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REGIONAL CURRENCY ARRANGEMENTS IN NORTH AMERICA

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with comments by
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Editorial

On February 24-25, 2006 an international workshop on "Regional and International Currency Arrangements" was held in Vienna. It was co-sponsored by the Oesterreichische Nationalbank and the Bank of Greece, and jointly organized by Eduard Hochreiter and George Tavlas. Academic economists and researchers from central banks and international organizations presented and discussed current research, and reviewed and assessed the past experience with, and the future challenges of, international currency arrangements. A number of papers and the contributions by the discussants presented at this workshop are being made available to a broader audience in the Working Paper series of the Bank of Greece and simultaneously also in the Working Paper Series of the Oesterreichische Nationalbank. The papers and the discussants' comments will be published in the journal, *International Economics and Economic Policy*. Here we present the second of these papers. (The first was issued as Bank of Greece Working Paper No. 39.) In addition to the paper by Sven Arndt, the Working Paper also contains the contributions of the discussants, Steve Kamin and Pierre Siklos.

May 2, 2006

REGIONAL CURRENCY ARRANGEMENTS IN NORTH AMERICA

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1. Introduction

Currency arrangements in North America have varied over the decades, during which both Canada and Mexico have experimented with fixed and flexible exchange rates. Mexico has suffered full-blown exchange-rate crises, while Canada has not. Both have had to deal with a neighbor, who dominates economic relations and economic conditions in the region.

Steps have been taken in North America in recent years to enhance economic cooperation, but the focus has been on trade rather than monetary relations. A decade after the introduction of NAFTA, a new debate is underway over its achievements and shortcomings. Projects under discussion include rewriting the rules of origin, deepening real-sector integration in the direction of customs union, and greater monetary cooperation, including both unilateral or cooperative currency union. The debate is most animated in Canada and least in the United States.

During such debates, whether in North America or South-East Asia, questions inevitably arise about the lessons to be learned from the European experience. It is by now fairly clear, that while Europe offers useful lessons, both positive and negative, the North American situation differs from Europe in several important respects. One is the extreme imbalance in economic size among countries; a second involves the much greater diversity in the degree of economic development among the partners; and a third pertains to the relative importance in trade and regional economic activity of cross-border production sharing and production networks. These differences have implications not only for the available policy choices in North America, but for the relevance of some of the optimum currency area (OCA) criteria.

The rest of the paper is organized as follows. Section 2 reviews the main arguments pertaining to the choice of currency arrangements. Section 3 considers several key implications of the recent experience. Section 4 examines production networking in the region and its implications for the relevance of the OCA perspective. Section 5 concludes.

2. Key Issues in the Debate[1]

The theoretical issues relevant to currency arrangements have been debated since the early contributions by Mundell (1963), McKinnon (1963), and Kenen (1969). In the early days, the focus was more on goods and services markets, than on financial sectors, reflecting in part the fact that European capital markets were just becoming unfettered from capital controls. The background of relatively high MFN tariffs and limited integration of financial markets, affected the magnitude of the costs and benefits to be expected from regional integration, including regional monetary integration.

Since then, huge strides have been made in the multilateral reduction of barriers to trade, FDI and financial flows. Further, technical innovations have brought about substantial reductions in communication and transportation costs. Together, these developments have allowed goods, services, and asset markets to become more closely linked, for shocks to travel faster, and for adjustment processes to spill over national borders. The result has been that market integration has often raced ahead of inter-governmental coordination of regulatory and other policies. Financial institutions, for example, have been able increasingly to cross borders and hence jurisdictions, while agreement on who should monitor and regulate them is yet to be achieved.[2]

The cornerstone criteria for successful monetary union are well-known and will not be discussed in detail here. Suffice it to recall the basic argument, which is that in the presence of significant asymmetries among countries, loss of floating exchange rates will force adjustment onto variables like wages, prices, employment and output. To minimize politically unpopular adjustment patterns, considerations based on Mundell (1963) call for cross-border factor mobility. Considerations based on McKinnon (1963) suggest that very open economies make better candidates for currency union, especially if they are major trading partners. As the subsequent debate has pointed out, whether trade raises or reduces asymmetries among countries depends at least in part on whether it is mainly inter- or intra-industry in nature.[3]

Kenen (1969) adds diversity as a criterion, suggesting that economies with diversified production and trade structures are likely to be better candidates for monetary integration, because shocks are likely to be more diversified in nature and more diversifiable in terms of impact.

An important feature of the original OCA arguments was their focus on the real side of the economy. As the debate has evolved and inter-country financial linkages have grown, concerns about financial adjustment and financial stability have come to the fore, particularly in policy arrangements involving developing economies, whose financial sectors, though very open, tend to be relatively underdeveloped and fragile.[4] This is relevant to North America, where economic development among the three countries ranges from highly developed to emerging, thus requiring policies to bridge much larger gaps than existed in the original European arrangements. When it comes to monetary union, the differences in terms of financial sector development are also much larger than among the countries which formed the EMU. The United States and Canada are financially mature and integrated into the world economy, while Mexico's

financial system, though linked to the United States, is relatively immature and burdened by "original sin" and "fear of floating."

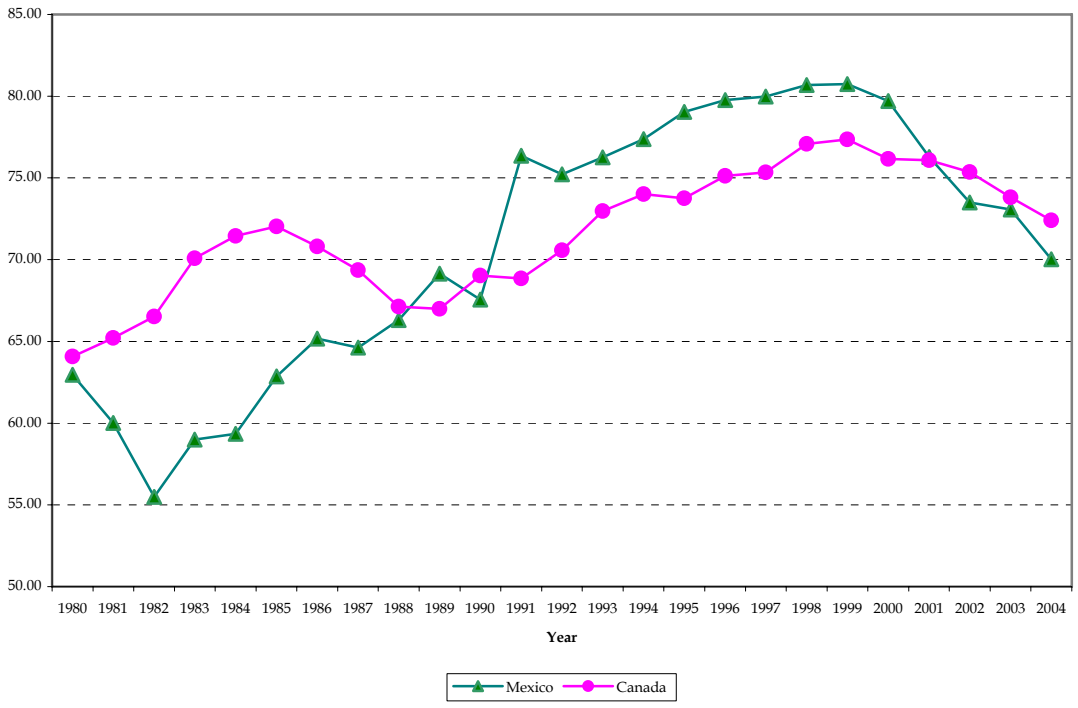
The conclusion to be drawn from the contemporary discussion is that North America is less than fully, but nevertheless substantially ready for closer monetary cooperation. There is significant market integration among the three countries; wages and prices are quite flexible, and there is considerable cross-border factor mobility.

While factor mobility was important in Mundell's original assessment, there has always been a question of adjustment speeds to changes in exchange rates, on the one hand, and responses involving the relocation of labor and capital, on the other. In contemporary North America, prices and wages are less sticky than in Europe and labor and capital are more mobile. Prices and wages are more market-driven. Capital is freely mobile among the three countries. Skilled labor is mobile into the United States, especially from Canada, a fact which gives rise to concerns about "brain drain" in that country. Unskilled labor is also mobile, at least from Mexico to the United States.

The question, nevertheless, is how useful an adjustment mechanism such factor movements provide, particularly in the short run. Compared to the guest-worker programs adopted by many European countries in the sixties and seventies, which appeared to possess considerable short-run flexibility, cross-border labor movements in North America would be expected to be slower and thus offer somewhat more promise as a vehicle for long-run structural rather than shorter-run cyclical adjustment. It is not easy to make a case for factor mobility as an efficient alternative to exchange-rate based responses, which brings the discussion back to the seriousness of asymmetries. This question is taken up in Section 3.

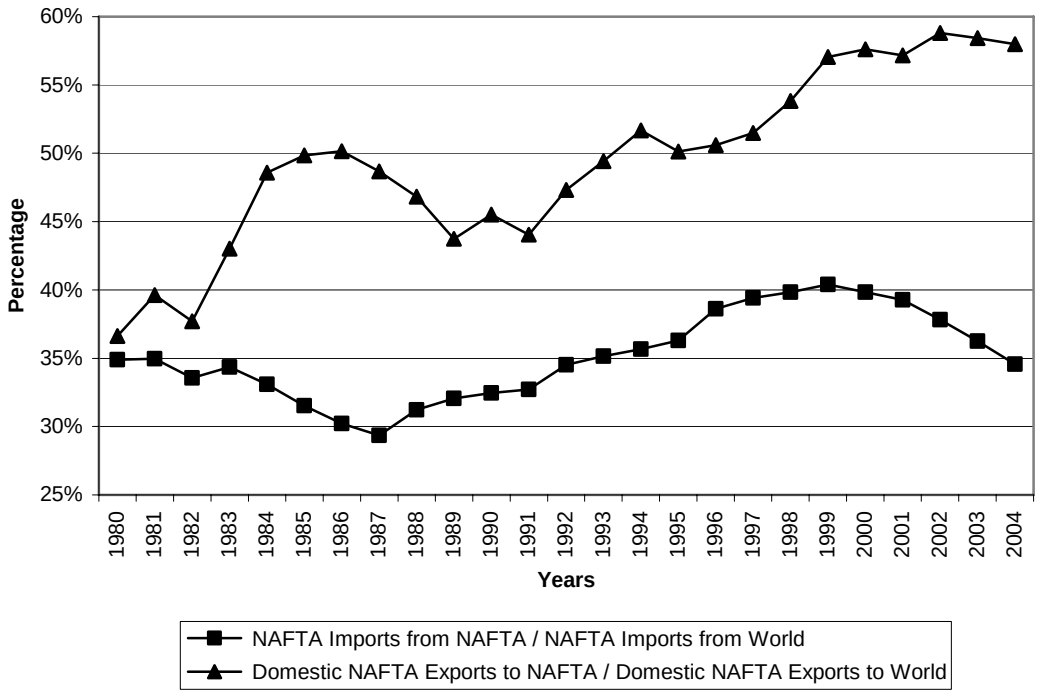
The three economies of North America are each other's major trading partners and the small economies are also quite open. Chart 1 shows the evolution of Canada's and Mexico's trade with the United States. Both ratios grew rapidly during the last two decades of the 20th century, peaked at the end of the century, and have been declining since. Chart 2 gives a slightly different perspective, focusing on the development of regional trade in manufacturing among the three NAFTA countries. It is important to note the decline since the late 1990s in intra-NAFTA imports, a decline that is particularly pronounced for the U.S. and Mexico. Overall, however, the behavior of intra-regional trade underscores the continuing integration of the region's economies.

