study, but one we do not touch upon, is one's definition of a pegged versus a floating exchange rate regime. Levy-Yeyati and Sturzenegger (2001) argue that conventional classifications of exchange rate regimes (e.g., IMF definitions) offer an inadequate portrayal of the actual regime in place. An even more comprehensive revisionist view of exchange rate regime classifications is Reinhart and Rogoff (2002) who conclude, for example, that freely floating exchange rate regimes deliver the best inflation performance.

for New Zealand in abandoning the NZD in favor of the AUD and rely on survey evidence to justify some of their arguments. One element in the cost-benefit analysis of alternative exchange rate arrangements concerns the perceived costs of exchange rate volatility, and the concomitant costs of foreign exchange intervention. Indeed, it is precisely these types of costs that have produced the "fear of floating" view of exchange rate movements (e.g., see Calvo and Reinhart 2000) in non-industrial countries. However, just as the analysis of the impact of exchange rate volatility and the role of exchange rate intervention needs to be conducted using data at very high frequencies for industrial economies, the same argument should hold for developing, or emerging market economies, for which there are a paucity of studies. Wickham (2002) is a recent exception. Using data for 16 countries, including Chile, Mexico, Colombia, and Peru, he finds that the conditional variance of exchange rates reacts more sharply to large shocks (e.g., the Asian financial crises) than in the industrial countries that are used as the benchmark.

The literature suggests that at least four elements are critical to the establishment of an OCA in the presence of asymmetric shocksa. They are: *labor mobility*: the free movement of labor smoothes regional disparities in unemployment rates; *capital mobility*: savings and investment will seek out the most profitable opportunities while barriers to capital movement prevent this. *Openness and regional interdependence*: it makes sense to use the same currency if goods move freely between the regions and if a significant portion of trade is done within a specific region[11]; *wage and price flexibility*: resources can only be allocated to their best uses if wages and prices are sufficiently flexible. Otherwise, the exchange rate must perform that function.

McKinnon (2001) points out that the foregoing list excludes an explicit role for risk sharing, a largely neglected feature of the OCA literature raised by Mundell in some lesser known articles where he effectively downplays the role of asymmetric shocks as a determinant of OCA. Indeed, this feature may be at the heart of the costs calculus associated with notions of "home bias" in financial asset holdings that might be relieved via a common currency arrangement. Bordo, Eichengreen, Klingebiel, and Martinez-Peria (2001) observe that a flexible exchange rate regime is better able to cope with a banking crisis.[12] Alesina and Barro (2002) also extend the existing criteria

[11] Lane (2001) is a recent survey of, among other issues examined, the connection between openness, trade, and real exchange rate behavior.

[12] Some of the countries considered here suffered from financial stresses or crises of some kind over the sample period considered.

to include a country's historical experience with the level and volatility of inflation, the degree of trade between candidate and target countries[13], the amount of synchronicity of business cycles, and the stability of the real exchange rate. For the purposes of the present paper we omit a direct reference to these issues, in part because the relevant literature is still far from reaching a consensus.[14]

3.2 Varieties of Currency Unions

There exist a number of arrangements that aim to provide benefits similar to a currency union at the cost of reduced policy flexibility. More relevant for our purposes is the possibility that the candidate economies will either adopt the target economy's currency or an entirely new currency will be established. The transition to EMU in 1999 corresponds to the latter position.

Dollarization is relevant to the experience of all candidate countries considered in this paper. It emerges in two forms. The first is *private market* dollarization: private businesses transact their business in US dollars. For example, a large number of business transactions in Canada are conducted in USD. Nevertheless, conventional measures of dollarization, such as foreign currency deposits to GDP, suggest that Canada is far less dollarized than might be otherwise believed (Murray and Powell 2002).[15] This does not require any involvement on the part of the Canadian Government, and is a response of the marketplace. The second form of dollarization is *policy* dollarization whereby the Canadian Government would officially sanction the use of the USD either as a parallel currency or by unilateral dollarization. Dollarization functions similarly to a fixed exchange rate. However, the candidate economies would be giving up all seigniorage and the control of monetary policy as in a currency board. For countries such as Argentina, attempting to emerge from under severe currency crisis, such an option is seriously being considered, at least at the political level though the proposal has so far been ruled out, echoing the recommendations of the Report by a Panel of Independent Advisers (Tietmeyer et. al. 2002).

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[13] The authors use the "client" and "anchor" nomenclature instead of the candidate and target terminology employed in this paper. There is, however, no essential difference between the two sets of terms.

[14] Also, in the case of Canada and the US, the home bias "puzzle" is complicated by the fact that taxes and other microeconomic considerations come into play since the relatively free movement of capital has long been a feature of the trading relationship between these two countries.

[15] Dollarization is certainly far less intensive than it was in, say, Argentina.

There is considerable disagreement about the pros and cons of dollarization. Some argue that such a policy is a sensible option only in the most extreme conditions such as persistent economic mismanagement (Buiter 1999). Others are skeptical about the evidence that dollarization can cure a multitude of economic ills (Eichengreen 2002a). The Journal of Policy Modeling (2001), represents other recent surveys of the literature with special emphasis on outstanding issues needing a firmer theoretical basis, and prospects of pitfalls of such a policy for the Americas. At the risk of oversimplification, the crux of the matter is that while dollarization would constrain inflation, such a policy does not resolve deep-seated problems such as weak institutions. Moreover, it is not at all clear that dollarization would completely prevent the possibility of excessive indebtedness in future (Edwards 2002). It should be emphasized that while dollarization remains an option, it is quite likely that countries that choose this path will, in all likelihood, loose the flexibility – assuming, of course, that such flexibility is desirable – of changing the exchange rate regime. It is, in principle, difficult to reverse a dollarization policy.

Yet another possibility is the formation of a completely new (multilateral) monetary union which is a far more complex and time-consuming process. A formal monetary union also represents a significant constitutional and political change. The EU has spent decades harmonizing policy, and building a solid economic union while a political union still remains elusive. In particular, such a monetary union represents the surrender of a significant portion of national sovereignty to a supranational entity. Thus, monetary integration is eminently a political process. Cohen (1993) is one study, among many, that have stressed the primacy of political factors over economic ones.[16]

If earlier monetary unions offer any insights, the monetary union in the United States was not complete until after political integration (Buiter 1999; Rolnick, Smith and Weber 1994). Italy and Germany are examples of countries that achieved political integration prior to monetary integration. Belgium and Luxembourg on the other hand formed a successful bilateral monetary union from 1922 onwards until their absorption into EMU in 1999. There have also been monetary unions that have been dissolved such as the Irish currency board. Dissolution in this instance was made easier because each member country maintained a central bank of its own during the

[16] Wyplosz (2001a, 2001b) essentially makes the same argument in reviewing the last half-century or so of European macroeconomic history leading up to EMU. However, he emphasizes that policy makers in Europe fundamentally believe that the gains from enhanced trade under a single currency system far exceed any macroeconomic costs from the loss of policy flexibility in EMU.

monetary union. However, in the case of political divorce, monetary separation has always followed (Bordo and Jonung, 1999), such as in the case of the break-up of Czechoslovakia or the Soviet Union. Ironically, it is almost always political and not economic developments that cause the break-up of a monetary union. The important innovation in the context of EMU precisely was monetary unification without political unification (Mundell 2000).

Feldstein (1997) points out that the desirability of EMU will be judged not by its impact on inflation and unemployment but by its effect on peace and conflict within Europe and the rest of the world. Nevertheless, Feldstein (2001) believes strongly that the current EMU arrangements have insufficient instrument flexibility to cope with naturally occurring business cycle asymmetries within a monetary union (see below). Indeed, he stresses, as have others (Calmfors 2000), that "… the reason that the EMU exists today is political rather than economic." Furthermore, it bears repeating again that monetary unions of the past have generally followed as part of the process of political unification[17]. It has been political glue that holds a monetary union together.[18] To take perhaps an extreme example, Soviet monetary history in the 1919–24 period (Siklos 1999) represents a cautionary tale of the nexus that links political union with monetary union. Rarely is one possible without the other. The Soviet authorities were unable to project their political authority until the many competing currencies that circulated throughout its territory were withdrawn form circulation (occasionally forcibly). It is important, however, to acknowledge (see below) that the long preparatory stages that culminated with EMU represents a critical and distinguishing characteristic of the novel European experiment.

3.3 The Role of Aggregate Shocks

In what follows, we focus on two questions surrounding the choice of monetary arrangements, namely the impact of economic shocks under different exchange rate regimes and the influence of currency arrangements

[17] There are a few notable exceptions where there are nation states, which do not have a national currency unit of their own, like Panama, Monaco, Andorra, San Marino, and the Vatican. Generally, these are very small countries. In this connection, see Rose (2001).

[18] This suggests, for example, that Finland and Sweden, two obvious candidates for monetary union (e.g., see Jonung and Sjöholm (1999), should both opt into EMU. At present, Finland adopted the euro while Sweden, after the failed referendum in September 2003, is unlikely to follow in the near to medium term.

on the synchronicity of business cycles.[19] To conserve space, the review below is highly selective.

As indicated earlier, some of the conditions that support flexible rates include structural differences between the candidate and target countries. For example, Murray (2000) argues that, despite the highly integrated nature of, for example, the US and Canadian economies, important structural differences do remain. Canada is more exposed to external shocks than is the US. Furthermore, there must be sufficient downward rigidity of wages and prices. In the case of Canada the available wage and compensation data do not suggest that the majority of private-sector firms faced a binding floor at zero wage change in the 1990s.

Ultimately, however, the principal advantage of a flexible exchange rate regime is its ability to absorb both foreign and domestic economic shocks thereby highlighting the role of monetary sovereignty. Therefore, much empirical research work has focused on whether aggregate shocks are symmetric or not.

It should be pointed out, however, that not all shocks are treated on the same footing. Hence, while technological or productivity shocks are believed to have permanent economic effects others, such as monetary, fiscal or exchange rate shocks are believed to have only a temporary impact on levels of economic activity. Equally important, as we shall see below, is that assumptions about the permanence of shocks are intertwined with the structure of the specified model. Hence, the degree of shock symmetry is sensitive to specification issues. An additional issue that has returned to greater prominence only fairly recently concerns the volatility of shocks and whether these produce additional detrimental economic effects.[20]

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[19] Typically, the shocks we have in mind are ordinarily of the aggregate demand or aggregate supply variety. Clearly, other shocks, such as fiscal or banking system shocks will also have repercussions for the choice of exchange rate regime. Taking account of these types of shocks would require a survey of financial crises, and their onset, a rather large literature that is omitted here due to space limitations. Readers are referred to several recent analyses or surveys such as Chinn (2001).

[20] Mussa (1976) remains the classic reference for empirical work that fails to find any deleterious effects from volatile exchange rates under a floating regime. Belke and Gros (2002) present some empirical evidence to the effect that exchange rate and interest rate volatility have reduced employment and increased unemployment in the LAC region and they blame the result on the fact that, since investment is irreversible, exchange rate volatility has negative economic effects. Current research on monetary policy rules finds that the volatility of inflation, output, and the real exchange rate (in deviations from some notional level for these variables) represent the loci of optimal policies.

Shock symmetry refers to the distribution of the impact of some economic shock across the participating economies in a potential monetary union. If shocks are indeed highly asymmetric – read uncorrelated – then floating exchange rates act as a shock absorber[21]; otherwise, the exchange rate does not serve a useful corrective role and so the various micro and macro economic costs of national currency arrangements become critical. Dupasquier, Lalonde and St.-Amant (1997) address the exchange rate response issue – the fact that Canada's exchange rate has tended to appreciate in the wake of non-monetary demand shocks. They also find that the interest rate rises following such a shock. These results suggest that identified non-monetary demand shocks correspond closely to real demand shocks and that what we are seeing is the crowding out effect of these real shocks. They also observe that, following a one standard deviation non-monetary shock, the adjustment in the exchange rate is much swifter and greater than that of prices. Moreover, the adjustment in prices is statistically insignificant, while the impact of nominal exchange rates is statistically different from zero. From this perspective, it looks costly for Canada to abandon exchange rate flexibility. They also show that the nominal exchange rate contributes to facilitating macroeconomic adjustments, and that it does so mainly for real demand shocks.

Theoretical models do not necessarily lead to the conclusion that the exchange rate acts as an automatic adjustment device. Devereux (1999) points out that it is crucial to consider whether prices are sticky in a flexible exchange rate world, as well as the level of international monetary policy coordination.[22] The former limits the pass-through effects of exchange rate changes; the latter can also impose external limits to the ability of domestic policies to react to international economic shocks. An extension of existing theoretical models leads to the conclusion that, in the presence of sticky prices and a cooperative peg, as opposed to a unilateral peg, a fixed exchange rate regime may welfare-dominate a floating regime.[23]

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[21] The shock absorbing qualities also depend on the intensity of second round effects following exchange rate changes.

[22] A pure float obviates the need for any form of monetary policy coordination. However, other exchange rate arrangements, as well as models (typically of the Keynesian variety), raise the specter of policy coordination. Space limitations prevent a fuller discussion of the issues. See, however, e.g., Canzoneri, Cumby and Diba (2002).

[23] In a more recent paper (Devereux 2003), the flexible exchange rate model as the perfect "shock absorber" is found to be inferior, in welfare terms, to a fixed exchange rate regime in the presence of aggregate demand shocks, imperfect or incomplete financial markets, and the absence of wage flexibility. As a result, consumption between domestic and foreign goods can be optimal under a pegged regime.

Flood and Rose (1995), compare the volatility of different major macroeconomic variables under fixed and flexible exchange rates. As noted earlier, a proper assessment of the net benefits of one region over another does not stop at a comparison of levels of some set of macroeconomic aggregates. Also, the frequency and size of shocks is likely to be related to the volatility of key macroeconomic aggregates. They find that there is no significant difference in the volatility of variables such as output and inflation. Flexible exchange rates may correspond to periods of greater and more volatile shocks, but their results support the hypothesis that exchange rate flexibility has facilitated adjustment to real demand shocks as in, for example, Canada over the last few years, and that without this flexibility, prices and domestic output would have been more volatile. Moreover, it is possible that exchange rate flexibility has attenuated the effects of certain shocks specific to the Canadian economy, such as ones stemming from movements in commodity prices.