Chart 1: Regional Openness (Ratio of X+M with US to X+M with the world; scale by 100)



Source: UN Comtrade

Chart 2: Aggregate NAFTA Import and Export Manufactures Ratios



Source: UN Comtrade

Kenen's diversity criterion is the most problematic and ambiguous of the three. Diversity is deemed to be desirable because it makes the economy less vulnerable to shocks in particular sectors or industries. If diversified industries are subject to different types of disturbances, the negative shocks originating in any one sector may be counter-balanced by positive shocks in others. To the extent that factor mobility is needed to facilitate adjustment, it takes place within the country, where labor mobility among sectors and regions is often higher than across borders. That would be true of the U.S. and Canada, for example.

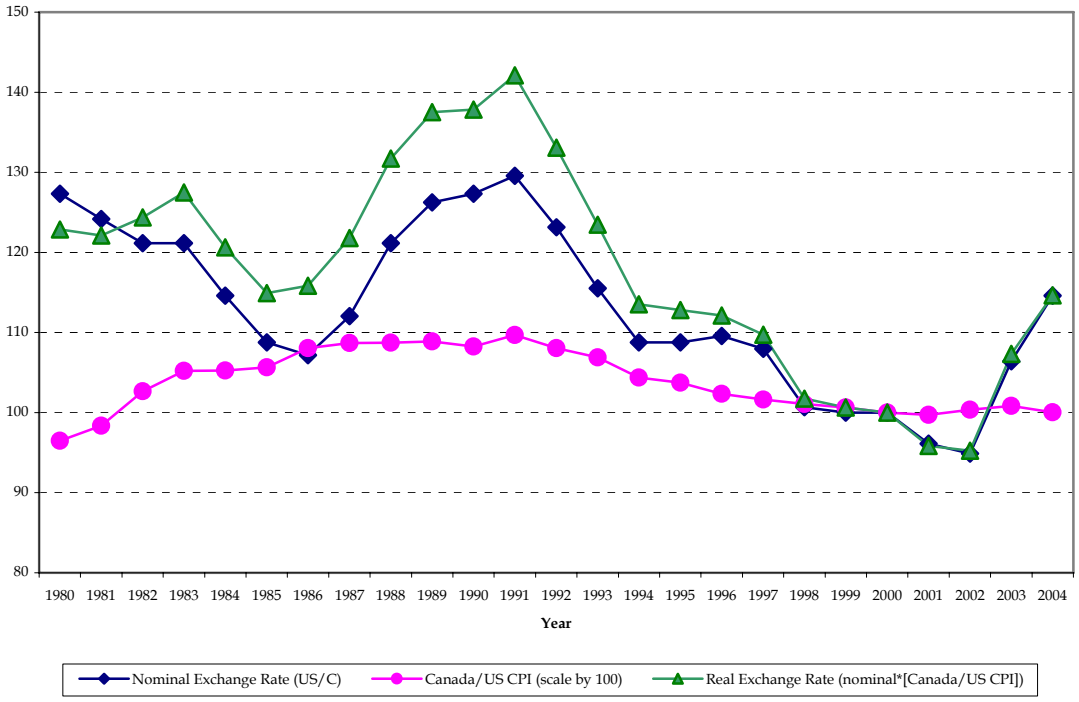
While it is certainly true that the U.S. and Canada, in particular, are diversified in terms of the variety of goods and services that are produced, consumed and traded in the overall economy, there is considerable regional concentration of many of these activities, which reduces

the diversity within regions relative to diversity in the country overall. This is easily seen in the concentration of manufacturing in Eastern Canada, and especially Ontario, and the concentration of agriculture and mining in the Western provinces. These regional differences are replicated in the United States. In Mexico, too, much manufacturing is located in the Northern states, particularly in the maquiladora sector and in other activities catering to the U.S. market. These inter-regional asymmetries have long been of concern to analysts, some of whom have suggested that instead of a horizontal division, the continent should have been divided vertically into two currency unions.

As the debate has evolved over the years, increasing attention has been paid to the role of capital mobility. The arguments are familiar. The key feature relevant to the current discussion are the conclusions pertaining to monetary policy sovereignty. This is a hot issue in Canada, as well as Mexico. Both theory and the empirical evidence suggest, that in the presence of high capital mobility small countries lose their ability to run independent monetary policies under fixed exchange rates.

This has been a topic of considerable discussion in Canada, where the central bank's economists, in particular Murray (2000), have defended floating rates. While there have been periods during which Canadian monetary policy appeared to follow U.S. policy, there have been significant policy differences between the two countries in recent years. Along with many other central banks, the Bank of Canada has pursued an explicit inflation-targeting policy and has shown considerable tolerance for significant movements of the exchange rate against the U.S. dollar. (See Chart 3 below.) A similar approach has been pursued by the Bank of Mexico. As we shall see below, the substantial depreciation of the Canadian dollar against its U.S. counterpart in the 1990s has been attacked for undermining growth in high-tech industries.

Chart 3: Canada - Nominal and Real Exchange Rates (2000 = 100)



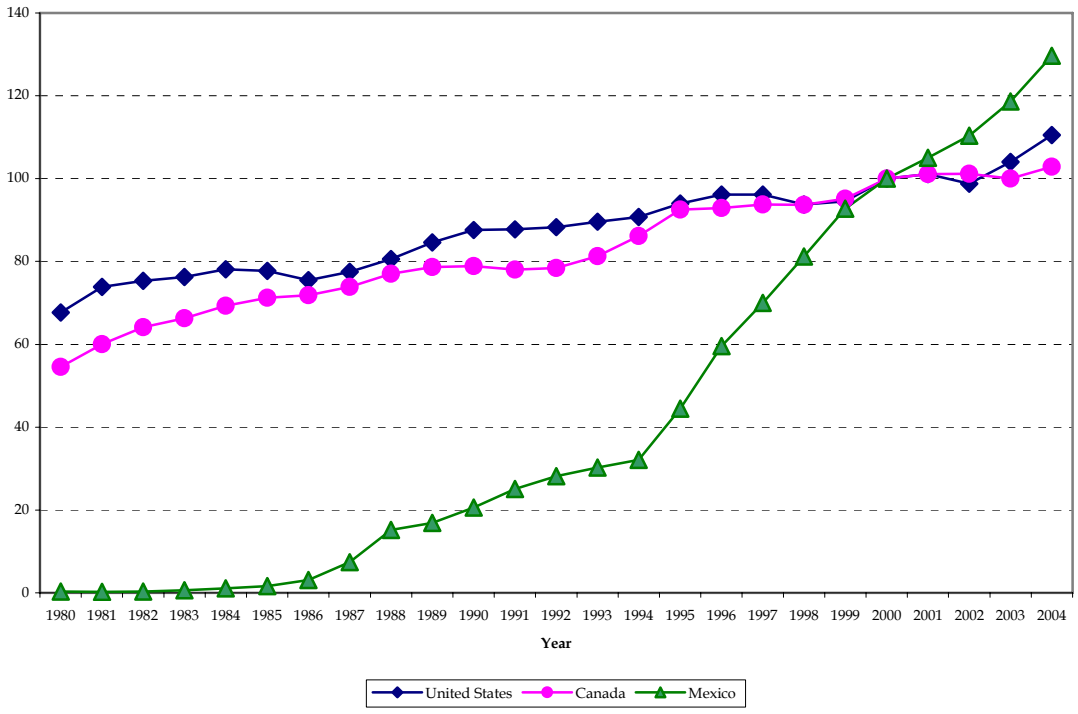
Source: IMF/IFS

The recent OCA debate has viewed fixed exchange rates - including dollarization and currency union with a low-inflation country - as a way for inflation-prone countries to import price stability. As Chart 3 shows, this is not an issue in Canada, where monetary policy has succeeded admirably in maintaining low inflation rates. Indeed, the ratio of Canada's CPI (WPI) to that of the United States has been falling since the early nineties.

As Chart 4 shows, however, inflation in Mexico has been rising relative to both Canada and the United States. It has been rising as well in relation to some third-country competitors, which has helped erode Mexico's share in U.S. markets, and it is part of the explanation of the relative fall in intra-regional trade, noted in Charts 1 and 2.

In recent years, the discussion of alternative exchange-rate regimes has voiced concerns about the viability of soft pegs for emerging economies. This argument may be of relevance to Mexico, but not to Canada. Both Canada and Mexico have experimented with fixed rate systems, but only Mexico has experienced exchange-rate crises. Canada carries considerable amounts of foreign-currency denominated debt and has run sizeable current account deficits, but these have not provoked crises.

Chart 4: Producer/Wholesale Prices - Index Number (2000=100)



Source: IMF/IFS

Lessons from Europe

There are two sets of lessons to be learned from Europe. One concerns the way Europe approached monetary unification, particularly with respect to sequencing of trade, financial and monetary integration and the gradual deepening of integration towards EMU. The second

pertains to experience since inception of EMU, particularly with respect to the viability of the Maastricht criteria and the efficacy of the Stability and Growth Pact.

With respect to sequencing, the question is whether trade liberalization and creation of a common and single market must necessarily precede monetary integration or whether the latter might at some point be introduced in order to facilitate further real-sector integration. In other words, have real- and financial-sector integration and reduction of asymmetries proceeded far enough in North America to make monetary integration a viable option, particularly if it can become a catalyst for further real integration? There is widespread concern that NAFTA has been deficient in a number of ways, that the benefits it has delivered have fallen short of expectations, while costs have been larger than anticipated, all of which suggests to some that the agreement is in need of significant revision. There is evidence, for example, that the dispute settlement system is not working as expected and that compliance with rules of origin is so costly and burdensome that it is causing significant amounts of trade to by-pass NAFTA altogether.[5]

If the European approach to sequencing is the relevant model, then further initiatives in pursuit of deeper real-sector integration are in order. These would include movement toward a customs union and greater harmonization of regulatory, competition and dispute-settlement procedures. These would be followed by a gradual shift toward fixed rates, in the manner of the European Monetary System (EMS). If, however, the U.S. proves unwilling to proceed in a coordinated manner, then Canada and Mexico could elect to unilaterally or jointly fix to the U.S. dollar and bring their policies and practices into conformity with the new regime.

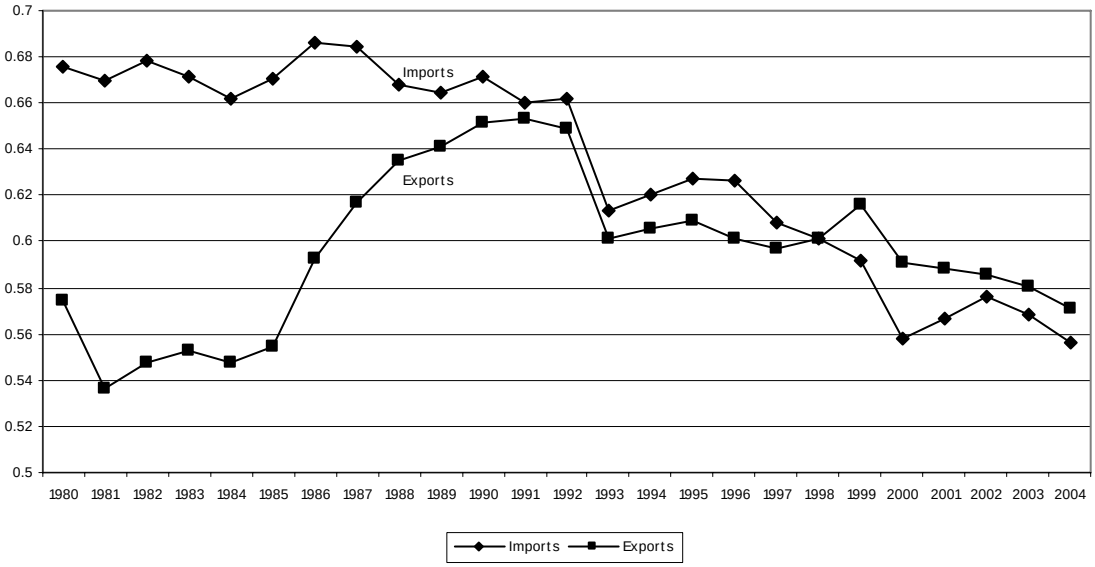
The second lesson to be learned, concerns Europe's experience with monetary union since the introduction of the Euro. Have the various OCA concerns raised in the preceding pages been an issue? Have asymmetries interfered with monetary policy at the ECB level? How

important is the fiscal indiscipline issue? Are countries violating the SGP's limits because they are not getting the monetary policy they need? Are the Maastricht conditions appropriate for North America? To what extent would the United States be willing to share control over monetary policy? To what extent would the United States allow itself to be bound by a Stability and Growth Pact? What would be the consequences if the U.S. violated the conditions of such a pact? More generally, what are the implications for the common welfare of policy indiscipline in large member countries? Conversely, what are the implications for individual countries of policy constraints imposed by the group?

Can Europe Learn from North America?

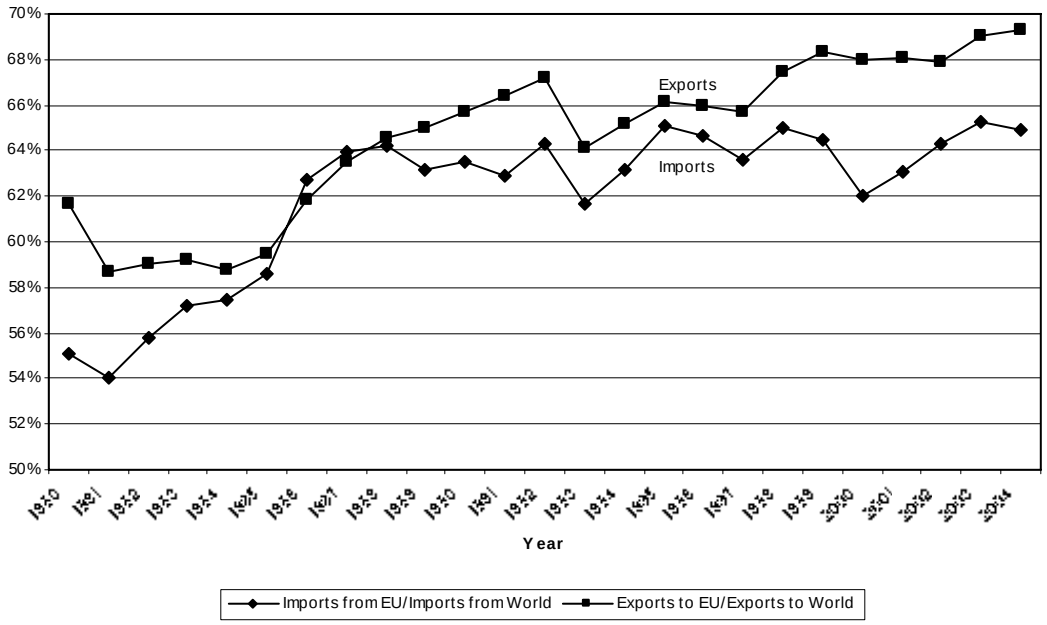
In North America, cross-border production sharing has played an important role from the outset of regional integration. Europe, on the other hand, is just now entering a phase of deepening by means of production sharing. As Chart 5 shows, the Europe-15 group of countries has gone through "de-regionalization" since the early nineties as the share of intra-group trade has fallen relative to total trade. Chart 6 provides the explanation: much of the growth in the group's trade has been with the recently admitted members (and a good portion of that has involved production sharing).

Chart 5: Intraregional Share of EU-15 Aggregate Imports and Exports



Source: UN Comtrade

Chart 6: EU 25 Regional to World Import & Export Ratios



Source: UN Comtrade

3. New Perspectives on an Old Problem

During the 1990s, the Canadian dollar depreciated against its U.S. counterpart. (See Chart 3 above.) It has recently recovered part of that lost value. Among Canadian observers, the sustained "undervaluation" of the currency has raised concerns about its effects on Canada's longer-run competitiveness. The argument may be stated as follows.

The sustained depreciation of the Canadian dollar has provided an important measure of protection to a variety of Canadian industries facing foreign competition. These include the resource-based industries, which suffered from depressed world prices of raw materials. The decline of the value of the home currency, gave these industries room to raise prices and wages, without suffering the competitive consequences that would have manifested themselves under fixed rates. Analogous competitive shelter was provided to non-resource based industries, many of them in the so-called "old manufacturing" sector, where they enjoyed a measure of protection from competition from emerging economies.

While this may have enabled these industries to sustain higher levels of activity than would otherwise have been possible, it also implies that the Canadian economy overall failed to move scarce productive resources into newer, more technologically advanced manufacturing. The weak Canadian dollar also raised the cost of imported technology, on which Canada relies heavily. In this sense, exchange-rate policy provided shelter to existing sectors at the expense of more modernization. This argument has been vigorously pushed by economists like Courchene and Harris (2000), and just as vigorously rejected by others, including economists at the Bank of Canada.

The evidence does not provide support for this argument; and even if it did, it may merely suggest, as McCallum (1999, 2000) has noted, that Canada needs a stronger dollar and

not that it needs monetary union with the United States. What is, nevertheless, interesting about this argument is the importance it attaches to the role of the exchange rate in stimulating economic growth.[6]

In the course of this debate, economists at the Bank of Canada have steadfastly supported floating rates.[7] They have based the argument on the importance of the buffer function of flexible exchange rates. They have claimed on the basis of econometric modeling that the behavior of the exchange rate vis-à-vis the U.S. dollar can be adequately explained in rather traditional ways.[8] They have also disputed another argument sometimes used in support of official unilateral dollarization, namely, the assertion that a significant amount of de facto dollarization already exists. Murray and Powell (2003) argue that while the U.S. dollar circulates alongside the Canadian dollar, especially in border areas, and is used in certain types of activities, there is no evidence of creeping dollarization.

A key element in the Canadian debate, and in Mexico as well, is the political dimension. A broad segment of Canadian public opinion is concerned about the loss of national identity. In the presence of Canadian anxieties about U.S. cultural and economic dominance, the economist's efficiency and cost/benefit arguments are puny by comparison. In view of the indifference toward coordinated approaches in Washington, the prospects for monetary integration are dim.

The situation is somewhat similar, but also somewhat different in Mexico, where analogous anxieties about the Big Gorilla in the north exist, but where domestic institutions and policy discipline may be too frail for a go-it-alone strategy. While the quality of monetary policy has improved sharply in Mexico, the political environment is still too fragile to ensure *continuity* of policy discipline. There may thus be a case for a unilateral fixed-rate policy with the dollar in order to "lock in" certain policy reforms, provided that a political agreement to abide by the

constraints on domestic policy independence can be reached. It is not clear that the current political environment in Mexico can generate such a consensus.[9]

4. Evolving Economic Structure

In this section we consider a feature of North American economic integration that distinguishes it from the original European experience, although much less from the situation since the most recent EU enlargement. This is the growing importance of cross-border production sharing across a range of industries. In the North American automobile sector, for example, parts and components made in the U.S. are assembled in Mexico into finished products and then exported to the U.S. In the same sector, production sharing is so intense between the United States and Canada, that special vehicles ferry automobiles at various stages of completion back and forth across a bridge between Detroit and Windsor. Similar multiple shuttling takes place in the furniture industry between Southern California and North-Western Mexico.

Production sharing began decades ago between the United States and Canada in the original auto pact. It was followed by the Canada-U.S. free trade agreement (CUSFTA) and then by NAFTA. Before NAFTA, the maquiladora program gave impetus to cross-border coordination of manufacturing activities between the United States and Mexico.

The trade flows generated by production sharing represent a new form of intra-industry trade. In Europe, trade among the countries of the EEC and EFTA was "intra-industry" in nature, but it was characterized by two-directional flows of "varieties" of finished products. Peugeots went from France to Germany, while Mercedes vehicles moved in the opposite direction. Production sharing adds a new dimension to intra-industry trade.