In a model of VAR simulations of inflation and output growth, Bayoumi and Eichengreen (1994) attempt to measure the asymmetry of contemporaneous shocks. They are able to identify permanent and transitory shocks using the Blanchard-Quah decomposition method. For Canada and the US they find that supply shocks are not highly correlated, while the degree of symmetry of shocks in regions within the US is notably higher. In a slightly more sophisticated study, taking into account the degree of symmetry of both demand and supply shocks affecting Canada and the US, DeSerres and Lalonde (1994), use models (VARs) with three variables: the growth rates of output, prices and money. They remove monetary shocks from other demand shocks by imposing the restriction of long-term neutrality, that is, monetary shocks have no permanent effect on real balances. They examine contemporaneous correlations of supply shocks and non-monetary demand shocks, and conclude that shocks affecting the Canadian economy have little in common with those that affect the US. Finally, DeSerres and Lalonde (1994) find that Canada and the US are subject to significant asymmetric shocks, whereas structural shocks hitting the nine regions of the US are very similar. The reported correlations in the latter case range between 50–99%. Therefore, they conclude that the US is an optimum currency area. Hochreiter, Korinek and Siklos (2003) also use a structural VAR but permit interaction between fiscal and monetary policy and find that the correlation of shocks is lower than reported elsewhere in the literature, as in the study cited above. They also point out that controlling for systematic policy can make a great deal of difference to the size of correlations between structural shocks. Such findings reflect a growing consensus at least among some economists

that the practice of extracting "shocks" alone from models potentially omits more systematic components that also ought to be considered in assessing the suitability of one monetary regime versus others.

The likelihood that an adverse shock would have a major impact on an economy will depend on the structure of production, both actual and perceived. The experiences of Canada and the Antipodes are particularly relevant here for their own sake, but also for the LAC countries, since many of them are perceived, rightly or wrongly, by foreign exchange markets as being "commodity currencies" and, therefore, may be vulnerable to adverse international shocks. Blundell-Wignall and Gregory (1990) argue that, in the context of large commodity price fluctuations, macroeconomic stabilization and price stability call for exchange rate flexibility. But, as in the case of a negative commodity price shock, the exchange rate will react through exchange rate depreciation, increasing the consumer price index by an amount proportional to the share of imports in consumption, thereby exacerbating inflationary pressures.

Courchene and Harris (1999) suggest that, in the case of Canada and the US, flexible exchange rates have not served their purpose in the face of a trend where trade is predominately North/South (i.e., between the US and Canada) instead of East/West (i.e., between the provinces). They state that we are witnessing the creation of large regional trading blocs, which favor the adoption of a common currency.[24] Asymmetric shocks that would have occurred are smaller if the potential union partner is a key bilateral trading partner. There is reason to believe the same might be true for the Australia-New Zealand case (e.g., see Scrimgeour 2001).

Currently, over 80% of Canada's exports are destined for US markets. The north-south trade is greater than the east-west trade now for Canada.[25] In contrast, trade between New Zealand and Australia represents only 4.5% of Australia's GDP.[26] Murray (2000) and Laidler (1999) find flaws with the

[24] In part for this reason, Chriszt (2000) argues that Canada, Mexico, and the US are good candidates for a monetary union.

[25] Grady and MacMillan (1998) found that between 1989 and 1997 Canadian exports to the rest of the world rose from 26.1% to 40.2% of national income, while inter-provincial trade declined from 22.7% to 19.7 % of national income.

[26] Hargeaves and McDermott (1999) say that even with this amount of trade they estimate potential transaction cost savings of a currency union with Australia at about .13% of GDP per year or roughly NZD 40 per person. Grimmond (1991) points out that exports from New Zealand to Australia tend to be manufacturing goods, not raw materials.

Courchene-Harris view. They call into question their interpretation of the structure of the Canadian and US economies. For example, Canada is far more dependent on commodities. The connection between the nominal exchange rate, the structure and productivity of an economy should be a secondary concern if it is accepted that the state of the economic environment follows from the choice of domestic policies (viz., monetary and fiscal), and not vice-versa. Yet, it is precisely this reverse-causation that opponents to the floating regime in Canada referred to above have in mind though the evidence for this view appears to be rather weak at best (also see Arndt 2002).

There appears to be little public support in Canada for such integration. It is also questionable how much support exists in the Antipodes, especially in Australia (see, however, Grimes, Holmes and Bowden 2000), though there have been attempts to create common currency arrangements in the past. Indeed, recent re-examinations of the potential net benefits of an Australian-New Zealand monetary union (e.g., see Coleman 2001) suggest that the case for net gains from trade under a common currency remain unclear. Moreover, while the exchange rate does not appear to have done an adequate job as a shock absorber, few believe that monetary union will take place in the foreseeable future largely because of political obstacles that stand in the way of such an arrangement. Moreover, as noted earlier, economic performance has continued to be good and the US recession of 2001–02 was note transmitted to either of these countries. In contrast, Austria and the Netherlands understood and, for the most part, welcomed closer political and monetary integration with Germany and the other EU member countries.

As noted earlier, there appears to be little taste for monetary integration with the US in the LAC region for the reasons outlined above. Instead, monetary union, or dollarization, is seen as providing the necessary the necessary anchor that might permit the development of sound financial institutions and a stable fiscal policy. It is not the exchange rate regime per se (see sections 2.1 above) that is the source of the problem but the weak political and institutional structures that have led to poor economic performance. Indeed, a notable feature of the three countries considered in Table 1 is that they have each adopted inflation targeting and this represents a coherent monetary policy strategy in the presence of floating exchange rates.

3.4 The Impact of Fiscal Policy

So far, the analysis has focused on the role of monetary policy as the principal means of macroeconomic adjustment in the presence of shocks under different exchange rate regimes. Yet, there is a crucial role for fiscal policy. Grubel (1999) argues that the need for flexible exchange rates is overrated and all that is required is internal price adjustment, a sound fiscal policy, and internal migration. He cites the example of California and the closure of the defense-related companies when the federal government decreased its defense spending in that state.[27] While Murray (2000) concedes that flexible exchange rates could indeed be made redundant if the country has a surfeit of macroeconomic instruments, this is rarely the case. Generous fiscal transfers could be enacted when there are shocks to the economy, but they often lack the speed necessary to be effective, and are difficult to reverse once the shock has passed. Obstfeld and Rogoff (1995) conclude that there is no evidence of a reliable link between exchange rate regimes and fiscal policy. Crow (1999) argues that floating currencies do not allow fiscal policy to be irresponsible on the grounds this irresponsibility is not floated off by depreciation. Grubel (1999) argues that a common currency would have a positive impact on fiscal discipline since there would be an external constraint on debt and deficit spending. Nevertheless, Grubel assumes that Canada's fiscal policy has been unusually irresponsible but it is far from clear that this was the case. The experience of the 1990s and the first years of the decade since the year 2000 put paid to that argument. Indeed, it is the US which is now viewed as being fiscally irresponsible while Canada is the only G7 country with a continuing fiscal surplus. Unlike Argentina (or New Zealand in the early 1980s), there were never any suggestions that the country was about to hit a "debt wall" with a consequent inability to cope with the demand for foreign exchange under a rigidly pegged exchange rate regime.[28] Fear of a future devaluation is

[27] California had the benefit of US fiscal federalism, which entitled the State to financial aid inflows from other States. Sachs and Sala-i-Martin (1992) emphasize that currency unions such as the United States have less of a need for monetary policy since this transfer system works for the nine US regions. They estimated that over 1970-1988, a $1 decline in a region's income led to a 33 to 37 cent fall in tax payments to Washington and a 1 to 8 cent increase in transfer receipts. Thus, at least a third of a region's economic bad luck is offset by this federal fiscal system. In Europe, while there are hardly any transfers on a EU wide level (limit of taxation of 1.27% of EU wide GDP), there exist large national fiscal safety nets.

[28] As Mussa (2002) points out "bad luck", in the form of a series of unexpected economic shocks, also contributed to the Argentine tragedy. In addition, the survival of Argentina's currency board despite the Tequila crisis of 1994 , and the Asian crisis of 1997, further emboldened policy makers to delay needed structural and fiscal reforms, as well as convincing foreign lenders that the country was a good bet.

generated by the consequences of lax fiscal policy today. By contrast, bad fiscal policy is reflected more quickly in current exchange rate movements under a floating regime. It is not immediately clear, a priori or even in theory, why one regime has greater net benefits than another in terms of fiscal discipline.

The importance of fiscal policy cannot be underemphasized in the case of LAC countries. As the Argentine experience amply demonstrates, running a budget deficit during years of strong growth, facilitated in part from the drive to root out inflation following the adoption of the currency board approach, together with an international financial community all too willing to provide foreign currency loans prior to assurances that fiscal and monetary policies would operate harmoniously and for the foreseeable future, spelled economic collapse when the overvalued peso's exchange rate could no longer be maintained (e.g., see Willett 2003).[29]

The importance attached to the role of fiscal policy and debt management has become a mantra among economists who point out that choosing the exchange rate regime is not enough. One must also have a coherent monetary and fiscal strategy. This point is elegantly made by Begg (2002) who also draws attention to the limitations of comparing the EU experience with the potential for monetary integration in the LAC region. He does, however, suggest that there are potential net benefits to relying on a supra-national agency – he does not specify which kind – at both the monetary and fiscal levels. Nevertheless, to date, the LAC countries have been "forced" to direct their attention to organizations such as the IMF in an attempt to provide a commitment mechanism when convenient or as the object of their fury when an economic crisis erupts. An alternative, underlined by Hochreiter, Schmidt-Hebbel and Winckler (2002) might be the long awaited Free Trade Agreement of the Americas (FTAA). Yet, unlike the EU experience where Germany and France (as well as Italy and the UK to a large extent) act as counterweights to each other in the formulation and execution of economic policies there is the fear that, under an FTAA, the US will have excessive influence over policy choices and outcomes.[30]

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[29] As noted above a currency board can be thought of as a type of fixed exchange rate system supported by additional institutional constraints. For additional details the reader may wish to consult, for example, Ho (2002).

[30] Rojas-Suarez (2002) draws a parallel between the pre-conditions for a sustainable FTAA and the maintenance of fixed exchange rates. Hence, it is far from clear under these circumstances how such a trading bloc could be a panacea for all the economic ills facing the LAC region.

3.5. Comovements in Business Cycle Synchronicity

Increased synchronicity of business cycles is a relevant argument in support of OCAs. Frankel and Rose (1998) argue that a currency union can lead to increased economic integration which will tend to synchronize business cycles.[31] However, they also believe that international trade patterns are endogenous, and having a fixed exchange rate will lead trade relations to become more intense between two countries (also, see Rose and van Wyncoop 2001).[32] This means that, as trade increases within a currency union, the shocks the union partners face will become more symmetric over time.[33] Bayoumi and Eichengreen (1992) conclude that the degree of asymmetry is considerably smaller if only the sub-set of EU countries that have traditionally maintained close economic and monetary links with Germany is considered. On the other hand, Hochreiter and Winckler (1995) show that, throughout the 1970s and 1980s, shocks hit the Austrian economy asymmetrically vis-à-vis the German economy. Empirical evidence does not support the view that shocks have become more symmetric over time.[34] Wyplosz (2001a) estimates a three variable VAR and open economy Taylor type policy rules and finds that business cycles in Germany and France, in particular, have become more synchronous. Hence, greater market integration in Europe may have contributed to reducing the overall heterogeneity in business cycle and monetary policies.

Also, if economic integration favors national specialization, as suggested by Krugman (1993), countries may then become more sensitive to industry-specific shocks, resulting in more idiosyncratic business cycles.[35] For

[31] However, there is evidence for New Zealand that suggests this may not be relevant since fluctuations in the prices of commodity exports tend to be the important source of shocks for the economy. Since commodity trade is unlikely to be greatly affected by currency union, this probably diminishes the opportunity for convergence of business cycles.

[32] Pakko and Wall (2001) question the methodology employed by Rose (2000), as does Persson (2001) and suggest that the gains from trade in a currency union are considerably smaller or possibly insignificant.

[33] However, recent evidence by Ballabriga, Sebastian, and Valles (1999), shows that the formation of a common currency area in Europe has not yet led to more synchronized business cycles across Europe.

[34] The authors do qualify this by stating that due to data problems, and limited statistical significance, an earlier version of their paper had found increased symmetry of shocks in the 1980's versus the 1970's.

[35] Of course this effect can be offset if industry production is conducted on a cross-national scale. Hence, components of certain goods might be produced in several countries so that it is not clear that industry-specific shocks will only have national effects.

example, in the case of Australia and New Zealand, since these two countries likely face asymmetric shocks, they are unsuitable for forming a currency union. Further exacerbating the problem is that New Zealand is also subject to a number of idiosyncratic shocks (Bayoumi and Eichengreen, 1994). Indeed, in a series of counterfactual experiments that rely on the Reserve Bank of New Zealand's model, Drew, Hall, McDermott and St. Clair (2001) report that the output gap would have been higher had New Zealand adopted the AUD.[36] However, business cycles may become more similar if demand shocks dominate, countries are subject to common external shocks, or intra-industry trade dominates. As a consequence, a monetary union between Canada and the US appears more costly from the point of view of shock asymmetry than from the perspective of business cycle asymmetry. A possible explanation is that the US business cycle is quickly transmitted to Canada, due to the size of the US economy and the tight economic relationship between the two countries. Hence, the two countries' business cycles are more correlated than previously suggested. Exchange rate flexibility may also have made the two countries business cycles more symmetric by smoothing the effect of asymmetric shocks between the two countries.

Melitz and Weber (1996) point out that, when dynamics are taken into account, the US and Canadian economies exhibit a much greater degree of symmetry. They find that the correlation between Canadian and US shocks is not very different overall from what we observe for European countries. This conclusion differs from the findings of Bayoumi and Eichengreen (1994) or DeSerres and Lalonde (1994), who reported a more marked symmetry between European countries than between Canada and the US.

Corsetti and Pesenti (2002) show that, as the endogenous OCA argument suggests, if firms change their pricing strategies, even if OCA criteria are not satisfied ex post, monetary union can still produce a form of integration and validate the choice of monetary regimes.[37] Similarly, choosing a floating regime over some alternative currency arrangement may also prove optimal even if business cycle movements between the candidate and target economies are highly symmetric, again depending in part on the strength of pass-through effects from exchange rates to prices. Currency areas can, therefore, be self-validating.