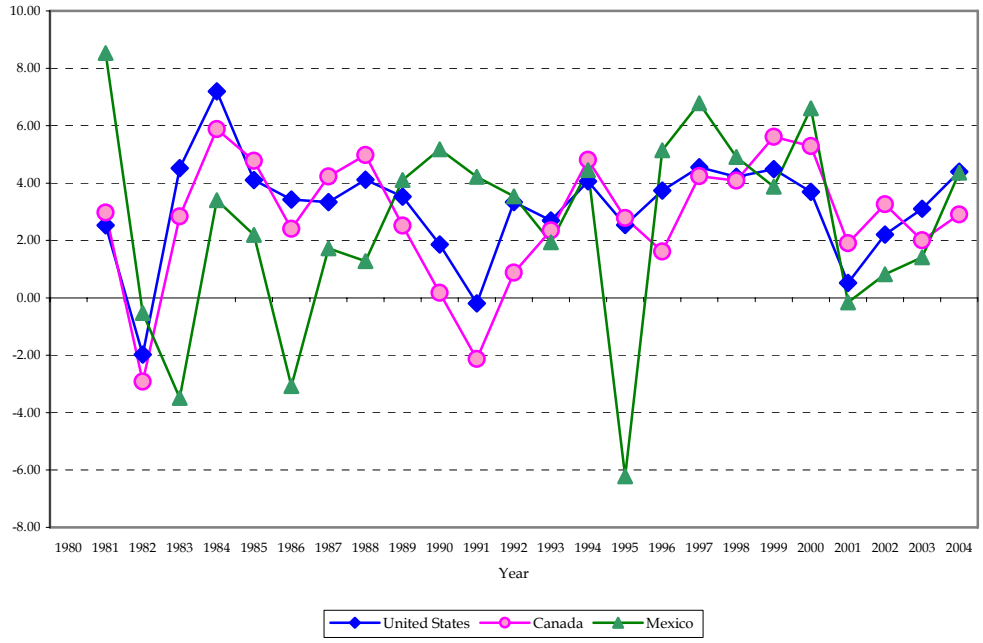
Production sharing has a number of implications. In the context of a preferential trade area, it improves the odds that a given PTA will be net trade-creating rather than trade-diverting (Arndt 2001). If a preferential trade arrangement is introduced where production sharing takes place with non-members, rules of origin tend to be welfare-reducing. Indeed, as noted, recent evidence suggests that compliance costs with NAFTA's rules of origin are so onerous, that a significant share of North America's cross-border trade avoids NAFTA and pays the MFN tariff.

Cross-border production sharing also has implications for the choice of monetary arrangements. It tends to support convergence and synchronization of business cycles and it affects the relationship between trade flows and exchange rates, as well as other variables in the traditional trade equation.

In a number of industries, specialization around the world has been pushed down from the level of end products to that of components and constituent activities. In the auto sector, for example, parts and components made in the U.S. are shipped to Mexico for assembly into finished passenger vehicles, most of which are then exported to the United States. Similar developments are taking place in electronics, machinery, textiles and apparel and furniture.

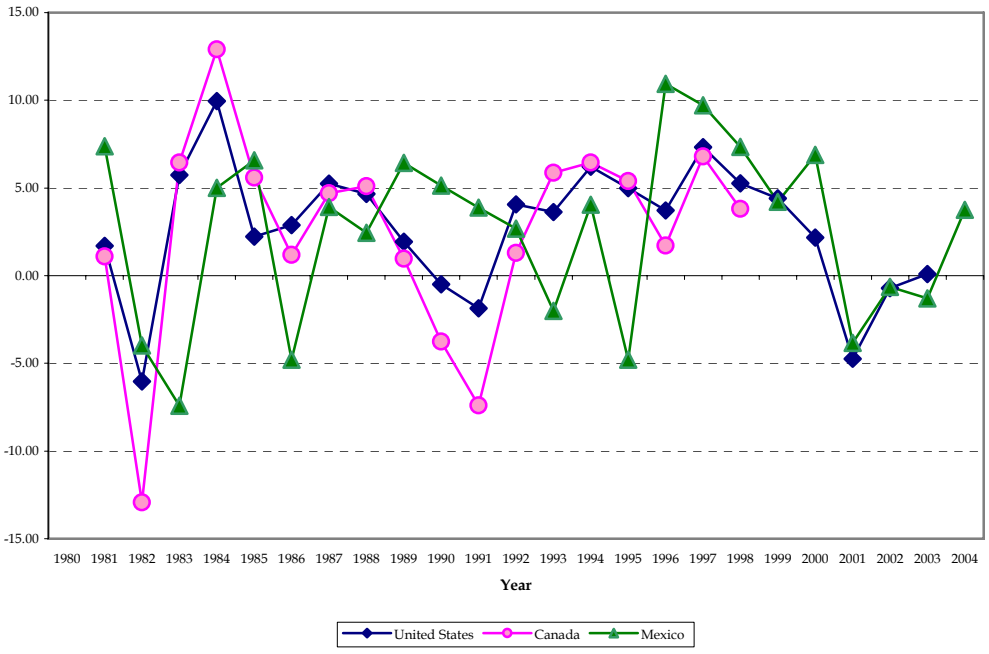
This type of intra-industry (intra-product) trade tends to reduce asymmetries between trading partners, certainly at the level of industries and sectors and possibly at economy-wide levels. Industry-specific shocks now affect production in all participating countries. If cross-border linkages occur across a broad range of industries, then the effect of production networks will foster cyclical convergence at the level of the aggregate economy.

Chart 7: Real GDP Growth Rate (Percentage)



Source: IMF/IFS

Chart 8: A Change in Manufacturing Production Indices (Percentage)



Source: UN Comtrade

It is, of course, possible that production sharing may be limited to particular sectors, in which case the reduction in asymmetries across borders in that sector, may be accompanied by greater asymmetries between that sector and the rest of the economy. In Canada, for example, this could contribute to a further widening of the gap between cycles in the Western and Eastern provinces. If industries concentrated in the province of Ontario engage in production sharing with their Eastern U.S. counterparts, or if industries located in the northern states of Mexico become more closely involved in production networks with U.S. firms, then this may widen asymmetries between such regions and other regions within their economies. The evidence to date suggests that production networks are contributing to convergence of business cycles.[10] (See Charts 7 and 8.)

As noted, production networks affect the relationship between trade flows and exchange rates, relative prices and incomes. They introduce a new direct relationship between exports and imports. Traditionally, an exogenous rise in the demand for a country's exports stimulates domestic output and raises income, which in turn boosts imports. This relationship also holds in the presence of production sharing, but to the extent that exports contain imported components, a rise in export demand has a direct effect on imports.

This implies that imports are affected not only by changes in domestic income (in the traditional direct manner), but by changes in foreign incomes as they raise the demand for a country's imported components needed to service the increased demand for exports.

$$\mathrm{M}^{*}_{\text{parts}} = \overset{-}{\alpha}_1 e + \overset{+}{\alpha}_2 Y_{MX} + \overset{+}{\alpha}_3 X_{pv} \qquad (1)$$

$$X_{pv} = \overset{+}{\beta}_1 e + \overset{+}{\beta}_2 Y_{US} \qquad (2)$$

$$\therefore M^{*}_{parts} = \overset{-}{\alpha_1} e + \overset{+}{\alpha_2} Y_{MX} + \overset{+}{\alpha_3}\left(\overset{+}{\beta_1} e + \overset{+}{\beta_2} Y_{US} \right)$$
$$= \left(\overset{-}{\alpha_1} + \overset{+}{\alpha_3}\,\overset{+}{\beta_1} \right) e + \overset{+}{\alpha_2} Y_{MX} + \overset{+}{\alpha_3}\,\overset{+}{\beta_2} Y_{US} \qquad (3)$$

This relationship is modeled very simply in equations (1)-(3), where Mexico's demand for parts imports (M^*_{parts}) is a negative function of the real exchange rate (e) and a positive function of domestic income (Y_{MX}) and exports of the finished product (X_{pv}). The latter, in turn, are a positive function of the real rate and of U.S. income (Y_{US}). Substituting equation 2 into equation 1, yields equation 3, a result which gives U.S. GDP a new role in determining Mexico's imports along with Mexico's GDP. In this setting, the coefficient on the real exchange rate may be negative, as in the traditional case, but it may also be insignificant or positive. It will be positive as Mexican value-added in passenger vehicle exports to the U.S. rises.

We would thus expect network-related imports to behave differently relative to more traditional imports, where the key characteristic of such imports is that they are not destined for re-export.

In auto trade between the United States and Mexico, U.S.-made parts and components are imported by Mexico for incorporation into finished vehicles, which are then shipped to the United States. Under normal circumstances, a depreciation of the peso against the dollar would be expected to raise the peso price of U.S.-made components and thus reduce demand. The higher price of imported components raises the peso cost of the vehicle into which they are incorporated. At the original exchange rate, this raises the dollar price of the vehicle. But the decline of the dollar price of the peso acts as an offset. The dollar price of the imported vehicle is pushed up by the increase in the peso price of components and pushed down by the depreciation of the peso.

The net effect on the dollar price of imported automobiles depends on the share of Mexican value-added in those vehicles. Mexican value added includes assembly and Mexican parts and components. When parts imports are destined for use by Mexicans and vehicle exports consist entirely of Mexican value-added, peso depreciation reduces imports, raises exports and improves the trade balance.

As the share of imported components intended for incorporation into exports rises, the response of trade to peso depreciation weakens as compensating changes on the two sides of the trade balance tend to mute the effect. To the extent that Mexico's vehicle exports contain Mexican value-added, the dollar price of exports falls as a result of the peso depreciation. This, in turn, raises the demand for vehicle imports from Mexico and thereby raises the demand for U.S.-made components. There are two forces operating on parts imports, therefore. On the one hand, the demand for parts for use by Mexicans falls, while the demand for parts to be incorporated into vehicle exports rises. The net effect depends on the share of imports for domestic use and on the share of Mexican value-added in vehicle exports. The response of imports to peso depreciation may thus be negative, positive or zero.

The foregoing helps explain the degree of pass-through of exchange-rate changes to domestic import prices. The peso depreciation will be reflected in lower dollar prices of vehicle imports only to the extent of embodied Mexican value-added. A simple view of this relationship may be sketched as follows.

$$P^*_{parts} = EP_{parts} \tag{4}$$

$$\begin{aligned} P^*_{pv} &= \lambda P^*_{parts} + (1-\lambda) VA^* \\ \therefore P^*_{pv} &= \lambda EP_{parts} + (1-\lambda) VA^* \end{aligned} \tag{5}$$

$$P_{pv} = \frac{1}{E}\left[\lambda E P_{parts} + (1-\lambda) VA^*\right] \tag{6}$$

$$\begin{aligned} dP_{pv} &= \frac{1}{E}\left[\lambda P_{parts} dE + (1-\lambda)\, dVA^*\right] - [\ ]\, dE \\ &= \lambda P_{parts}\frac{dE}{E} + (1-\lambda)\frac{1}{E} dVA^* - \left[\lambda P_{parts} + (1-\lambda)\frac{1}{E} VA^*\right]\frac{dE}{E} \end{aligned} \tag{7}$$

$$\frac{dP_{pv}}{P_{pv}} = -(1-\lambda)\frac{VA^*}{EP_{pv}}\frac{dE}{E} + (1-\lambda)\frac{VA^*}{EP_{pv}}\frac{dVA^*}{VA^*}, \tag{8}$$

where P* and P are prices expressed in pesos and dollars, respectively, E is the peso price of the dollar, λ is the share of imported parts in vehicle exports, and VA* is Mexican value-added. Dollar prices of U.S.-made parts are assumed to be fixed.

Thus production sharing adds a new explanation for the observed weakness or absence of pass-through. [11]

The decline in sensitivity to exchange-rate changes of some trade flows has implications for the choice of exchange-rate regime. If trade becomes less sensitive, then the buffer function of flexible rates becomes less important, but so does the claim that floating rates destabilize trade.

5. Concluding Remarks

The pros and cons of greater monetary cooperation in North America have received extensive attention in recent years. The three countries in the region have taken steps toward closer economic integration through NAFTA. They meet many of the basic pre-conditions for monetary union – not perfectly, but reasonably well. They are each other's major trading partners in most dimensions and their economies are strongly linked across goods, services and asset markets and to a lesser extent at the level of factor markets.

Most empirical studies see gains from monetary integration, which tend to be easier to measure than the costs. That is due in part to the fact that the cost of lost policy independence is difficult to assess.

While the debate over policy continues, de facto integration moves forward. Among the more interesting developments in the past decade or so has been the rapid expansion of cross-border production networks, both within the region and beyond. The available evidence suggests that in the course of the process, cyclical and structural asymmetries among the countries are declining, thereby eroding a major argument against common currencies.

Furthermore, the evidence suggests that network-based trade tends to be less sensitive to variations in exchange rates, a result which reduces the importance of a floating rate's buffer function.

These are developments, the thrust of which should further diminish the economic obstacles to currency union. But while the economic pre-conditions are positive, the political environment is quite hostile. The attitude in Washington is one of indifference, while popular opposition in Canada and Mexico is based on cultural and political considerations. This is quite the reverse of the conditions that prevailed in Europe, where the economic case was often less than compelling, but where integration proceeded nevertheless because political forces pushed it along.

Acknowledgments

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the Vienna workshop for valuable comments, to B.J. Dechsakulthorn and Maria Tzintzarova for valuable research assistance, and to Alex Huemer for useful discussions.

Endnotes

1. For a detailed assessment of the options available to Canada, see Arndt (2003).
2. See, Mayes (2005), for example.
3. See, among others, European Commission (Emerson, 1990), Eichengreen (1997) and Krugman (1993).
4. See, for example, Berg and Borensztein (2000) and Hausmann et al. (1999).
5. In a recent study, Kunimoto and Sawchuk (2005) suggest that utilization of NAFTA hovers in the neighborhood of plus or minus fifty percent, meaning that for a significant share of intra-NAFTA trade the costs associated with MFN tariffs are lower than compliance with NAFTA's rules of origin.
6. Grubel (2000) has also been a forceful critic of Canada's recent exchange-rate regime, but for reasons that have more to do with hysteresis and the role of labor unions.
7. See Amano and van Norden (1993), Murray (2000), and Murray, Schembri and St-Amant (2003), for example.
8. The main causal variables in this model are the inflation differentials and relative prices of energy and non-energy products.
9. In this context, Austria's experience with a fixed-rate system involving the German mark is an extremely valuable case study (Arndt, 1982). It is doubtful that Mexico is capable of meeting those standards, in which case some version of a floating rate system is superior.
10. See, for example, Chiquiar and Ramos-Francia (2005) and Torres and Vela (2003).
11. See, for example, Knetter (1993), Goldberg and Knetter (1997), and Krugman (1987).

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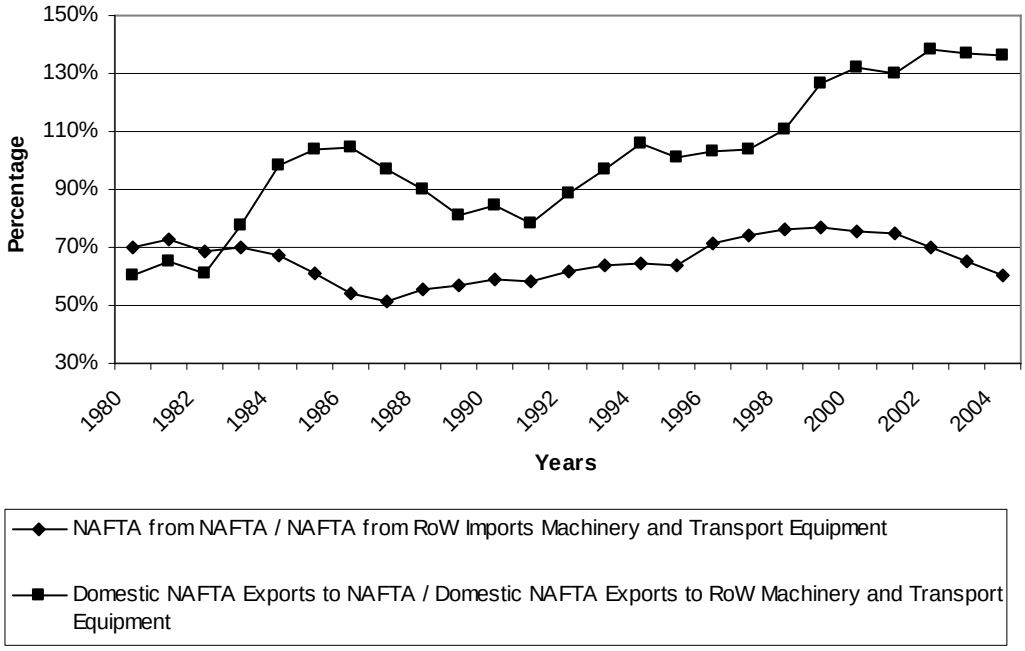
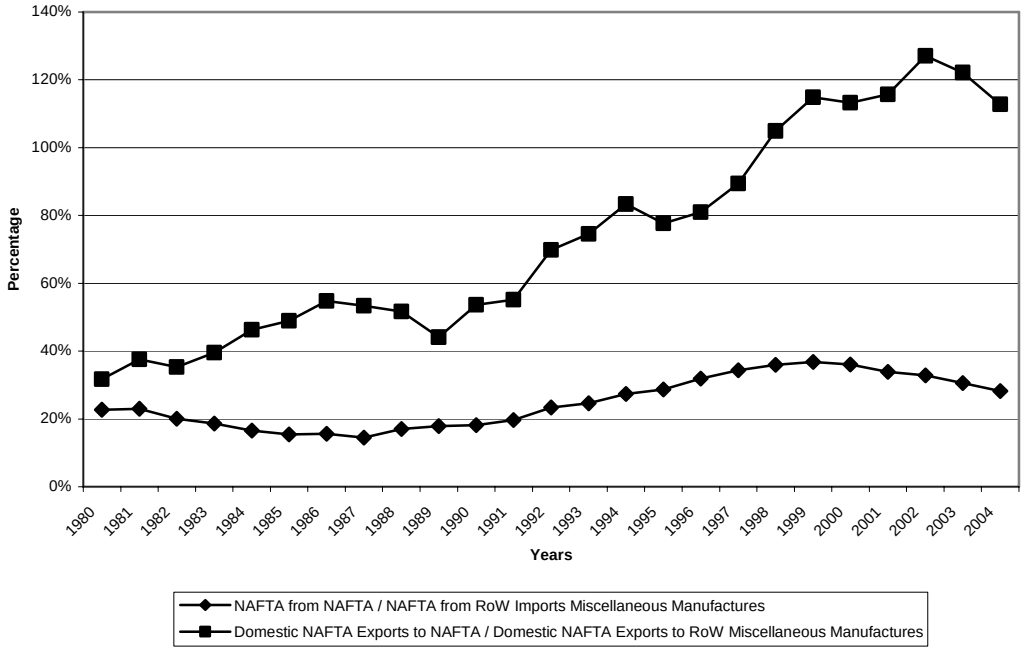
Appendix

Chart 1A: Manufactures Machinery and Transport Equipment NAFTA Imports and Exports / RoW Ratios



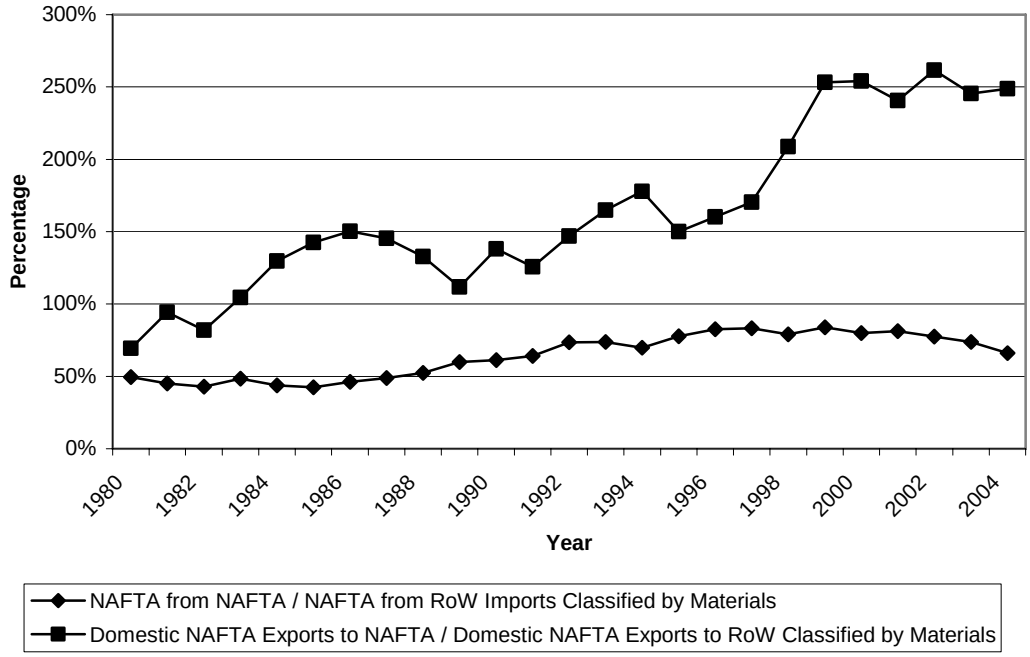
Source: UN Comtrade

Chart 2A: Manufactures Miscellaneous Manufactures NAFTA Imports and Exports / RoW Ratios



Source: UN Comtrade

Chart 3A: Manufactures Classified by Materials NAFTA Exports and Imports / RoW Ratios



Source: UN Comtrade

DISCUSSION

Steve Kamin
Federal Reserve Board[1]

Sven's paper represents an interesting and informative discussion of some of the issues associated with the creation of a currency union involving the United States, Canada, and Mexico. (For convenience, I will be referring to this arrangement as NAMU, or North American Monetary Union.) This union could be a formal arrangement such as in the euro area, or it could be an informal arrangement in which Canada and Mexico unilaterally dollarize. The paper acknowledges that there is little political momentum for NAMU, in any of its variants, in the United States, Canada, or Mexico at present. Nonetheless, Sven's paper brings out some interesting issues associated with three such diverse economies accepting a common currency and monetary policy.