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[36] Monetary policy would also have been looser thanks to a flatter yield curve inherited from Australia.

[37] In particular, the currency in which products for export are denominated becomes important. We do not pursue this question any further. See, however, Bacchetta and van Wyncoop (2001).

Throughout the foregoing discussion it is clear that a significant portion of the current literature focuses on the experiences of industrial countries. First, and foremost, there are considerable data related hurdles in constructing a usable data set of time series that permit the type of sophisticated econometric testing reviewed above. Belke and Gros (2002) make this clear since both their models and econometric evidence is narrowly focused on the connection between exchange rate and interest rate volatility and employment or unemployment. In particular, they recognize the role of fiscal policy in assessing the suitability for the Mercosur countries to form a monetary union but are unable to meaningfully incorporate this feature in their empirical exercise. No doubt it would have been useful to have more precise estimates of the degree to which LAC countries are subject to asymmetric shocks. Nevertheless, as the foregoing sections point out, there is ample aggregate evidence to demonstrate that the combination of weak institutions, and still more fragile politics, mean that the current time series evidence is not likely to be sufficiently informative about this question.

4. Economic Distance: Selected Case Studies[38]

In addition to calculating notional Maastricht convergence criteria it is useful to consider a straightforward metric of the likely costs of monetary union in the regions considered in this study. Alesina and Grilli (1992) present a simple model to show that the costs of a monetary union depend on the volatility of output growth between the candidate and target countries, to use our nomenclature. This model begins by assuming a standard loss function for society (or the central bank) wherein inflation variability and output variability are the determinants. Hence, the greater are the differences between the candidate and target countries' output variances and the smaller the correlation between candidate and target countries' output growth, the larger the potential costs of forming a monetary union. As a result, the combination of these two factors defines their notion of "economic distance" as follows:

$$\left\{ \left(\frac{\sigma_C}{\sigma_T} \right)^2 + (1 - \rho_i)^2 \right\}^{\frac{1}{2}} \tag{1}$$

In equation (1), σ_C is the standard deviation of output growth or inflation in the candidate country; σ_T is the standard deviation of output growth or inflation in the target country; ρ_i represent the simple correlation coefficient of output growth or inflation between the candidate and target economies. The measure of economic distance is defined in such a way so that the larger the economic distance, the greater are thought to be the costs of monetary union. Although the statistic has usually been applied to output we also consider inflation since it is, of course, central to the strategy implicit in the Maastricht Treaty. Figures 1 through 3 plot the relationship between the two components of equation (1) for the various country groupings considered in this paper. Data limitations restrict the number of sub-samples that can be examined. For the three candidate countries examined in Table 1, we consider two sub-samples for the following reasons. First, during the 1980s, monetary union was far from certain in the European context, and little discussed in either Canada or the Antipodes. Second, as there is considerable merit in the argument surrounding endogenous OCAs, it is likely that European economies especially will have adapted to the negotiations and, ultimately, to

[38] Some of the material below draws from Hochreiter and Siklos (2002).

the fulfilling of the Maastricht Treaty requirements. Hence, it seems appropriate to consider, as a benchmark, economic distance between Austria or the Netherlands and Germany. The former countries were long thought to be the ideal candidates for monetary union in Europe since at least the 1980s. In Canada and the Antipodes, the introduction of inflation targeting (together with the FTA for Canada and, later, NAFTA for Canada and Mexico) will have also signaled a change in regime. For the Latin and North American countries in the sample (Figures 2 and 3), we not only consider sub-sample estimates but consider the possibility that either the US or Brazil represent the target countries. Targeting the US would be consistent with, say, a policy of dollarization, an oft-discussed option, while targeting Brazil would be consistent with targeting a relatively large economy in a potential monetary union involving the Mercosur countries.

Figure 1 reveals that the costs of monetary union have declined substantially over the years for Australia and New Zealand. In the Canadian case, while output growth correlations remain very high throughout the years considered, output volatility has also grown considerably. Hence, the costs of forming a monetary union with the US have, on balance, risen over time. Finally, in the case of the European countries in our sample, these broadly reflect the self-validating view of OCAs as reflected in the rise in the output growth correlations and a relative fall in output growth volatility. The picture is more mixed for the Netherlands with a fall in volatility offset by a sharp fall in correlation.

Figure 2 assumes that the US is the target country. Output growth correlations rise for Mexico, reflecting the impact of NAFTA and the float but output volatilities remain markedly higher relative to the countries depicted in Figure 1. None of the countries appear to be a good fit for monetary union with the US. The situation is somewhat better than if Brazil is the target country, as shown in Figure 3. Nevertheless, for the most recent decade of data (1991–2000), Paraguay is the best fit with Chile in second place. The costs of forming a monetary union with the other countries appear rather high.

The measures of economic distance shown in Table 4 also confirm the foregoing results. Economic distance in terms of output growth suggests that the LAC countries are not generally good candidates yet for monetary union, at least along these narrow lines. The evidence is considerably more favorable in the case of inflation though one must be cautious as the 1990s cover an era of sharp reductions in inflation throughout the world. It is far from clear whether these are permanent but the data do suggest that inflation

convergence of sorts is a feature of the Mercosur and other Latin and American countries considered here. It is also interesting to note that economic distance in terms of inflation between Canada and the US is relatively high a reflection perhaps of the manner in which a floating exchange rate regime has de-coupled relative inflation performance in the two countries.[39]

The LAC region is not the only one contemplating monetary union. The potential impact of proposals for adopting a common currency in parts of Asia have also been considered (e.g., see Wyplosz 2001a). Finally, several European countries are to join the European Union in 2004. The European Union Treaty requires the accession countries to adopt the euro once the Maastricht convergence criteria are satisfied. Table 4 therefore also considers economic distance for such candidate economies. In the case of the accession countries, the euro area is the target while, for illustrative purposes, we use Japan as the target country for the Asian economies considered.

While some accession countries, notable the Czech Republic, Hungary and Slovenia, are good candidates for monetary union in terms of overall economic performance, most are not. Indeed, they lag far behind many of the candidate economies in a Mercosur type of monetary union. The results are even less promising when one examines economic distance in terms of inflation, though Hungary, Malta, and Slovenia are not more distant than is Canada vis-à-vis the US.

Turning to the Asian bloc of countries, there is a smaller spread in economic distance from Japan separating many candidate countries in terms of output growth. The range is somewhat larger when examining economic distance in terms of inflation with China, Hong Kong and Indonesia relatively distant from Japan.

Overall, it appears that business cycle synchronicity is fairly well established for many countries among the groups considered as candidates for a monetary union. There is a long road ahead, however, before economic distance in inflation is conducive to monetary union. Clearly, inflation convergence mechanisms of the kind specified in the European model of monetary union appears to be critical in this regard.

[39] Over the sample considered in Table 1, Canada's inflation rate has been consistently lower, though more volatile, than in the US.

5. Choosing and Exchange Rate Regime: Some counterfactual Illustrations[40]

5.1. Model Specification and Econometric Considerations

A critical question is, given a *different* set of unsystematic policies, would the outcomes for inflation and output have been different in the candidate economies in question had a different monetary regime been in place? Identification of systematic and unsystematic components of monetary and fiscal policies is therefore important. The econometric requirements lead us, however, to consider only the case of the candidate countries listed in Table 1, as well as Austria and the Netherlands, since proper inference requires high quality data at a reasonable frequency (i.e., at least quarterly) over a fairly long time span.

In this section we focus on the role of the exchange rate regime and we distinguish between a pegged exchange rate with no currency union, thereby permitting different interest rate policies, a monetary union in which the interest rate in candidate and target economies are identical, and a floating exchange rate where exchange rates and interest rates are permitted to float but are constrained to satisfy the uncovered interest rate parity (UIP) condition.[41] As an alternative to the UIP constraint we also examine what would have happened if all candidate countries had adopted a target for inflation while permitting the exchange rate to float freely. We do so by "forcing" inflation to meet the specified inflation target.[42] In the case of Australia, Canada, and New Zealand, numerical inflation targets were officially announced in the 1990s (cf. Siklos 2002 for the precise dating).

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[40] This section draws on Hochreiter, Korinek, and Siklos (2003).

[41] One could have instead imposed relative purchasing power parity. However, empirical support for this hypothesis for a span of data of 30 years is rather weak. There is relatively stronger evidence that UIP holds.

[42] This counterfactual raises a number of difficult questions for, unless a central bank is a "strict" inflation targeter (in the words of Svensson) then it would be preferable to force the target to be met over a specified – but equally unobservable – target horizon. Although not entirely satisfactory, we opted to model the inflation "forecast" as a smoothed series derived by applying a Hodrick-Prescott filter with a large weight (4800) to actual inflation. However, for the sample when Australia, Canada, and New Zealand actually adopted numerical inflation targets the relevant figures are used.

Answering these questions requires that we formulate a structural model of the economies under investigation. The technical details are relegated to an appendix.

Instead, below we provide a brief outline of the constructed model. The model we have in mind estimates the structural relationship between a set of monetary and non-monetary variables. The non-monetary variables consist of real GDP and the share of government spending to GDP. The monetary variables are the inflation rate in the CPI, short-term domestic and foreign interest rates (in real terms using lagged realized inflation), and the rate of change in the nominal exchange rate (vis-à-vis the US dollar).

Once estimated, we use the model to extract the "shocks" (i.e., the unexplained variation) that are of interest, namely ones due to fiscal and monetary policies, as well as ones originating from shocks originating from the aggregate demand and supply sides. Other types of shocks can also be identified and the reader is asked to consult the appendix for technical details. In estimating such models we also condition on idiosyncratic shocks we have identified from the historical record of each country under investigation. The reason is that, in conducting counterfactual experiments, we wish to determine the sensitivity of our results to shocks which are unlikely to be repeated in future.

Models are separately estimated for each country but where interdependence between countries exists through the addition of the foreign interest rate (i.e., the US interest rate) to the relevant equations of the model. Finally, there are important statistical reasons to worry about the form in which the time series under investigation enter into any estimated model. In particular, results can be sensitive according to whether the series enter in levels or in first differences. The reason is that the series in question must be stationary. That is, they must not exhibit any persistent tendency to rise or fall over time.

Next, we generate forecasts of the variables in the model by imposing hypothetical constraints on the model. They define the four counterfactual scenarios we wish to consider: (1) a candidate country pegs its exchange rate to that of the target country; (2) a full monetary union consisting of a fixed exchange rate and adopting the nominal interest rate of the target country; (3) adopting a floating exchange rate under the constraint that uncovered interest parity holds in equilibrium. (4) Adopting a floating exchange rate regime, where inflation is "forced" to meet the specified inflation target (π^*) every period (see n. 11).

5.2. Empirical Results: Correlation of Aggregate Shocks

As noted previously, it is likely that the symmetry of shocks will be sensitive to the treatment of the stationarity of the time series under investigation. As a result, Tables 5 through 7 display two sets of correlations. Part (i) is based on a SVAR where the series are in first differences but inflation and real interest rate are assumed to be stationary. Part (ii) treats the real interest rate as being difference stationary, while the remaining variables are unchanged in form from part (i). Finally, we provide separate estimates of the correlation coefficients according to whether unsystematic components of economic policies are taken into account. Details about the construction, justification, and specification of the relevant dummy variables are relegated to an unpublished appendix (available at www.wlu.ca/~wwwsbe/faculty/psiklos/home.htm).

Generally, the results for the full sample (1970–2000; see Table 5) suggest relatively small correlations across various types of shocks, regardless of how the series are defined. It is apparent that the correlation of shocks is often positive and higher between the Netherlands, Austria, and Germany than for any other grouping of countries. Indeed, the correlations suggest that the least amount of asymmetry occurs between the Austria and Germany pairing than for any other grouping of countries. The one possible notable exception is the set of correlations for the Canada-US case though the results are highly sensitive to the specification of the SVAR. Indeed, there are sometimes striking differences depending on whether stationarity is achieved via differencing of the real interest rate or when estimates are conditioned on the unsystematic shocks. In particular, it is interesting to note that the smallest correlations are often between the aggregate supply shocks experienced by these country groupings. This result essentially suggests that, in some cases, the least amount of asymmetry emanates from aggregate demand or non-monetary shocks.

The correlations of supply and monetary shocks appear to be the most sensitive of all to the time series specification of the real interest rate series. However, if we assume that first differencing is adequate, and this is generally viewed as the transformation of choice, then the correlation of structural shocks is rather modest though most significant in the Austria-Germany and Netherlands-Germany pairings. Also, note that the correlation of monetary shocks is generally positive and significant with the exception of a couple of cases for the Canada-US pairing and one case for the New Zealand-Australia group.[43]

Part (B) of the Table allows us to determine whether conditioning the results on unsystematic policies has a significant impact on the results. If we examine the case where inflation and the real interest rate are stationary, we find that ignoring the unsystematic component of economic policies often leads to a downward bias in estimates of the correlation of aggregate supply shocks for Canada-US and NZ-Australia while the opposite is true for the monetary shocks between Germany and Austria or the Netherlands. This is generally also true when the real interest rate is assumed to be difference stationary. Nevertheless, and this is especially apparent for the Austria-Germany and Netherlands-Germany pairings, shocks are more highly correlated when the control dummies (i.e. these capture idiosyncratic shocks) are included. Hence, conditioning on unsystematic policies can have a significant result on the degree of shock asymmetry estimated from the data.

It is also interesting to examine the impact of our results for a couple of sub-samples. We first consider a sample that excludes the 1990s. The last decade is thought to be a historically unusual one because of the popularity of inflation control objectives and the relative absence of aggregate supply shocks. Next, we estimate for the 1990s period alone. The results are shown in Tables 6 and 7. Aggregate supply shocks and monetary shocks are ordinarily less highly correlated for the 1990s when unsystematic shocks are not controlled for. When estimates are conditioned on these shocks the impact is country group specific. For example, aggregate supply shocks and monetary shocks become less highly correlated for the Netherlands-Germany or Austria-Germany pairings while the opposite holds for the Canada-US and NZ-Australia parings. Note, however, that this result is again sensitive to the time series treatment of the real interest rate series. Non-monetary aggregate demand shocks are also lower in the 1970–1989 sample in most cases. Given that the 1970–1989 sample contains the period of high inflation and much of the subsequent disinflation, it is probably reasonable to suggest that the correlation of monetary policy shocks has *fallen* during the 1990s, despite the growing convergence in monetary policies among the industrial countries, if we are not prepared to condition our estimates on unsystematic shocks. In other words, despite seemingly similar monetary policies there are sufficient differences (perhaps in the timing of monetary policy actions?) and that these are reflected in lower correlations in monetary shocks. Once we

[43] We also consider, but do not go into details here, the possibility of pairings between either New Zealand or Australia and the US. There is greatest symmetry of shocks between Australia and the US while the correlation of aggregate supply and demand shocks between New Zealand and the US are negligible.

control for unsystematic shocks the picture is less clear regarding differences between the 1970s and 1980s versus the 1990s. Note also that, in almost half of the cases considered, shocks that were positive in the 1970–1989 sample turn negative in the most recent sub-sample. Finally, we consider the impact of adding commodity prices as an exogenous variable for the Canada-US and NZ-Australia groupings. Interestingly, this addition generally increases the correlation of all Canada-US shocks while only aggregate supply shocks are positively affected in the NZ-Australia case.