Sven's paper does not argue forcefully either for or against NAMU. Instead, it reviews a subset of the arguments that have been made regarding monetary union. It then develops one argument in detail–that the evolution of production-sharing arrangements has increased integration and made NAMU more advantageous. In the end, it cautiously asserts that the three countries meet some of the basic conditions for monetary union, and that economic obstacles to such union are diminishing.

In my remarks, I would like to first address the most articulated argument in Sven's paper, that regarding production sharing arrangements. I would then like to touch on some additional considerations: the behavior of Canadian and Mexican exchange rates; prospective economic performance under NAMU; and the gains from NAMU.

Turning first to production-sharing, Sven appropriately highlights the importance of two-way trade in components in integrating the North American economies. He argues that one consequence

[1] I would like to thank Christopher Gust and Martin Bodenstein for their work on the modeling simulations described in this paper, and Heidi Fischer and Philip Rescober for able research assistance. The views expressed are my own and not necessarily those of the Board of Governors of the Federal Reserve System or its staff.

of production sharing is that it makes trade flows less responsive to exchange rates, so that giving up exchange rate flexibility for NAMU becomes less costly. I do not find this point to be especially compelling. Consider an example in which the U.S. initially produces its own automobiles (stage 1), and then starts exporting components to Mexico and importing assembled autos (stage 2). I agree that trade in components and assembled products probably is less sensitive to exchange rates than trade in final goods. However, in stage 2, the trade in components and assembled autos exists side-by-side with trade in other, final goods that already existed before the advent of production-sharing, and which has nothing to do with production sharing. The trade that has nothing to do with production-sharing is still as sensitive to exchange rates as it was before. Therefore, increased production sharing may gross up the amount of imports and exports, and the sensitivity of these gross trade flows with respect to the exchange rate may be diminished. However, it is not clear that the sensitivity of the trade balance or of economic activity in the two economies will be diminished, relative to the case in which no production sharing exists.

I have much more sympathy with Sven's related argument: that a consequence of production-sharing is that shocks to any one economy are more likely to affect the other economies. This causes business cycles to become more symmetric, thus lowering the costs of giving up exchange-rate flexibility and monetary independence.

However, Sven does not make the case that in integrating business cycles in North America, production-sharing offsets other factors that have been pointed to as creating business-cycle asymmetries–for example, the greater importance of commodities to Canada and Mexico compared with the U.S. economy. Therefore, it remains unclear whether or not, on balance, such asymmetries pose a substantial cost to NAMU.

As a related point, Bank of Canada economists have been emphatic that changes in the U.S./Canadian exchange rate have importantly been driven by asymmetric shocks hitting the two economies, particularly relating to commodity prices–therefore, fixing the exchange rate would deprive Canada of an important adjustment mechanism.[2] In connection with this issue, it is

[2] See John Murray (2000), "Why Canada Needs a Flexible Exchange Rate," *North American Journal of Economics and Finance*, vol. 11, pp. 41-60.

interesting to note that the U.S./Canada exchange rate and the U.S./Mexico exchange rate have behaved quite differently in recent years. As shown in Exhibit 1, in recent years, a weakening of the U.S. dollar against the euro–shown as a rise in the number of dollars it takes to buy a euro–has been associated with a strengthening of the Canadian dollar against the U.S. dollar. This suggests, unsurprisingly, that shocks which lower the U.S. dollar against major currencies such as the euro lower the U.S. dollar against the Canadian dollar as well. However, when the dollar has fallen or risen against the euro (Exhibit 2), the Mexican peso has moved in the same direction against the dollar, and quite systematically. That is, when the dollar rises against the euro, the peso rises against the dollar and thus even more against the euro.

It is not clear what accounts for the strange behavior of the peso. One possibility is that the Mexican economy is highly dependent on the U.S. economy. Therefore, positive shocks to the U.S. economy that boost the dollar, for example, portend even greater increases in Mexican growth, so the peso rises against the dollar. These considerations, if valid, underscore the importance of exchange rates in stabilizing the economies of North American against asymmetric shocks.

This discussion is admittedly quite abstract. What would be the practical implications of Canada, Mexico, and the United States adopting a single currency? Two of my colleagues at the Federal Reserve, Chris Gust and Martin Bodenstein, have used the Federal Reserve's general equilibrium macro-model, FRB/Global, to simulate what might have occurred if Canada and Mexico had informally dollarized starting in 2001. In this experiment, the Canadian and Mexican exchange rates are frozen against the U.S. dollar, and both countries are assumed to now face U.S. interest rates. The U.S. fed funds rates is set by a Taylor rule that responds to U.S. inflation and U.S. output gaps. The consequences, shown in Exhibits 3 - 8, are as follows:

For Canada, instead of the large appreciation of the Canadian dollar against the U.S. dollar that took place in reality, as indicated by the solid line labeled "actual" in Exhibit 3, the exchange rate implicitly would have stayed at its initial weaker level, indicated by the dashed line labeled NAMU. Moreover, the level of interest rates would have declined to U.S. levels. These two developments would have been destabilizing: GDP growth would have been boosted above its already robust performance in recent years, and inflation would have soared. For Mexico, an even greater decline in interest rates (bottom of Exhibit 5, top of Exhibit 6) would have boosted the economy

initially, but that would have been offset later because under NAMU, the depreciation of the peso against the dollar that actually took place would not have occurred. Therefore, GDP growth, while higher than baseline in the first two years of NAMU, would have fallen well below baseline thereafter. Inflation would have been little affected over the period.

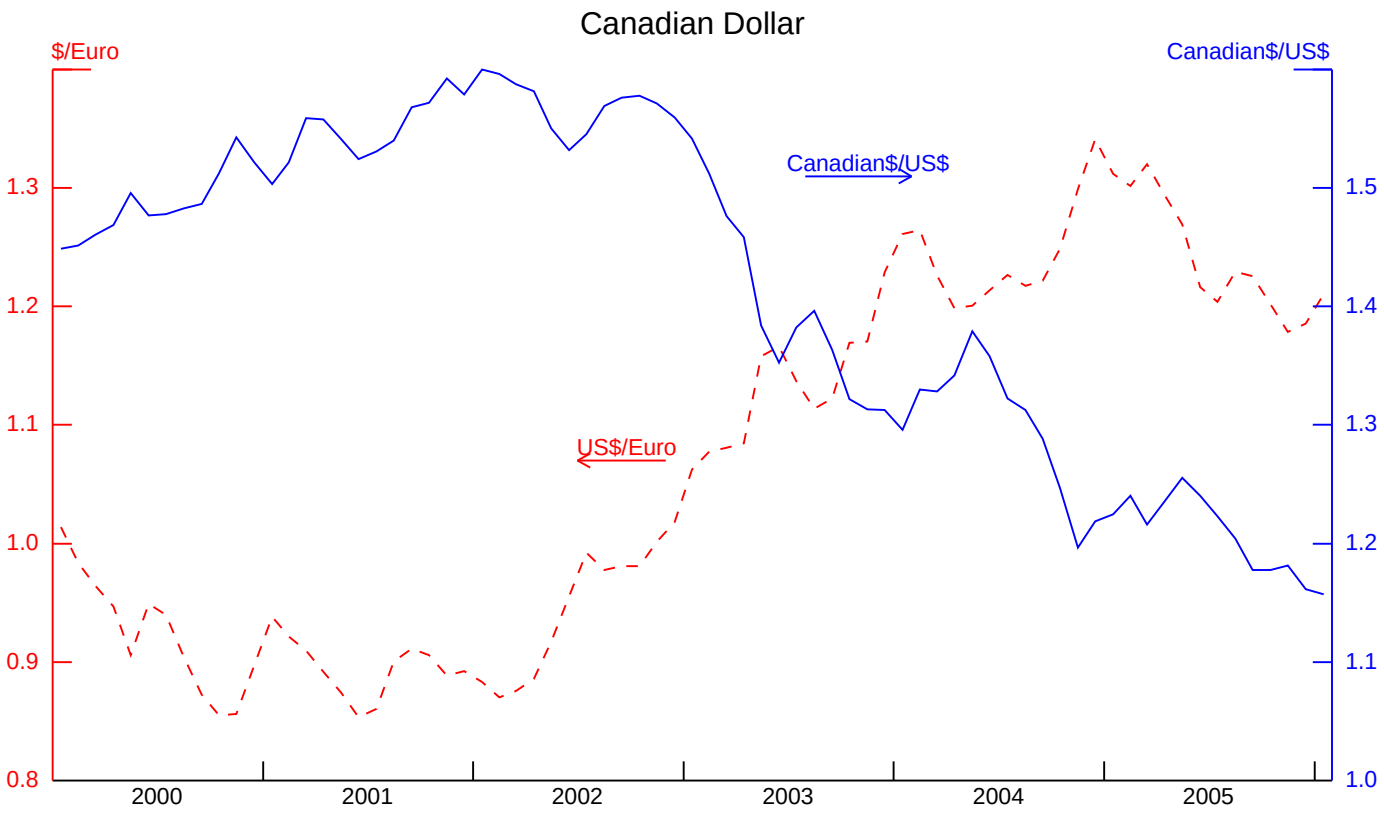
Finally, as we might expect, given the relative sizes of the economies involved, the performance of the U.S. economy would have been little affected by the informal currency union, as measured either by GDP growth or the path of short-term interest rates (Exhibit 8).