Overall, the degree of shock symmetry is not as high as other estimates based on simpler models have shown. In any event, they certainly do not lend support to any firm conclusions concerning the appropriateness of a chosen monetary regime. In addition, there is considerable evidence that, despite the maintenance of more or less the same exchange rate regimes over the three decades examined, there are noticeable changes in the correlations among different types of economic shocks. Given the wide diversity of models, restrictions, and variable transformations considered in the literature, this is reassuring in the sense that choosing "fixed" versus "flexible" exchange rates does not tell the whole story about economic performance. Controlling for unsystematic shocks has a measurable impact on the correlation of major economic shocks suggesting that this is potentially an important element in understanding economic fluctuations in the countries considered beyond the type of exchange rate regime in place.

Figures 4 through 7 consider the impulse responses. Only the ones for the candidate countries are shown to conserve space. These impulse responses are akin to multipliers often used in economic analysis. In other words, they measure how a shock in some variable of interest (e.g., an aggregate supply shock) affects the other variables in the model in subsequent periods. To facilitate their interpretation the plots show the *accumulated* response to various shock combinations. Although there are a large number of results we highlight the main features. Moreover, we restrict our attention to the full sample estimates despite likely sub-sample differences because, as the discussion above makes clear, there is no obvious delineation between the various decades considered. Also, the span of the data is considerably longer for the 1970–2000 period which, given the size and complexity of the restrictions imposed, is likely to yield more useful results.

For *Austria*, shown in Figure 4, it is notable that monetary and exchange rate shocks have a quantitatively small or neutral impact on output. On the other hand, aggregate supply shocks have a permanent effect on all the variables in

the system. In contrast, exchange rate shocks have little impact whatsoever. Not surprisingly, monetary shocks have a permanent impact especially on inflation. The results are broadly similar for the *Netherlands*, as shown in Figure 5. However, aggregate supply shocks have a declining impact on inflation over time unlike the experience for Austria. More importantly, perhaps, the cumulated exchange rate and interest rate response to a monetary shock is, respectively, permanent and temporary in the case of the Netherlands whereas the same shocks have relatively less impact for Austria. Turning to the case of *Germany* (not shown), there are only a few differences in the impulse responses relative to the candidate countries considered for an alternative monetary arrangement. Fiscal, (non-monetary) demand, and monetary shocks have a non-permanent effect on German output growth. This is usually not the case for the Netherlands, for example while the results for Austria broadly parallel those for Germany. However, unlike Austria for example, monetary shocks in Germany have a permanent impact on the exchange rate and the interest rate.

If we consider now a comparison between *Canada* (Figure 6) and the *US* (not shown) a few features are worth emphasizing. First, exchange rate shocks, while persistent, have only temporary effects on the other variables in the system for Canada. For the US, the impact is generally of a more permanent nature. However, while a fiscal shock is seen to have a permanent effect on Canada's inflation rate, the same is not true for the US. In addition, a fiscal shock has a positive but diminishing impact on output growth in Canada the impact is negative in the US and begins to decline after about 20 quarters. The same interpretation applies to the impact of an aggregate supply shock on interest rates in Canada versus the US. That is, the impact of a supply shocks is negative and rising for Canada and positive, but stable after 20 quarters for the US. Moreover, while aggregate supply shocks permanently reduce US inflation, there is no long-run impact on Canadian inflation. Perhaps this is because such shocks have a permanent impact on US real interest rates while Canadian real interest rates fall in the face of aggregate supply shocks.

Finally, Figure 7 considers the case for *New Zealand* (*Australia* is not shown). Of all the country groupings considered, the similarity of responses to various shocks is, surprisingly perhaps, the greatest among all the country pairs considered. Nevertheless, there are differences between the two countries, as well as one notable difference between New Zealand, Australia and the other countries considered here. First, a comparison between New Zealand and Australia reveals that monetary shocks have a permanent impact on fiscal policy in Australia while the impact is transitory in the New Zealand case.

Finally, it is also worth noting that, for New Zealand, exchange rate shocks have a temporary impact on domestic inflation, and a positive but diminishing effect in the case of Australia. This is unlike the experience of most of the other countries considered save perhaps Germany.

5.3. Counterfactual Experiments

Once again, as there are a large number of results, we have chosen to summarize them in a series of figures. Figures 8 to 10 plot separately for inflation, output growth, and the real interest rate, the *range* of estimates obtained under the various experiments carried out, shown as vertical lines in the figures, together with the mean "forecast" obtained from the model with the impact of the unsystematic shocks described earlier, also removed, shown as a horizontal line. Separate estimates for the full sample, as well as the sub-samples described earlier, were also carried out. These are also shown in the various figures. As the additional restrictions imposed to obtain the estimates based on the various counterfactuals were previously discussed we need not do so here. As for removing the impact of unsystematic shocks we are of two minds. Since there is no reason to believe that past unsystematic shocks will be reproduced in the future in exactly the same way as in the past, as a comparison of the 1970s and 1980s versus the 1990s demonstrates, these effects should be removed when conducting inferences based on the counterfactuals. On the other hand, it is highly likely that some unsystematic shocks will appear in the future. On balance, however, we believe that the chosen approach is likely to be more "realistic" for our purposes.

We begin with inflation (Figure 8). With the exception of the 1970–1989 sample for Canada and New Zealand, the inflation rate based on the various counterfactual experiments encompass the forecast generated from the model using actual data. Moreover, no clear winner emerges from the various regimes considered across samples and country groupings. Nevertheless, it appears that monetary union or a floating regime with UIP would have produced lower inflation for Canada in the 1970s and 1980s while it is unclear whether monetary union with the US would have resulted in better inflation performance in the 1990s as the results are sensitive to the chosen specification. It is interesting to note that inflation in the Netherlands would have generally been higher under a float with UIP but lower under the same conditions for Austria.

Figure 9 displays the estimates for output growth. For Canada, an inflation targeting regime would have produced higher output growth had it been in place

during the 1970s and 1980s but it is not the case that monetary union would necessarily have delivered better inflation performance in the most recent decade. In the case of New Zealand, monetary union with Australia throughout the full sample or the 1990s would have led to higher than actual output growth while a floating regime during the decade of the 1970s and 1980s would have led to considerably lower output growth performance. There is little difference between the existing exchange rate regime's impact on output growth and inflation targeting for Austria in either the full sample or the 1970–1989 period. In the case of the Netherlands inflation targeting in the full sample would have boosted output growth a little while a floating regime would have delivered better economic performance during the decade of the 1970s and 1980s.

Figure 10 compares real interest rate estimates under the various scenarios considered. A pegged exchange rate would have led to generally higher real interest rates in Canada while a float under UIP conditions or monetary union during the 1990s would have resulted in lower real interest rates for New Zealand. In the case of Austria and the Netherlands, an inflation targeting regime would almost always have led to marginally lower real interest rates in both countries while a float vis-à-vis Germany, under conditions of UIP, would have produced higher than actual real interest rates.

Finally, we turn to the relationship between the variance and inflation and output growth and the real interest rate (plots not shown). These are meant to provide some idea of the trade-offs between the key variables that appear in the so-called new trade-offs and can serve as a guide of "good conduct" in a monetary regime. An indicator of the success of a particular regime should be negatively correlated with the variance of inflation, output growth or real interest rates. For the most part and inflation targeting regime would have delivered a better output-inflation volatility trade-off than the actual data while a pegged exchange rate system would have produced the least favorable trade-off. The picture is somewhat less clear as far as the volatility of real interest rates since the results are clearly sample sensitive. Hence, if the 1990s alone are considered a monetary union would have led to a superior inflation-real interest rate trade-off while estimates for the 1970–1989 would have placed an inflation targeting regime ahead of the other scenarios considered. Turning to the case of New Zealand we find that the least favorable inflation-output volatility trade-off takes place under a floating regime with UIP. Interestingly, the most favorable trade-offs are in an inflation targeting environment, except when the 1990s are considered in which case monetary union with Australia would have delivered a relatively superior inflation-output volatility combination.

There is rather more clarity regarding the choice of monetary regimes for Austria and the Netherlands. For Austria, inflation targeting produces the most favorable output or real interest rate versus inflation volatility over all samples. In contrast, the least favorable trade-off takes place under the floating with UIP condition. Finally, in the case of the Netherlands the results also seem clear-cut. Inflation targeting may yield relatively higher real interest rate volatility but produces the most favorable inflation-output trade-offs. By contrast, monetary union results in the least amount of real interest rate volatility given the level of inflation variability while a floating regime with UIP produces the worse inflation-output variance trade-offs.

6. Concluding remarks

In this paper we analyze the feasibility of regional currency unions outside Europe by looking at specific aspects of the Optimum Currency Area approach, measuring economic distance and by conducting a series of counterfactual experiments. Because of Europe's forerunner role we use the "Maastricht Model" as a benchmark for potential currency unions in the Americas and the Antipodes. The impending enlargement of the European Union by 10 countries with the specific requirement for these countries to adopt the euro prompted us to also include selected accession countries from central and eastern Europe in our study. We believe that this specific European approach (while not without significant risks) may offer insights for regional currency unions elsewhere because its architecture combines a centralized monetary policy with only loosely coordinated national fiscal policies. Such a currency union thus does not depend on political unification, at least initially.

We first selectively review the OCA literature focusing on the roles of the exchange rate regime to counter economic shocks and its influence on business cycle synchronicity as well as on the importance of fiscal policy as an adjustment tool. The empirical evidence points to a greater degree of business cycle synchronicity in Europe (including the majority of the accession countries) than in the Americas. In general, weak fiscal policy and institutions, such as in LAC, provide an argument against entering a monetary union.

The potential cost of a monetary union may also be assessed by measuring the economic distance, calculated comparing the volatility of output growth and of inflation between the candidate country and the target country. The results suggest that business cycle synchronicity within the regions of our study can vary widely. This result points to a relatively low cost of joining or forming a monetary union on this score, at least for some of the countries considered. Interestingly, some of the accession countries (Estonia, Lithuania and Poland) are economically quite distant to the euro area. We also find that the costs of monetary union have declined over time for Australia and New Zealand but the political costs dwarf these at the present time so such a step seems highly unlikely in the near future.

In another look at the issue of shock symmetry we estimate a structural model that allows not only for the interdependence of shocks but also permits an explicit role for fiscal policy. The evidence suggests and qualifies the results

achieved above but this is to be expected, as statistical models can only capture a reality that is as good as the specification put forward. We find that the degree of shock symmetry in some of the regions perhaps is not as great as one might expect. Thus, for example, if Canada and New Zealand were to give up an autonomous monetary policy, some shocks would be substantially different under a monetary union or a hard peg. Even Austria and the Netherlands, both of which have chosen full monetary union face asymmetric shocks.

In addition we perform – quite speculative – counterfactual experiments by investigating the impact of alternative monetary regimes on the volatility of inflation and economic growth. Ultimately, we find that economic integration can be as much a feature of floating regimes as the interdependence that is generated via a pegged exchange rate arrangement. If this is true, then the core differences that matter in deciding which monetary regime is more appropriate for some countries but not others are, ultimately, political or institutional. This reminds us of the fundamental importance of the political dimension of Economic and Monetary Union in Europe.

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Table 1. The Maastricht Model: The Euro area and selected candidate regions[44]

COUNTRY YEAR	INFLATION (CPI) % p.a.	FISCAL 1 (DEFICIT) % of GDP	FISCAL 2 (DEBT) % of GDP	INTEREST RATE in %
Australia				
1998	0.9	0.6	33.0	5.5
1999	1.5	1.0	26.1	6.1
2000	4.5	–0.2	26.6	6.3
New Zealand				
1998	1.3	1.4	38.6	6.3
1999	0.1	0.3	37.1	6.4
2000	2.6	0.5	34.7	6.9
Canada				
1998	0.9	0.5/1.0	116.2/64.9	4.89
1999	1.7	1.6/0.8	111.6/61.0	6.18
2000	2.7	3.2/1.8	104.9/51.8	5.35
Euro area				
1998	1.7 (0.7)	–2.3	73.2	4.8 (4.8)
1999	1.5 (0.6)	–1.3	72.1	4.7 (4.8)
2000	2.8 (1.2)	–0.9	69.6	5.4 (5.4)

Sources: ECB, OECD Economic Outlook Volume 2001/1, No. 69, June; IMF Staff Country Report No. 2000/139, and others listed below.

Inflation: For EU from Eurostat (HIPC inflation rates), for Canada from OECD Economic Outlook, Annex Table 16, for New Zealand from www.rbnz.govt.nz and for Australia from www.rba.gov.au. Average inflation rate of the EU and average inflation rate of the three best performing EU-countries in parenthesis.

1998: Germany (0.6%), France (0.7%), Austria (0.8%); average: 0.7% →

[44] Protocol 6 of the "Maastricht Treaty" contains the convergence criteria.

(1) **Inflation criterion:** an inflation rate not more than 1 ½ % higher than those of the three best performing EU countries over the latest 12 months).

(2) **Fiscal convergence criteria:** These criteria restrict the government budget deficit and the government debt to certain levels. A country which wants to participate in the EMU may not have

– a government **budget deficit** higher than 3 % of GDP,

– a government **debt ratio** of more than 60 % of GDP or sufficiently fast approaching that level.

(3) **Interest rate criterion:** an average nominal long term interest rate that does not exceed by more than two percentage points that of the three best performing member states in terms of price stability.

(4) **Exchange rate criterion:** participation in the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS) within the normal fluctuation margin without severe tensions for at least two years.

1999: Austria (0.5%), France (0.6%), Germany (0.6%); average: 0.6%
2000: UK (0.8%), Sweden (1.3%), Germany (1.4%); average: 1.2%

Deficit: For the Euro area from ECB Monthly Bulletin (Table 7). For Australia and New Zealand from OECD Economic Outlook, Annex Table 30. For Canada from Bank of Canada *Banking and Financial Statistics*, Table A2.

Debt: For the euro area from ECB Monthly Bulletin. For Australia from OECD Economic Outlook, Annex Table 34, for New Zealand: Source from IMF Staff Country Report No. 2000/139, Table 12 (these terms refer to fiscal years). For Canada from www.fin.gc.ca.

Interest Rate: OECD Economic Outlook, Annex Table 38. Average interest rate of euro area and average interest rate of the three best performing EU-countries with regard to the inflation rate in parenthesis. Terms refer to 10-year government bond yields. For Canada from Bank of Canada *Banking and Financial Statistics* Table A2.

1998: Sweden (5.0%), France (4.7%), Austria (4.7%); average: 4.8%
1999: Sweden (5.0%), France (4.6%), Austria (4.7%); average: 4.8%
2000: Sweden (5.4%), France (5.4%), Germany (5.3%); average: 5.4%.

Table 2. Maastricht Criteria for Latin America

COUNTRY OR COUNTRY GROUPING		INFLATION[2] (CPI) % p.a.	FISCAL 1 (DEFICIT) % of GDP	FISCAL 2 (DEBT) % of GDP	INTEREST RATE[3] in %
Mercosur[1]	`				
Argentina	1998	6.6(5.4)[4]	–2.1	41.3	19.4(9.4)[4]
	1999	4.0(3.6)	–4.2	47.4	16.1(8.0)
	2000	5.0(4.3)	–3.6	50.6	12.8(4.2)
Brazil	1992		–4.4 (1992)[5]	NA[6]	
	1993		–0.3 (1993)	NA	
	1994		–0.6 (1994)	NA	
Paraguay	1991		–6.40	12.1	
	1992		–33.6	13.3	
	1993		–2.6	12.8	
Uruguay	1998		–0.8	23.6 (92)	
	1999		–3.7	21.9 (93)	
	2000		–3.4	24.5 (94)	
Chile	1998	5.1	0.4	12.7	9.1
	1999	3.3	–1.5	13.9	7.4
	2000	3.8	0.1	13.9	8.7
Mexico	1998	15.93	–1.4	27.9	26.9
	1999	16.6	–1.5	25.6	24.1
	2000	9.5	–1.3	23.2	17.0
Pro memoria. Euro area					
	1998	1.7 (0.7)	–2.3	73.2	4.8 (4.8)
	1999	1.5 (0.6)	–1.3	72.1	4.7 (4.8)
	2000	2.8 (1.2)	–0.9	69.6	5.4 (5.4)

Notes:
1. Mercosur consists of Argentina, Brazil, Paraguay, and Uruguay.
2. Annual rate of change
3. Money market rate, except for Chile (discount rate) and Mexico (Bankers' Acceptances).
4. The figures represent the mean CPI inflation and short-term interest rates with standard deviations (across countries) in parenthesis.
5. Most recent year for which there were comparable data.
6. Signifies that data comparable across countries were unavailable.

Sources: International Financial Statistics, individual country central banks, Government Financial Statistics (International Monetary Fund). See Table 1 for criteria definitions and euro area data. Data for FISCAL 2 for Argentina are from Mussa (2002).

Table 3. Maastricht Criteria for Selected central and eastern European Countries

COUNTRY YEAR	INFLATION (CPI) % p.a.	FISCAL 1 (DEFICIT) % of GDP	FISCAL 2 (DEBT[45]) % of GDP	INTEREST RATE[46] in %
Hungary				
1998	14.2	–8.0	61.9	n.a.
1999	10.0	–5.6	61.0	9.9
2000	10.0	–3.0	55.4	8.6
Czech Republic				
1998	9.7	–4.5	13.7	12.0[47]
1999	1.8	–3.7	14.5	8.5[52]
2000	3.9	–4.0	17.0	7.1
Poland				
1998	11.8	–2.3	41.6	n.a.
1999	7.2	–1.5	42.7	9.6
2000	10.1	–1.8	38.7	11.9
Slovakia				
1998	6.7	–4.7	25.1	12.4[48]
1999	10.4	–6.4	26.4	11.4[53]
2000	12.2	–10.4	27.6	8.3
Lithuania				
1998	5	–3.1	17.1	6.8[49]
1999	0.7	–5.7	23.0	8.2[54]
2000	0.9	–2.6	24.0	9.6[7]
Latvia				
1998	4.3	–0.7	10.6	
1999	2.1	–5.3	13.7	7.7[50]
2000	2.6	–2.7	13.9	7.4[55]
Pro memoria:				
Euro area				
1998	1.7 (0.7)	–2.3	73.2	4.8 (4.8)
1999	1.5 (0.6)	–1.3	72.1	4.7 (4.8)
2000	2.8 (1.2)	–0.9	69.6	5.4 (5.4)

Sources: EUROSTAT, national central banks.

[45] general government debt

[46] 10 year government bond benchmark rate unless otherwise indicated.

[47] annual average interest rates on loans over 4 years

[48] average annual interest rates on long-term loans

[49] average annual interest rates on loans over 5 years

[50] weighted annual average long-term interest rate

Table 4. Economic Distance, 1991–2001

Candidate (Target)	Output Growth	Inflation
New Zealand (Australia)	1.62	.71
Canada (US)	1.11	2.04
Austria (Germany)	.59	.83
Netherlands (Germany)	1.20	.81
Argentina (Brazil)	2.50	.34
Paraguay (Brazil)	.86	.10
Uruguay (Brazil)	1.97	.23
Chile (Brazil)	1.88	.11
Mexico (US)	2.63	12.59
Cyprus (euro area)	2.44	2.71
Czech R (euro area)	1.16	5.96
Estonia (euro area)	3.04	5.24
Hungary (euro area)	0.73	2.29
Latvia (euro area)	1.86	4.57
Lithuania (euro area)	3.41	6.01
Malta (euro area)	2.46	2.01
Poland (euro area)	8.21	6.33
Slovakia (euro area)	1.90	4.20
Slovenia (euro area)	1.16	2.13
China (Japan)	2.03	5.92
Hong Kong (Japan)	2.73	4.13
Indonesia (Japan)	4.70	9.96
Korea (Japan)	3.38	1.78
Malaysia (Japan)	4.07	0.86
Philippines (Japan)	1.80	2.85
Singapore (Japan)	3.25	1.69
Thailand (Japan)	4.29	2.58

Note: Economic distance is as defined in Alesina and Grilli (1992) and equation (1). Annual data were used. See Figures 1 to 3 for sources of data and Tables 1–3.

Table 5. Correlation of Structural Shocks, 1970–2000

(A) Ignoring Unsystematic Shocks

Candidate-Target Countries		Sources of shocks	
	Supply	Demand (non-monetary)	Monetary
(i) Inflation, Δg and *r* stationary[1]			
Canada-US	–0.15	–0.03	0.11
NZ-Australia	–0.07	–0.02	0.12
Netherlands-Germany	0.21	0.27	0.05
Austria-Germany	–0.04	0.18	0.22
(ii) Inflation is stationary, g and *r* are difference stationary[2]			
Canada-US	0.15	0.47	–0.03
NZ-Australia	–0.09	0.09	0.04
Netherlands-Germany	0.14	0.18	0.04
Austria-Germany	0.18	0.17	0.17

B) Conditional on Unsystematic Shocks

Candidate-Target Countries		Sources of shocks	
	Supply	Demand (non-monetary)	Monetary
(i) Inflation, Δg and *r* stationary			
Canada-US	0.05	–0.03	0.06
NZ-Australia	–0.10	–0.11	0.05
Netherlands-Germany	0.19	0.22	0.11
Austria-Germany	0.12	0.13	0.33
(ii) Inflation is stationary, g and *r* are difference stationary			
Canada-US	0.14	0.29	–0.09
NZ-Australia	–0.13	–0.004	–0.07
Netherlands-Germany	0.21	0.18	0.10
Austria-Germany	0.20	0.20	0.26

Notes:
1. All other series are first difference stationary. See text for details.
2. All other series are first difference stationary.

Table 6. Correlation of Structural Shocks, 1970–1989

(A) Ignoring Unsystematic Shocks

Candidate-Target Countries		Sources of shocks	
	Supply	Demand (non-monetary)	Monetary
(i) Inflation, Δg and *r* stationary			
Canada-US	–0.30	–0.26	0.19
NZ-Australia	–0.28	–0.08	0.13
Netherlands-Germany	0.15	–0.10	0.08
Austria-Germany	–0.11	0.13	0.35
(ii) Inflation is stationary, g and *r* are difference stationary –0.26			
Canada-US	0.19	0.29	0.17
NZ-Australia	–0.23	0.06	0.10
Netherlands-Germany	0.02	0.06	–0.09
Austria-Germany	0.08	0.10	0.26

B) Conditional on Unsystematic Shocks

Candidate-Target Countries		Sources of shocks	
	Supply	Demand (non-monetary)	Monetary
(i) Inflation, Δg and *r* stationary			
Canada-US	–0.16	0.10	0.13
NZ-Australia	–0.18	0.14	0.10
Netherlands-Germany	0.25	0.14	0.04
Austria-Germany	0.12	0.13	0.45
(ii) Inflation is stationary, g and *r* are difference stationary			
Canada-US	0.15	0.10	0.02
NZ-Australia	–0.28	–0.14	0.03
Netherlands-Germany	0.11	0.19	0.00
Austria-Germany	0.16	0.15	0.35

Table 7. Correlation of Structural Shocks, 1990–2000

(A) Ignoring Unsystematic Shocks

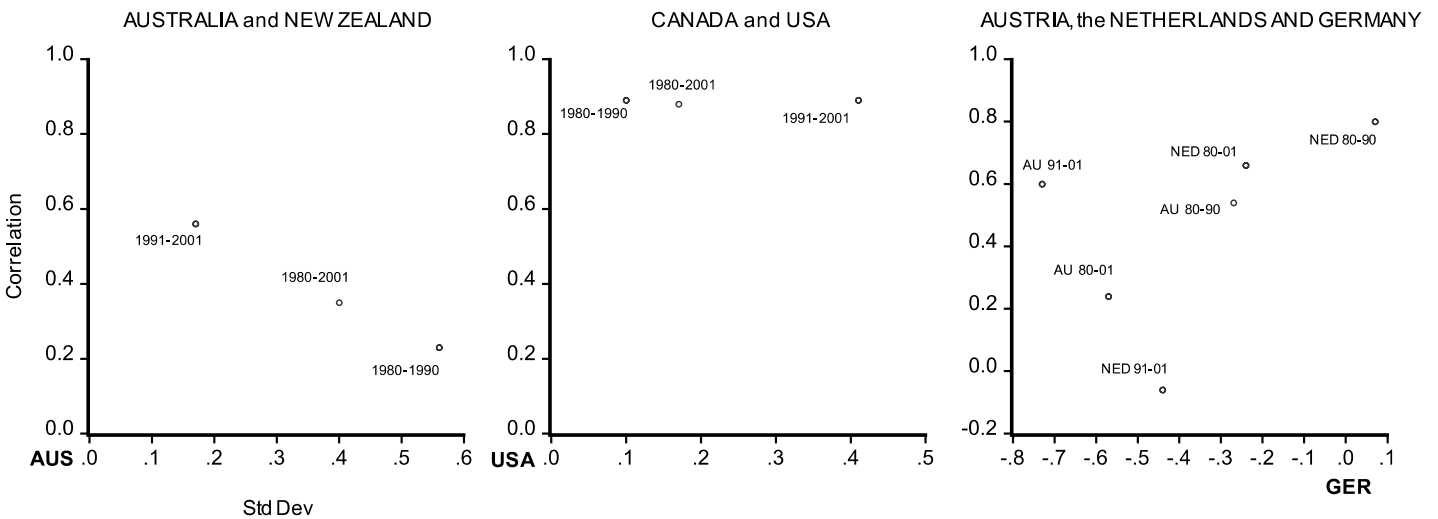
Candidate-Target Countries		Sources of shocks	
	Supply	Demand (non-monetary)	Monetary
(i) Inflation, Δg and *r* stationary			
Canada-US	–0.15	0.15	–0.06
Canada-US[#]	*–0.07*	*0.25*	*–0.15*
NZ-Australia	–0.06	0.33	0.17
NZ-Australia	*–0.15*	*0.24*	*–0.02*
Netherlands-Germany	0.19	–0.10	0.03
Austria-Germany	–0.06	0.09	0.22
(ii) Inflation is stationary, g and *r* are difference stationary –0.14			
Canada-US	–0.06	0.10	–0.13
Canada-US	*–0.05*	*0.14*	*–0.16*
NZ-Australia	–0.22	–0.04	0.09
NZ-Australia	*–0.27*	*–0.11*	*0.08*
Netherlands-Germany	–0.08	–0.08	–0.08
Austria-Germany	–0.24	0.21	–0.02

B) Conditional on Unsystematic Shocks

Candidate-Target Countries		Sources of shocks	
	Supply	Demand (non-monetary)	Monetary
(i) Inflation, Δg and *r* stationary			
Canada-US	0.08	0.22	0.04
Canada-US	*0.14*	*0.30*	*0.21*
NZ-Australia	–0.06	0.33	0.17
NZ-Australia	*–0.15*	*0.24*	*–0.02*
Netherlands-Germany	0.09	–0.05	0.04
Austria-Germany	0.18	0.07	0.09
(ii) Inflation is stationary, g and *r* are difference stationary			
Canada-US	0.22	–0.05	0.11
Canada-US	*0.22*	*0.03*	*0.13*
NZ-Australia	–0.22	–0.04	0.09
NZ-Australia	*–0.27*	*–0.11*	*0.08*
Netherlands-Germany	–0.07	–0.02	–0.09
Austria-Germany	–0.05	0.24	–0.02