So the message of the model is that NAMU could be destabilizing because it shuts down important adjustment mechanisms in the economy. But even if NAMU were less destabilizing, one question Sven's paper does not fully address is why Canada and Mexico would desire to enter into such an arrangement. Aside from lowering transactions costs, whose benefits are difficult to measure, a common reason cited for seeking currency union is to reduce inflation, interest rates, and macro volatility. However, as shown in top panel of Exhibit 9, Canada's recent performance, whether measured by inflation rates, nominal interest rates, or real interest rates, has been quite comparable to that of the U.S. economy.

For Mexico, although spreads on dollar debt have fallen to low margins, inflation and particularly nominal and real peso interest rates remain above U.S. rates. Nevertheless, the Mexican economy has shown clear progress toward disinflation in recent years (bottom of Exhibit 9, top of Exhibit 10). Moreover, in the aftermath of the 1995 Tequila crisis, Mexico's experiment with floating exchange rates has gone as smoothly as anyone could have reasonably hoped.

In conclusion, Sven's paper suggests, albeit without stating it explicitly, that the United States, Canada, and Mexico are on a course that will logically take them to monetary union. I find that argument less convincing. First, at least for now, it is unclear that the costs of moving to NAMU would be all that small. Second, it is unclear that the gains from NAMU would be all that great. In particular, both Canada and Mexico are enjoying relatively stable macroeconomic performance, and this diminishes the need for them to anchor to a strong currency such as the U.S. dollar. With macro management in both countries not broken, it likely would not be a good idea to try to fix it.

Exhibit 1


Canadian Dollar
$/Euro
Canadian$/US$
Canadian$/US$
US$/Euro
1.3
1.2
1.1
1.0
0.9
0.8
1.5
1.4
1.3
1.2
1.1
1.0
2000
2001
2002
2003
2004
2005

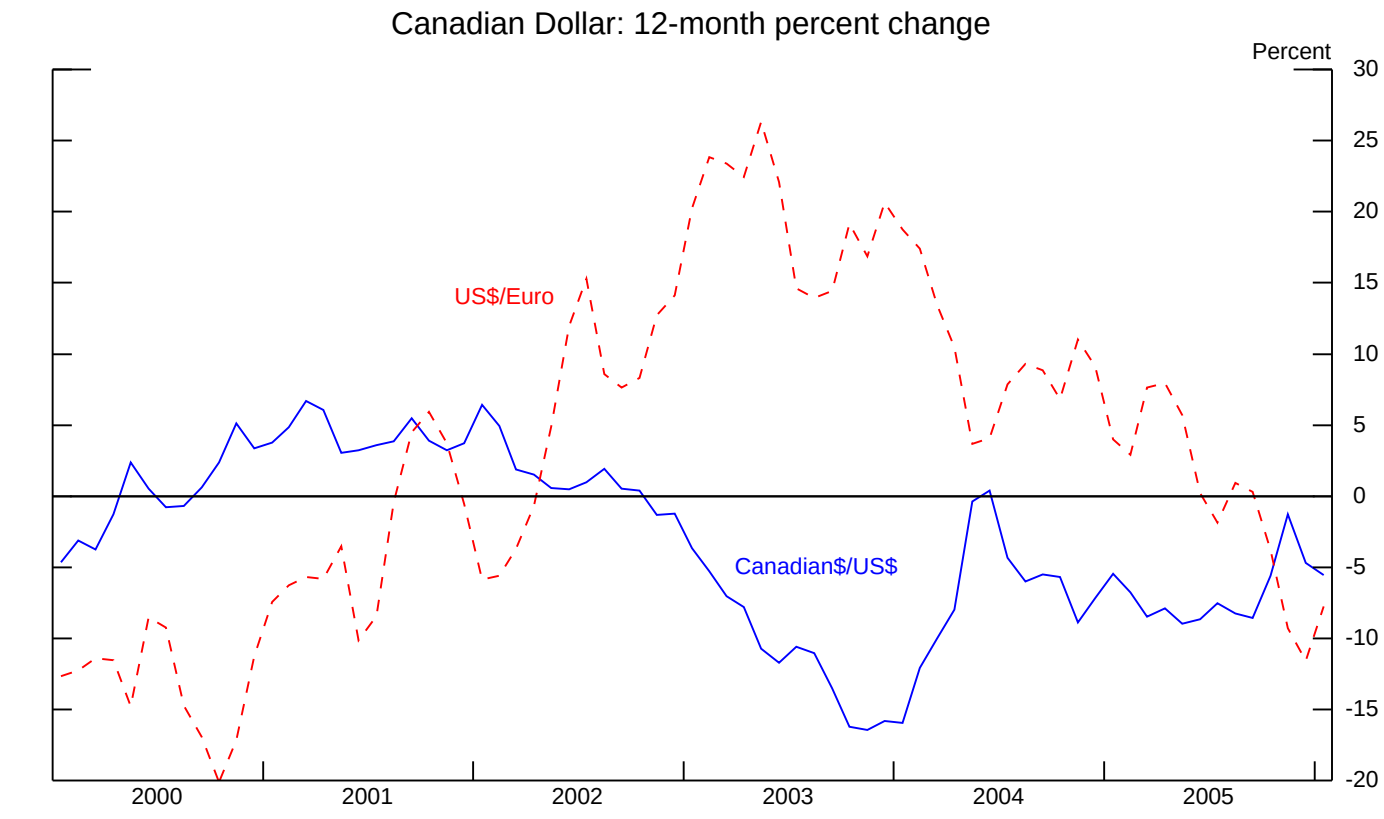
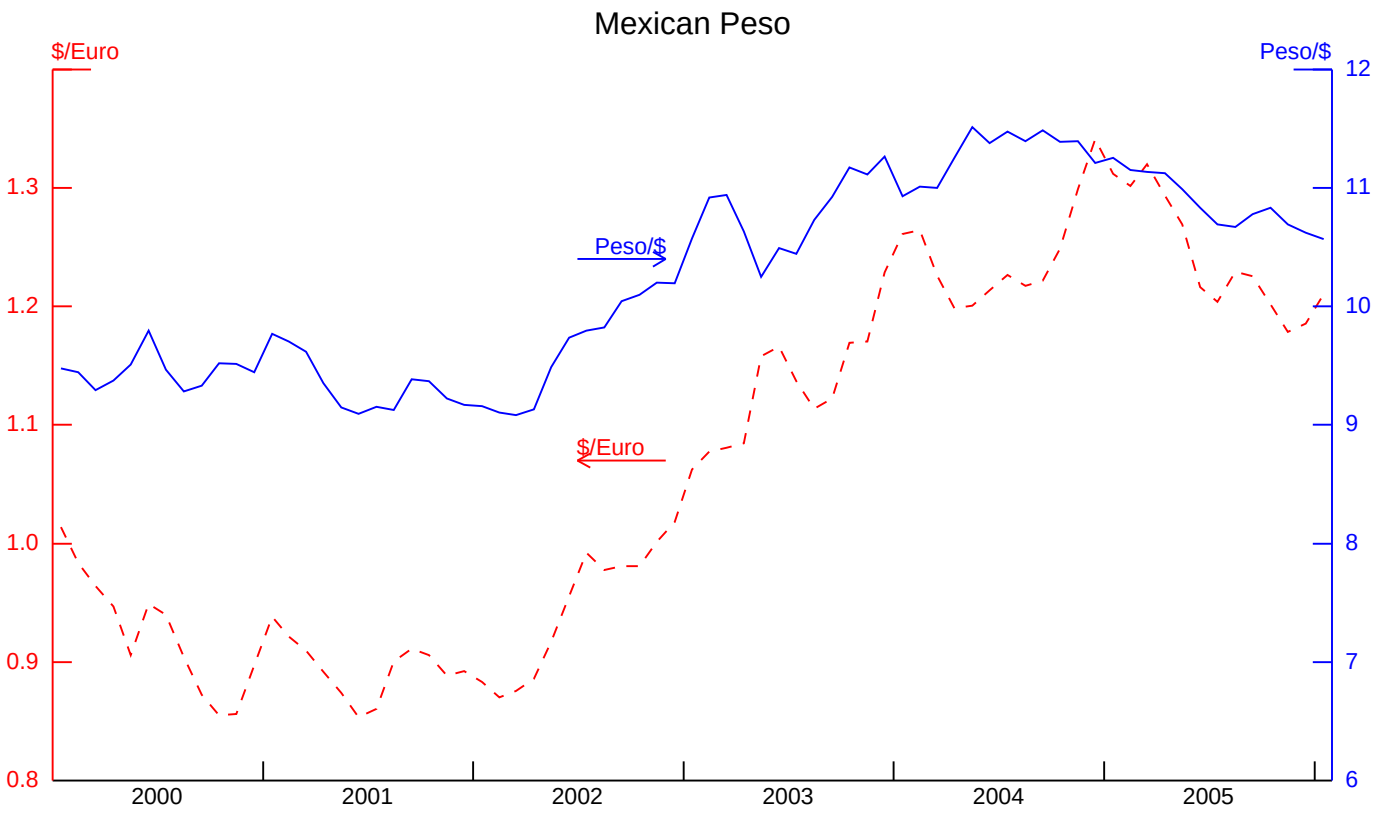

Canadian Dollar: 12-month percent change
Percent
US$/Euro
Canadian$/US$
30
25
20
15
10
5
0
-5
-10
-15
-20
2000
2001
2002
2003
2004
2005

Exhibit 2


Mexican Peso
$/Euro
Peso/$
1.3
1.2
1.1
1.0
0.9
0.8
12
11
10
9
8
7
6
Peso/$
$/Euro
2000
2001
2002
2003
2004
2005