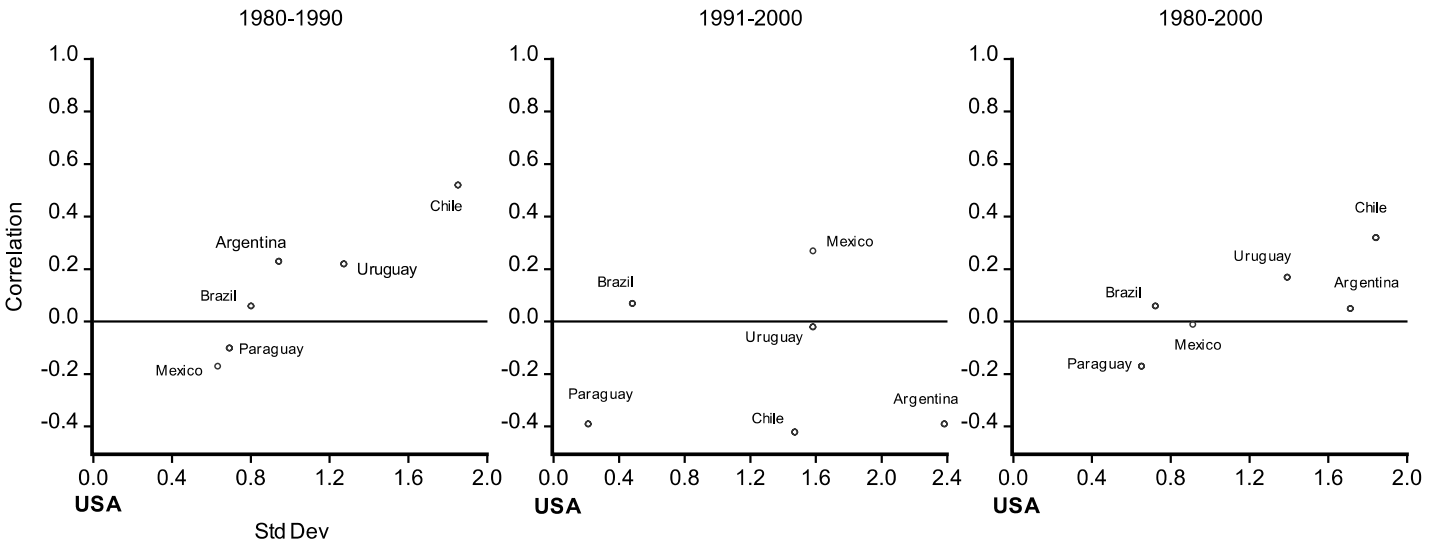
[#] Figures in italics are based on an SVAR with 2 lags of the commodity price index as exogenous variables.

Figure 1. Economic Distance



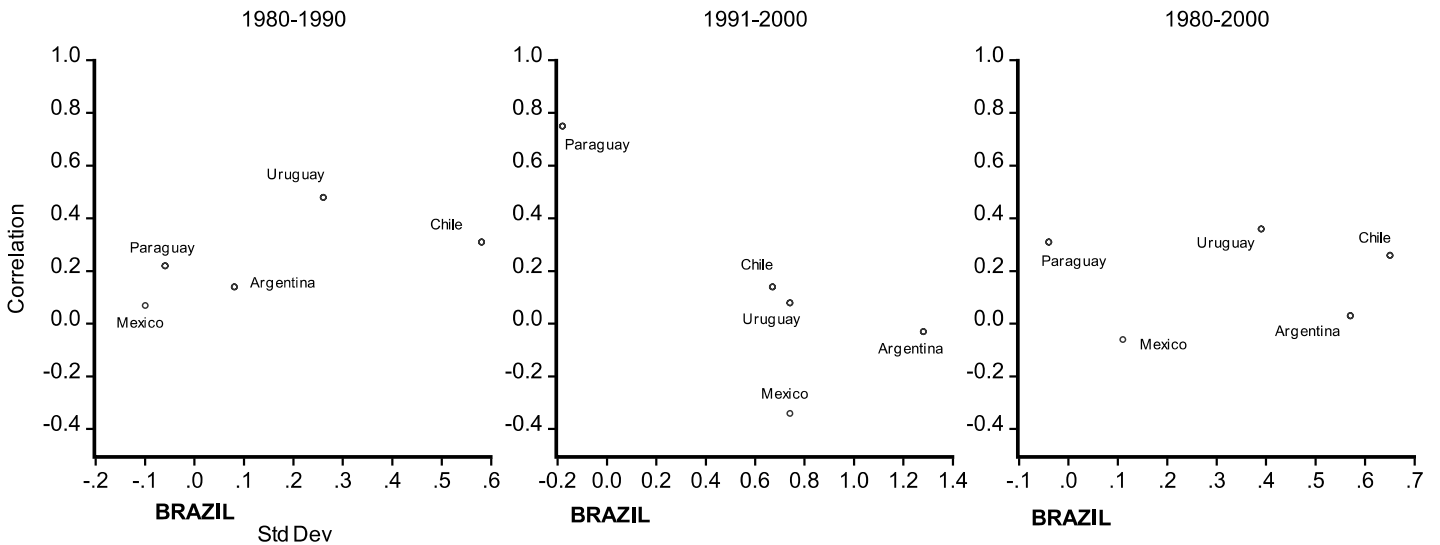
Note: Std. Dev. = $(\sigma_C/\sigma_T) - 1$, where σ_C, σ_T are, respectively, the standard deviation of output growth for the candidate (C) and target (T) countries. Correlation is the sample correlation coefficient for output growth between the candidate and target countries. Annual data are used. GDP growth is the first log difference in GDP (1995 = 100) from the International Financial Statistics (Washington: International Monetary Fund).

Figure 2. Economic Distance: US is the Target Country*



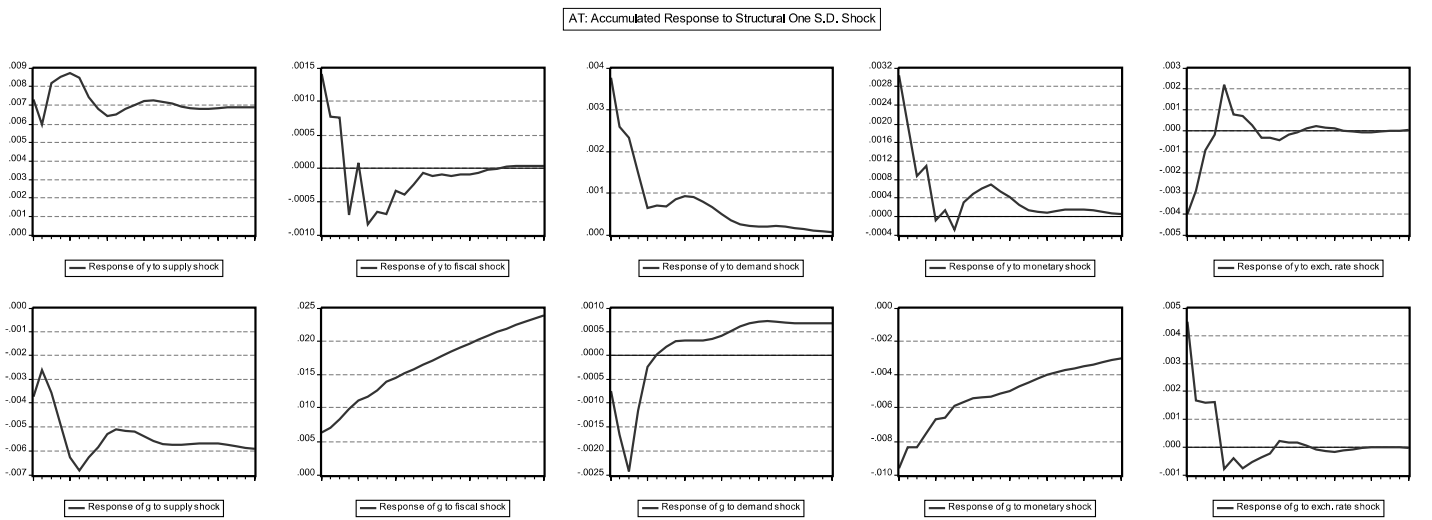
* See notes to Figure 1.

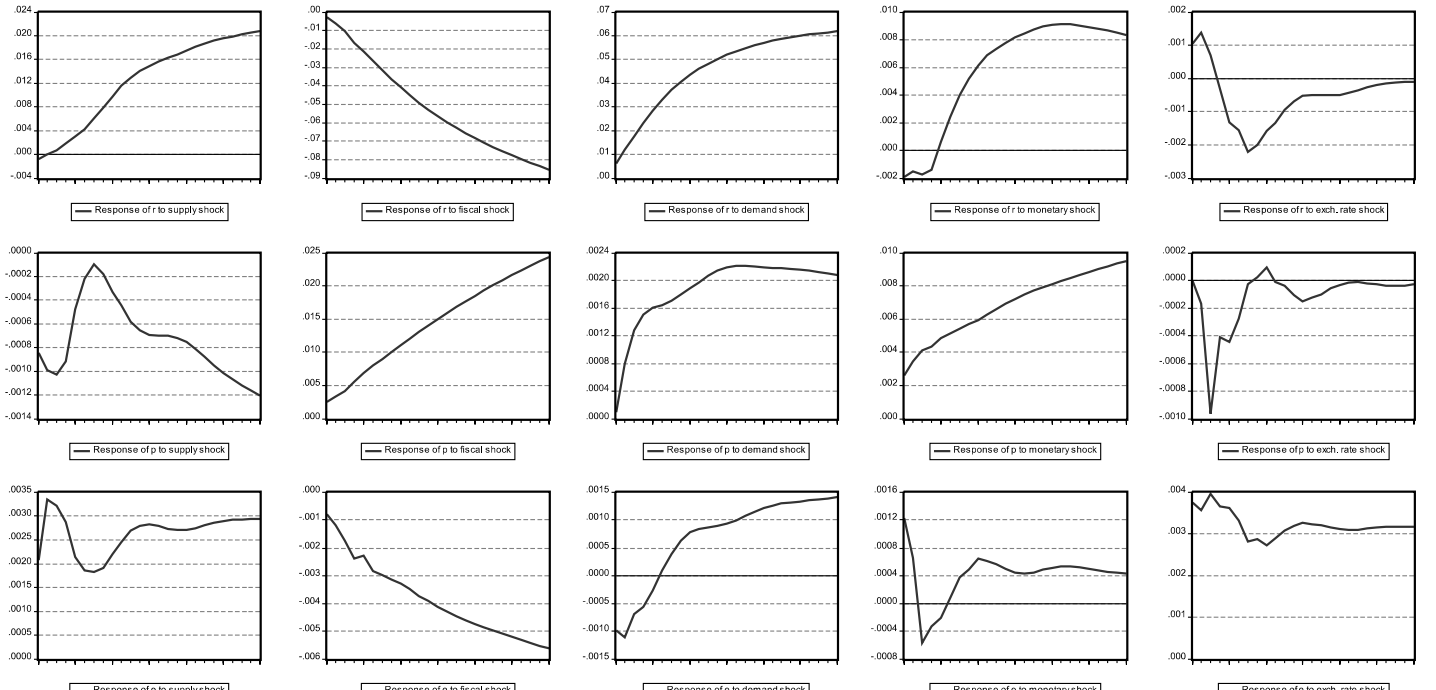
Figure 3. Economic Distance: Brazil is the Target Country*



* See notes to Figure 1.

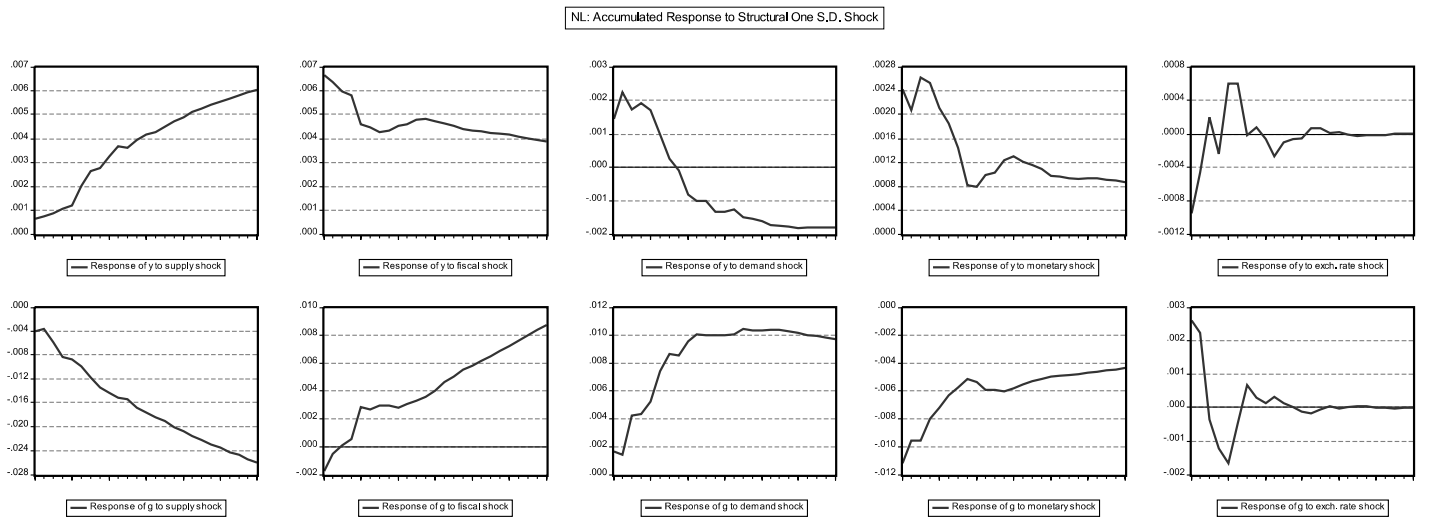
Figure 4. Impulse Responses from the Structural VAR: Austria*





* All plots in Figures 1 through 4 are based on the SVARs shown in Tables 3 and 4, part (B) ii. The IRFs are evaluated over a 30 quarters period.

Figure 5. Impulse Responses from the Structural VAR: Netherlands



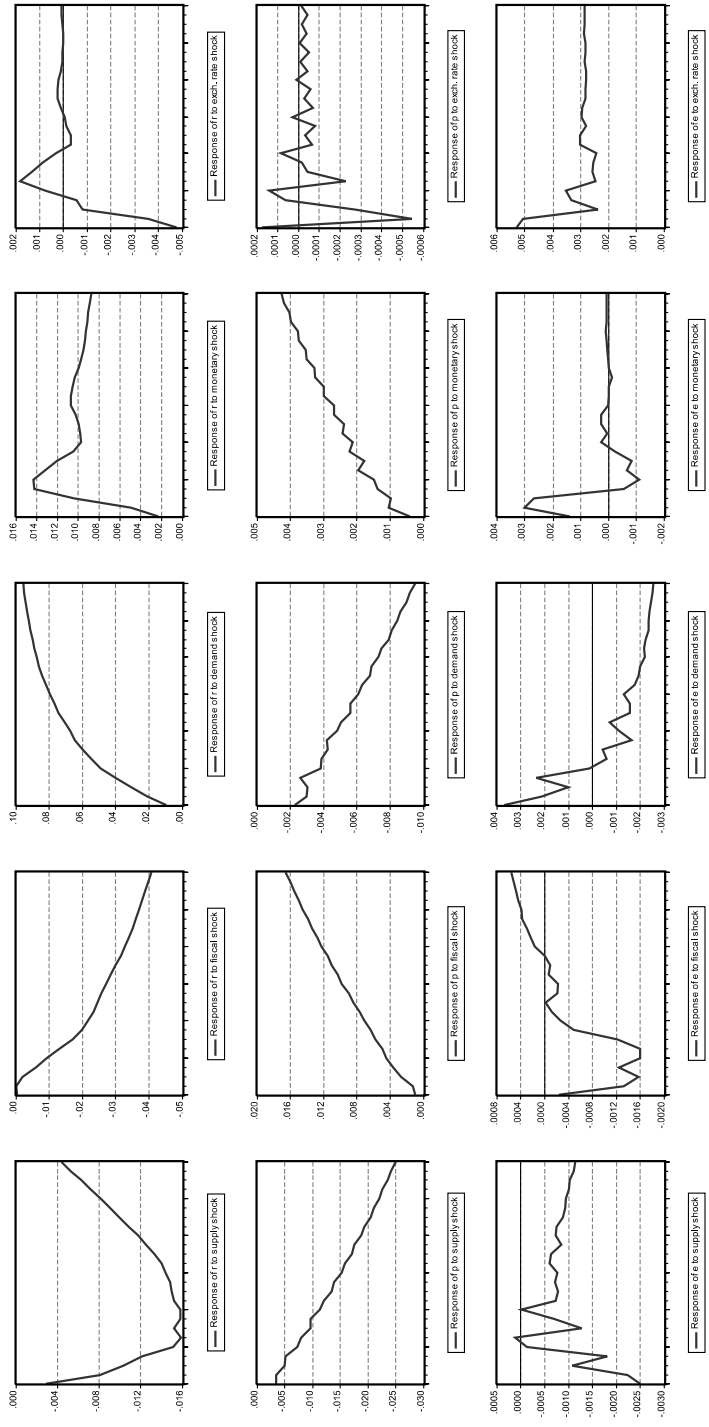
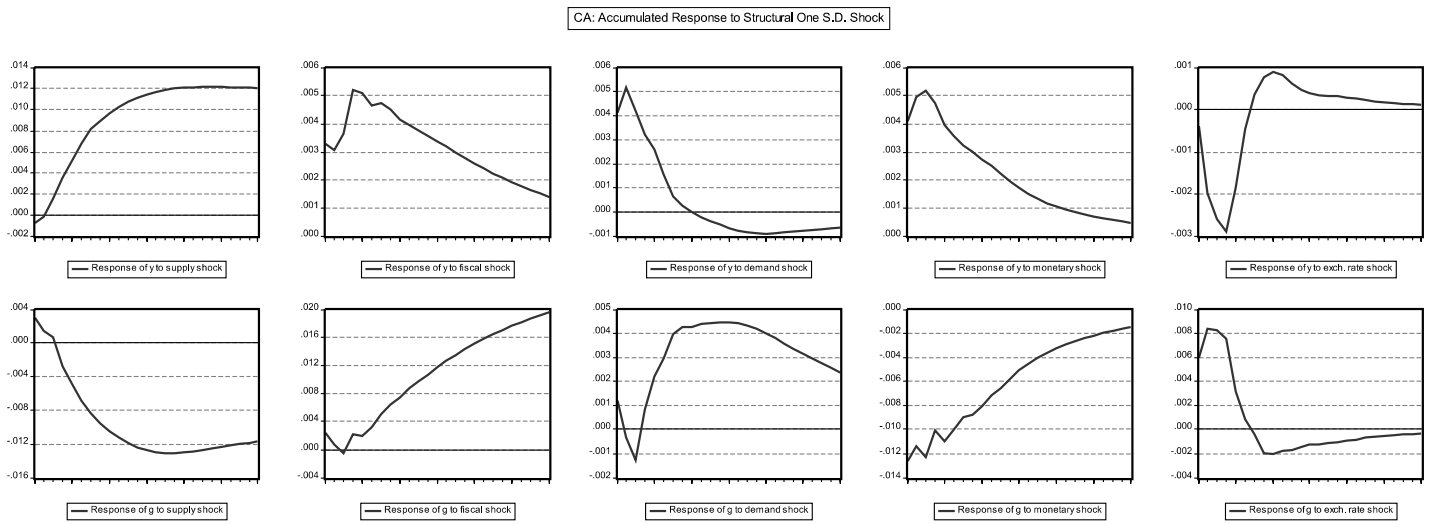
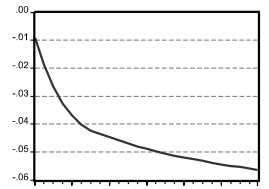
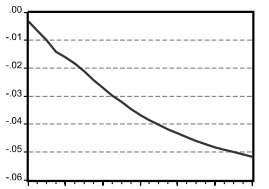
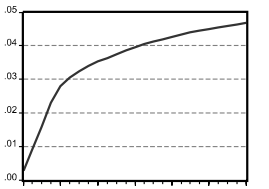

Response of r to supply shock
Response of r to fiscal shock
Response of r to demand shock
Response of r to monetary shock
Response of r to exch. rate shock
Response of p to supply shock
Response of p to fiscal shock
Response of p to demand shock
Response of p to monetary shock
Response of p to exch. rate shock
Response of e to supply shock
Response of e to fiscal shock
Response of e to demand shock
Response of e to monetary shock
Response of e to exch. rate shock

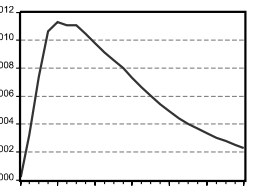
Figure 6. Impulse Responses from the Structural VAR: Canada

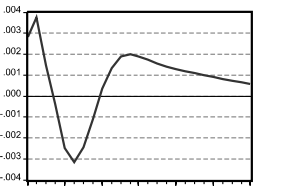


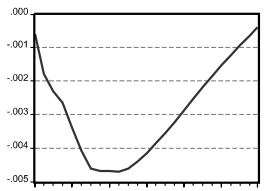

Response of r to supply shock

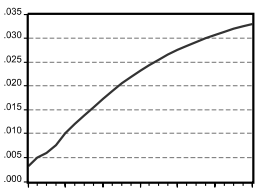

Response of r to fiscal shock

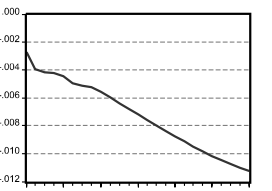

Response of r to demand shock

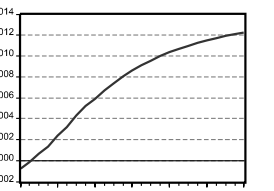

Response of r to monetary shock

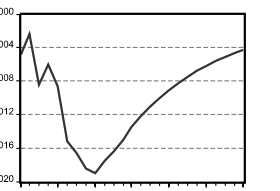

Response of r to exch. rate shock

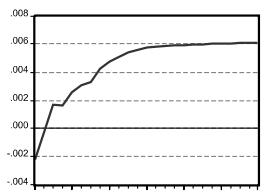

Response of p to supply shock

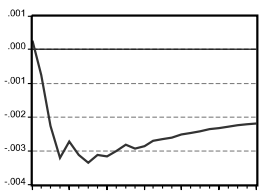

Response of p to fiscal shock

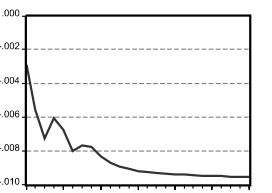

Response of p to demand shock

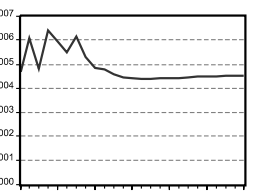

Response of p to monetary shock


Response of p to exch. rate shock


Response of e to supply shock


Response of e to fiscal shock


Response of e to demand shock


Response of e to monetary shock

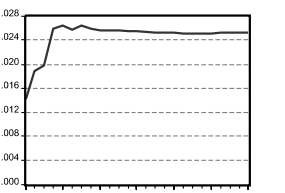
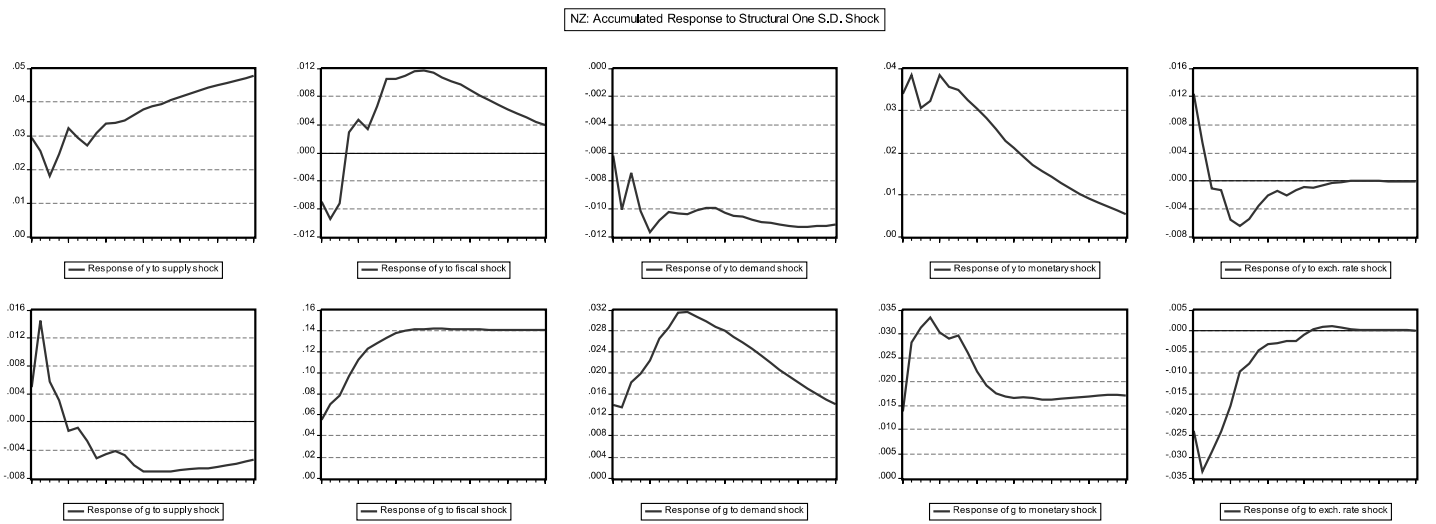

Response of e to exch. rate shock

Figure 7. Impulse Responses from the Structural VAR: New Zealand



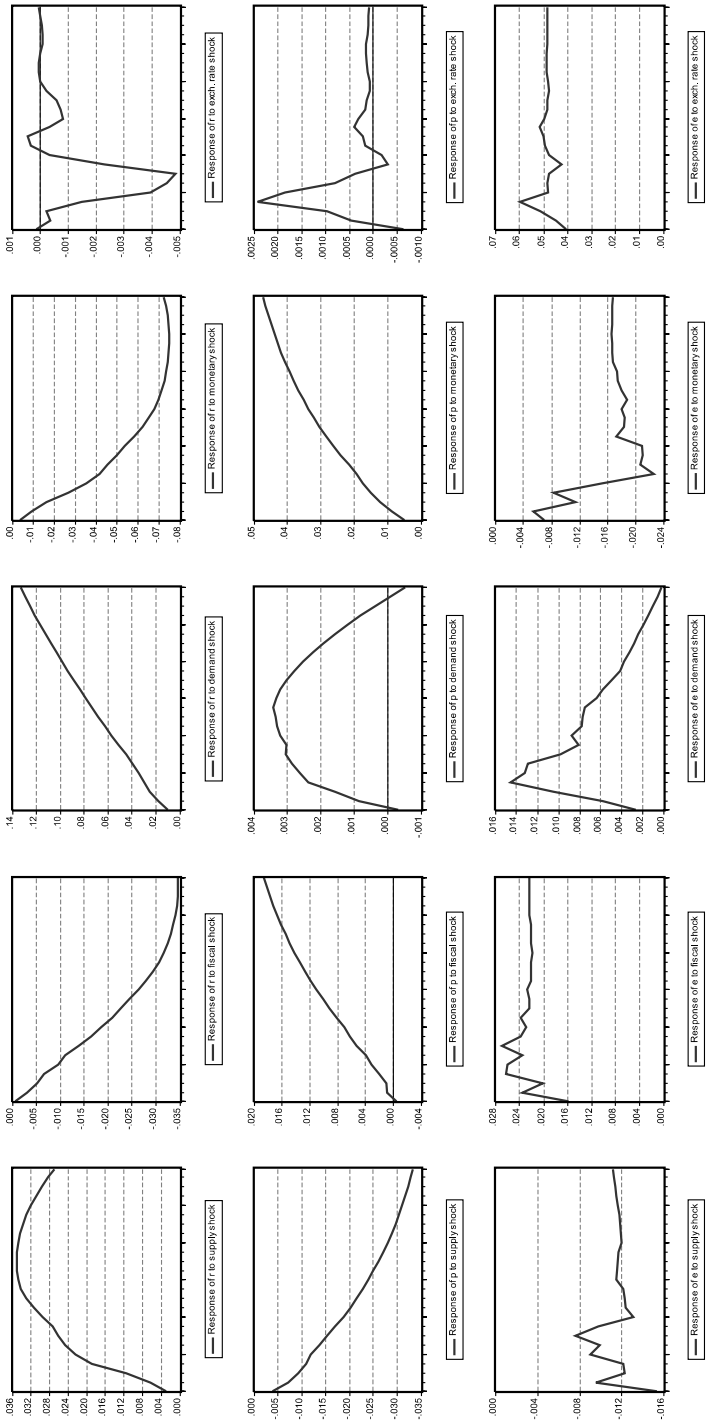
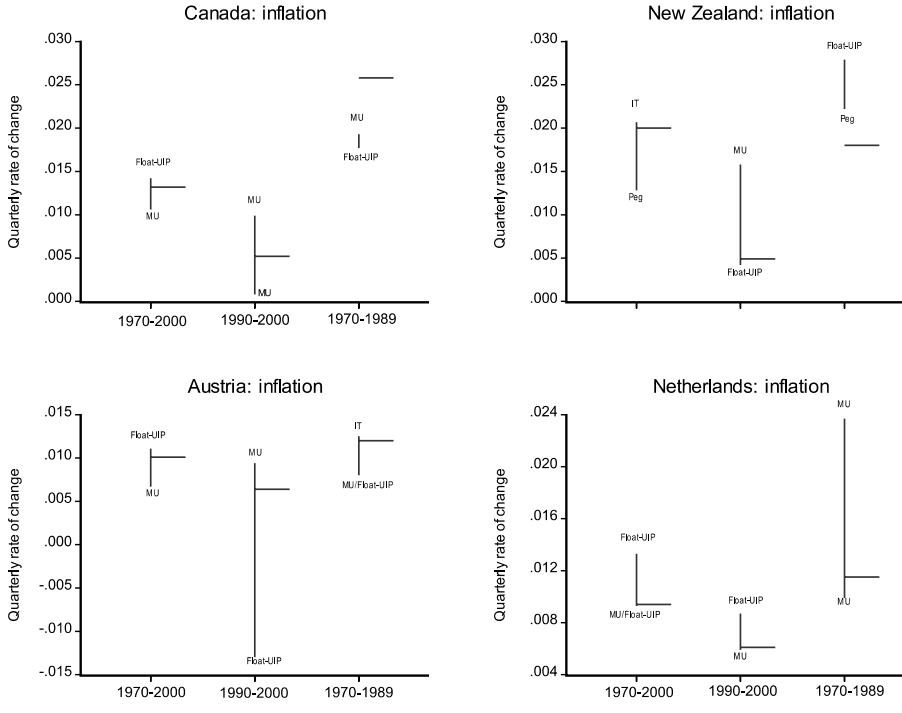
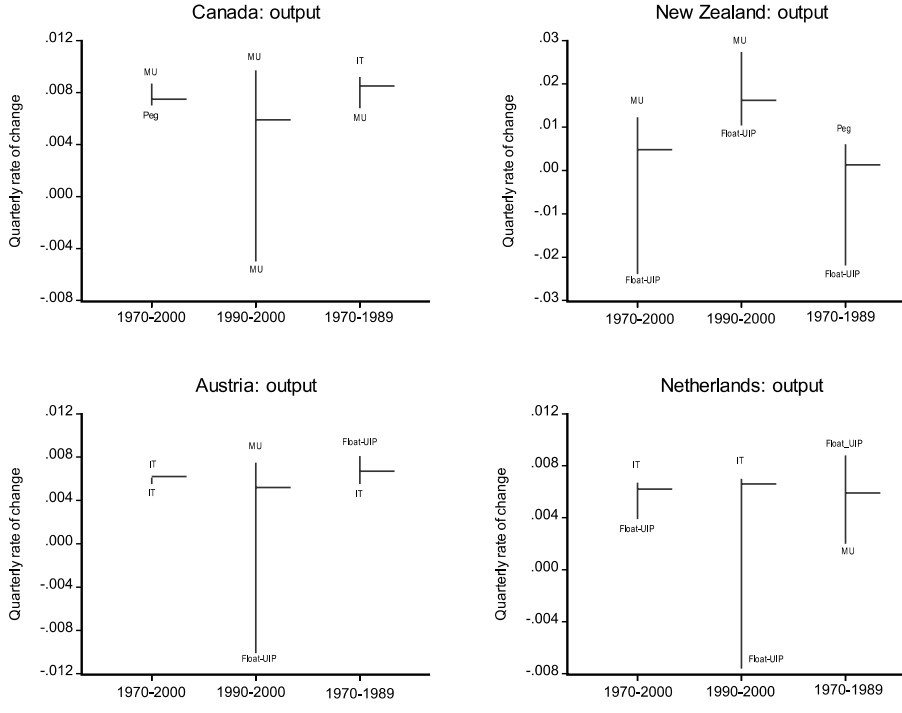

Response of r to supply shock
Response of r to fiscal shock
Response of r to demand shock
Response of r to monetary shock
Response of r to exch. rate shock
Response of p to supply shock
Response of p to fiscal shock
Response of p to demand shock
Response of p to monetary shock
Response of p to exch. rate shock
Response of e to supply shock
Response of e to fiscal shock
Response of e to demand shock
Response of e to monetary shock
Response of e to exch. rate shock

Figure 8. Counterfactuals: Inflation



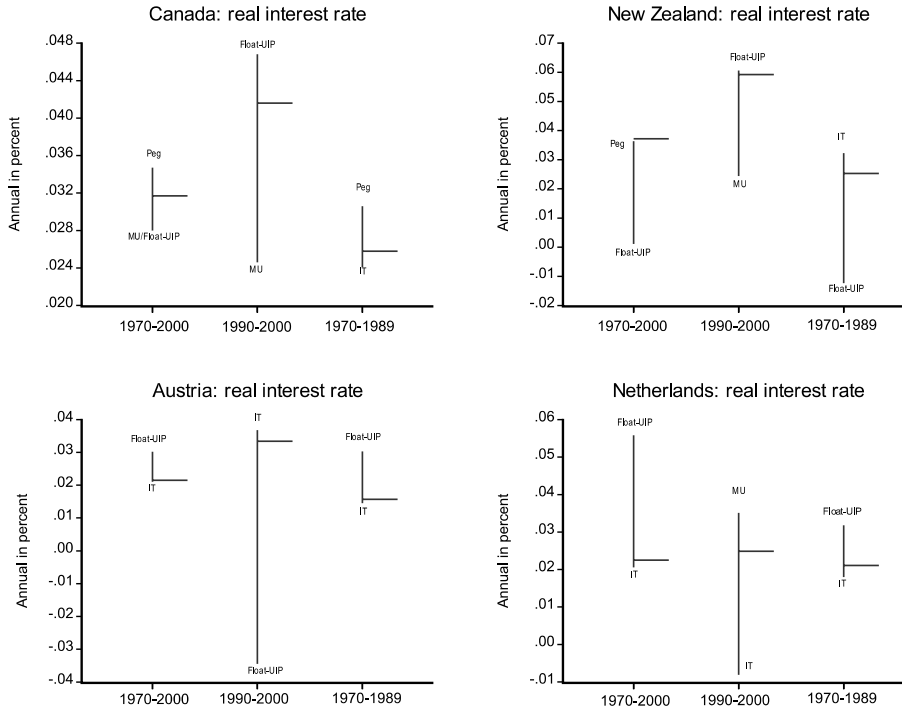
Note: The vertical lines show the maximum and minimum mean quarterly rates of change forecasted from the counterfactual "unrestricted" version of the VAR (see equation (1)). The labels indicated which monetary regime produced the largest or smallest mean growth rates, regardless whether unsystematic shocks are controlled for. The horizontal line if the mean forecast from the "unrestricted" VAR based on the actual data. The horizontal axis indicates the relevant samples over which the VARs were estimated. All series, except the real interest rate, are in first differences. The appendix has all the detailed estimates.

Figure 9. Counterfactuals: Output Growth



Note: See notes to Figure 8.

Figure 10. Counterfactuals: Real Interest Rate Levels



Note: See notes to Figure 8.

Appendix – Technical Details About Structural Model Estimation and Counterfactual Experiments

We estimate a structural VAR of the form

$$\mathbf{Z}_t = \mathbf{A(L)}\boldsymbol{\varepsilon}^{\mathbf{M}}_t + \mathbf{B(L)}\boldsymbol{\varepsilon}^{\mathbf{N}}_t + \delta R_t + \theta B_t + \beta c_{t-1} + \alpha r^*_{t-1} \quad (1)$$

The vector $\mathbf{Z} = [\mathbf{N; M}]$, consisting of two sub-vectors **N** and **M**, is given by [y, g; r, π, ξ]', where y is output growth (real GDP), *g* is the share of government (consumption) expenditures relative to GDP, *r* is a short-term domestic and foreign real interest rate[51], π is the inflation rate, and ξ is the nominal rate of currency depreciation.[52] The first two series in **Z** are the non-monetary variables, while the remaining three are the monetary indicators. A data appendix provides data sources and definitions. $\boldsymbol{\varepsilon}^{\mathbf{M}}$, $\boldsymbol{\varepsilon}^{\mathbf{N}}$ are vectors of monetary and non-monetary innovations. The estimation of five equations yields a total of five shock series. However, for expositional purposes, we classify them here into these two groupings (see below). r^* is the real interest rate of the target country, and *c* is a commodity price index. R and B are level shift and impulse dummies that define unsystematic changes in monetary regimes that are anticipated.[53] The significance of these dummies cannot be under-emphasized. They essentially accomplish two objectives. First, they are meant to deal with the Lucas critique. Second, they convey the notion that the locus of this study's interpretation of what is meant by a "regime" focuses on the choice between a fixed versus a floating exchange rate policy.[54] Hence, the model is conditioned, among other things, not only

[51] Calculated as the nominal short-term interest rate less current CPI inflation. It is possible that our results are influenced by the choice of interest rates. We chose comparable interest rates (see Appendix) across the countries considered but it is possible that other interest rate combinations may have been more suitable.

[52] An alternative would have been to specify and estimate a joint model for each of the candidate-target groups of countries. We feel, however, that the presence of a foreign (i.e., the target country's) interest rate accomplishes the same objective, as well as producing a relatively parsimonious model. Indeed, our approach allows a better focus on the role of *key* policy *instruments* that exist outside a monetary union. We chose to use the nominal instead of the real exchange rate because their overall time series properties are roughly the same when expressed n first differences, and it is doubtful that the real exchange rate series are comparable across the countries considered. In this connection, see Obstfeld and Rogoff (1995, pp. 606-608).

[53] A complete list of the dummies is relegated to an appendix available on request.

[54] As noted earlier, the choice of a floating exchange rate regime does not by itself fulfill the definition of a policy regime for it must be accompanied by a policy to anchor the price level either via some form of monetary targeting, uncovered interest rate parity, or an inflation target. The specification of the dummy variables reflects this view.

on common unsystematic shocks but also on the idiosyncratic shocks that appear to be independent of the choice of exchange rate regimes but can, potentially, influence the success of chosen policies under the respective exchange rate regime. An alternative strategy would be to allow the data, as it were, to find the location of the "breaks". We chose not to adopt this strategy because it tends to select dates that are close to ones that an historical analysis would have selected in any event, as well as because the location and the number of estimated breaks can be sensitive to the technique employed.

The identifying long-run restrictions are such that in

$$\mathbf{A(L)}\ \mathbf{e}_t = \mathbf{B(L)}\ \mathbf{u}_t$$

A is lower triangular and **B** is a diagonal matrix. The identification approach essentially adopts the Blanchard and Quah strategy of long-run identifying restrictions. Restricting the matrix of long-run responses to be lower triangular, aggregate supply shocks (i.e., output) can have permanent effects but aggregate demand or policy shocks are not permitted to have a long-run impact on output. Similarly, monetary policy shocks (e.g., interest rates, exchange rates) are not permitted to have a long-run impact on output, inflation, and fiscal policy. Fiscal shocks are permitted to have a long-run effect on all variables save output.

Next, we examine the impulse response functions in order to ascertain the reaction of the endogenous variables under the hypothesized identifying restrictions. Given the potentially large number of permutations of models we provide only a small selection of results. Once the SVARs are estimated we then evaluate the correlation of structural shocks for these same variables between candidate and target countries.

A natural objection to any such counterfactual is that the structure and coefficient estimates of the model need not be invariant under the specified scenarios. In other words, the choice of regime results in a structural shift that cannot be adequately replicated in the data.[55] Although no technique can fully accommodate the potential implications of the type of policy change we are contemplating here, the impact of this criticism is somewhat mitigated by

[55] In performing the counterfactuals, we constrained the residuals estimated from the VAR whose ordering was described below equation (1). We experimented both with constraining the "unrestricted" VAR as well as the SVAR. We found that in some cases the counterfactuals based on the SVAR produced implausible or even explosive estimates for several of the variables in question. A possible explanation is that the counterfactual, while not necessarily inconsistent with the hypothesized long-run identifying conditions, requires large corrections to the residuals from the SVARs.

making allowances for the fact that, for example, in the case where the exchange rate is pegged, other shocks were estimated under conditions where the ε in (1) would not have left ξ unaffected. Consequently, one should view the assumption that $\xi=0$ as incorporating the additional restriction that the structural exchange rate shock is modified to keep the exchange rate constant. Since it is unlikely that a peg would not permit some movement of the exchange rate we do permit the exchange rate to fluctuate within a band whose size we can set. However, the exchange rate is mean reverting so that the peg restriction is satisfied over the sample in question. Similarly, if the actual model had been estimated under a pegged exchange rate with periodic realignments the move to a floating exchange rate regime, that is adoption of scenario (3), would require that the sum of all structural shocks be consistent with the maintenance of uncovered interest rate parity. The same considerations apply for the analysis of counterfactuals in scenario (2).

Two other important choices must be made prior to estimation: The choice of lag lengths in the VARs and the stationarity of each series in the model. Regarding the former, a variety of lag exclusion tests (not shown) suggest that 4 lags are adequate in a VAR of 5 endogenous variables (r^* is exogenous in the candidate countries and the systematic policy dummies are exogenous in all models) estimated for a sample of 30 years of data. To ensure stationarity, all raw series (i.e., log levels of output, prices, government expenditures to GDP ratio, nominal exchange rates, and interest rate levels) were first differenced following the outcome of augmented Dickey-Fuller tests (not shown). With the possible exception of *r, and* r^**,* these transformations should not be controversial. Nevertheless, we consider some sensitivity tests regarding the impact of differencing of some series.

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