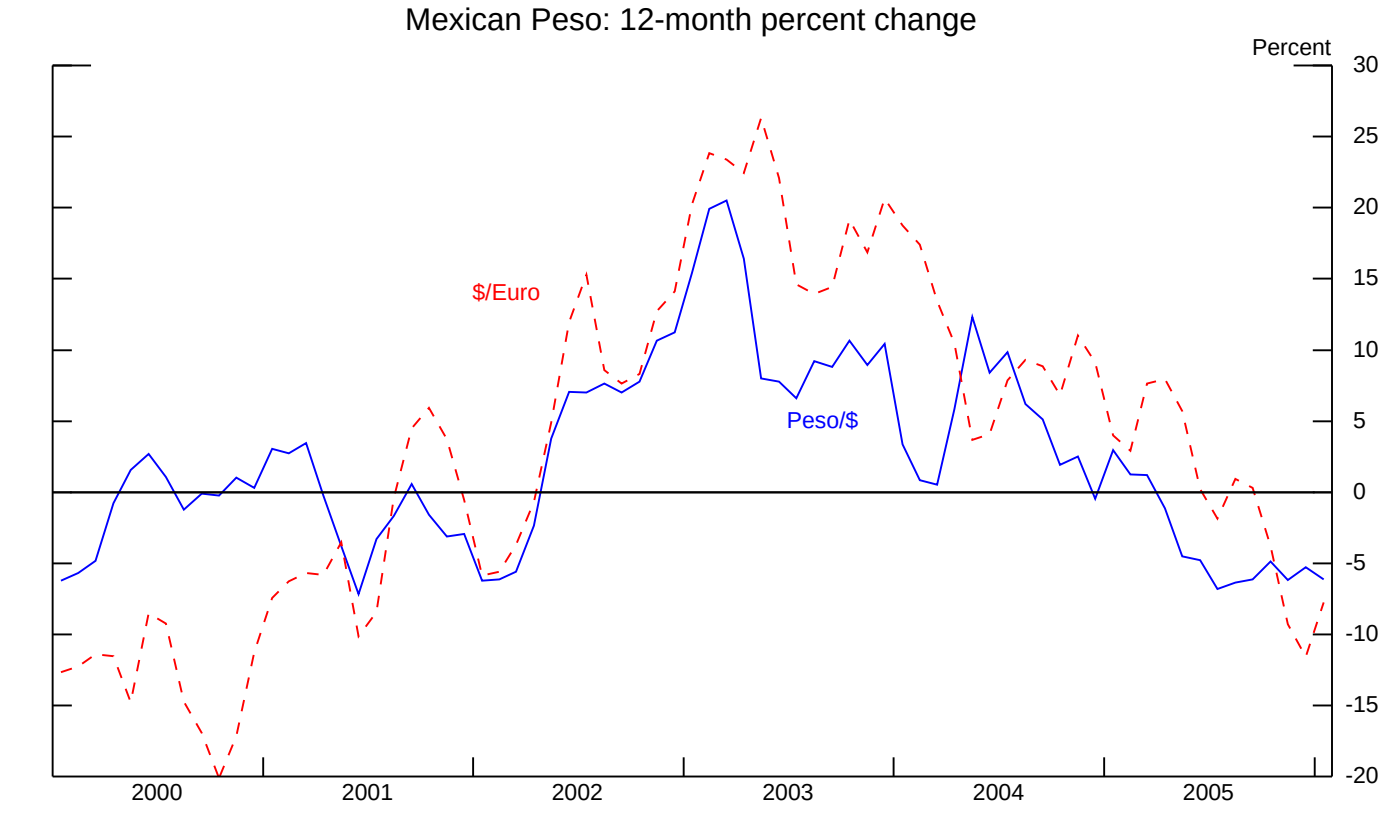
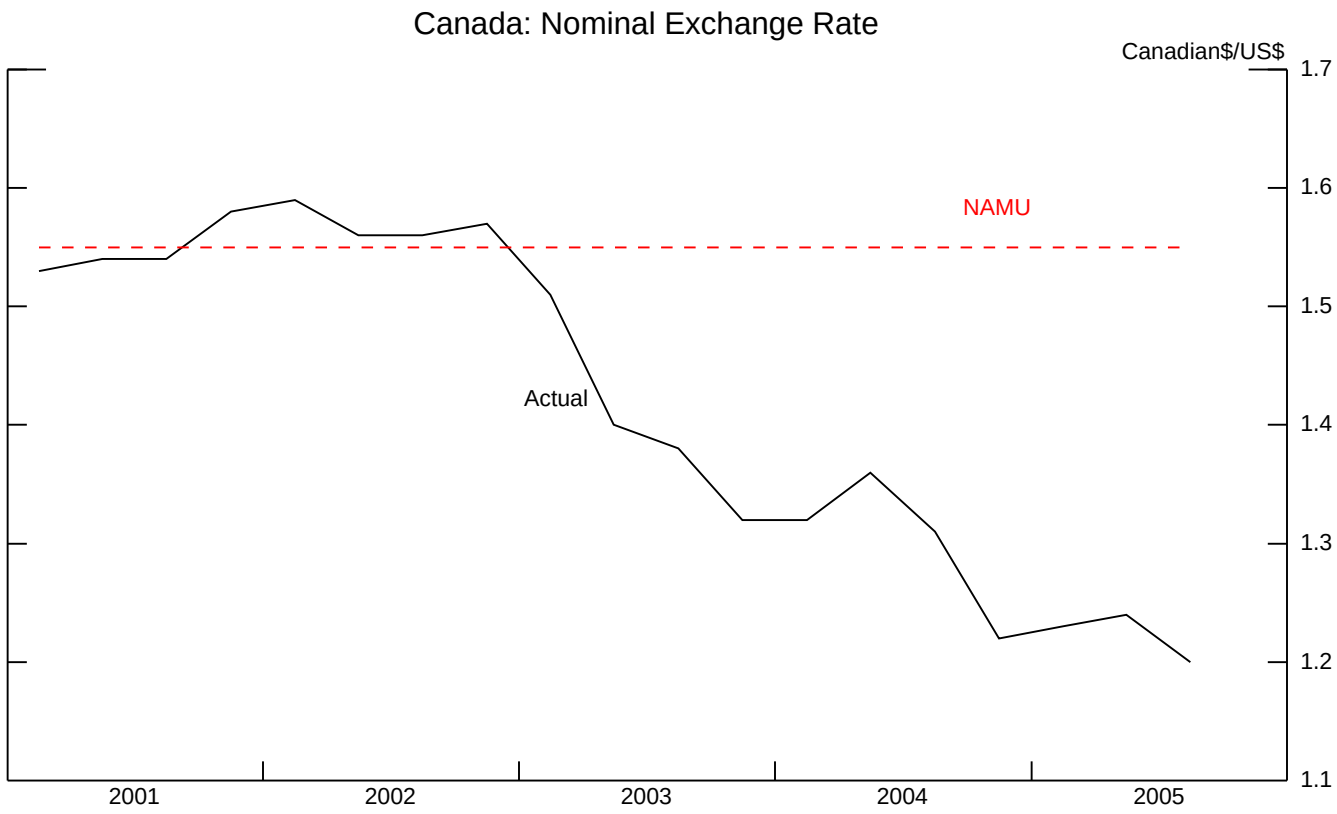

Mexican Peso: 12-month percent change
Percent
30
25
20
15
10
5
0
-5
-10
-15
-20
$/Euro
Peso/$
2000
2001
2002
2003
2004
2005

Exhibit 3


Canada: Nominal Exchange Rate
Canadian$/US$
1.7
1.6
1.5
1.4
1.3
1.2
1.1
NAMU
Actual
2001
2002
2003
2004
2005

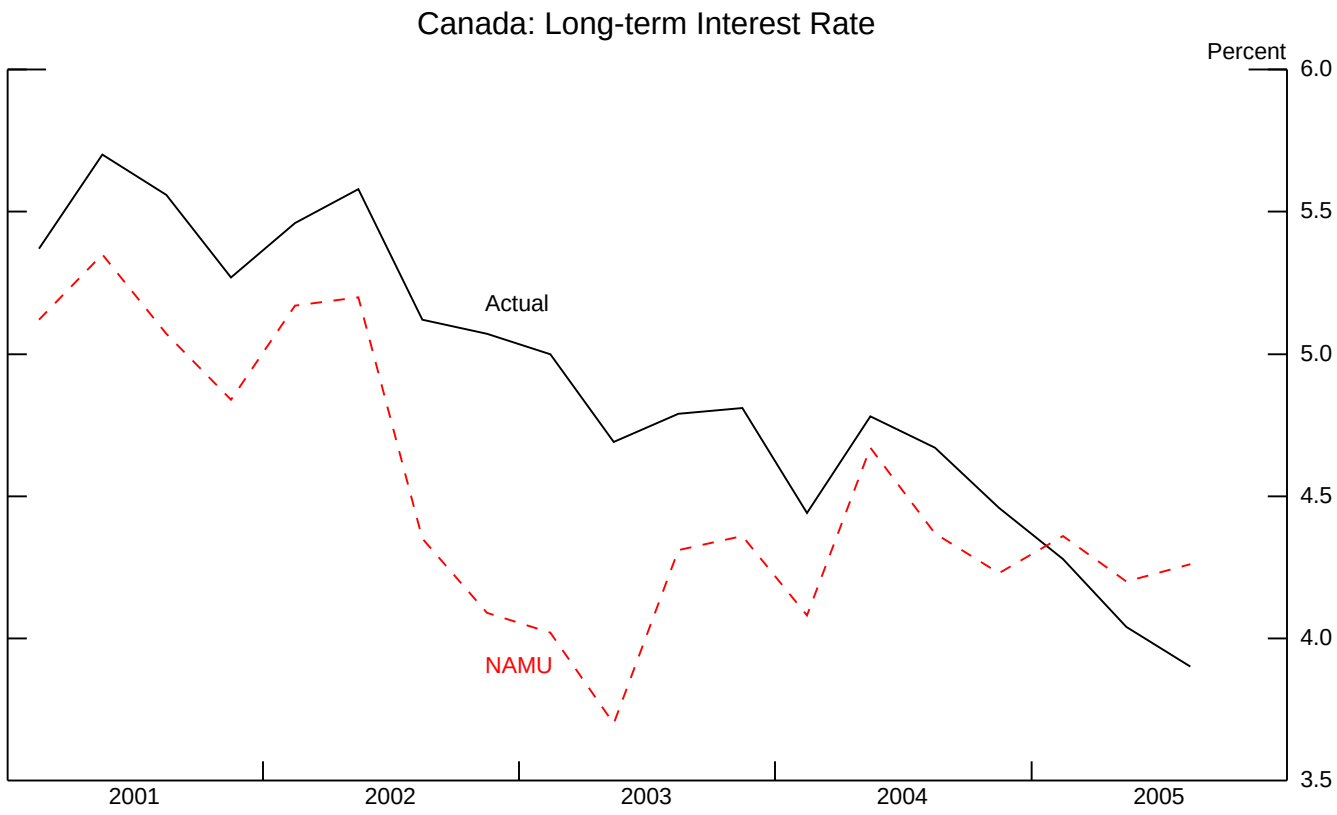
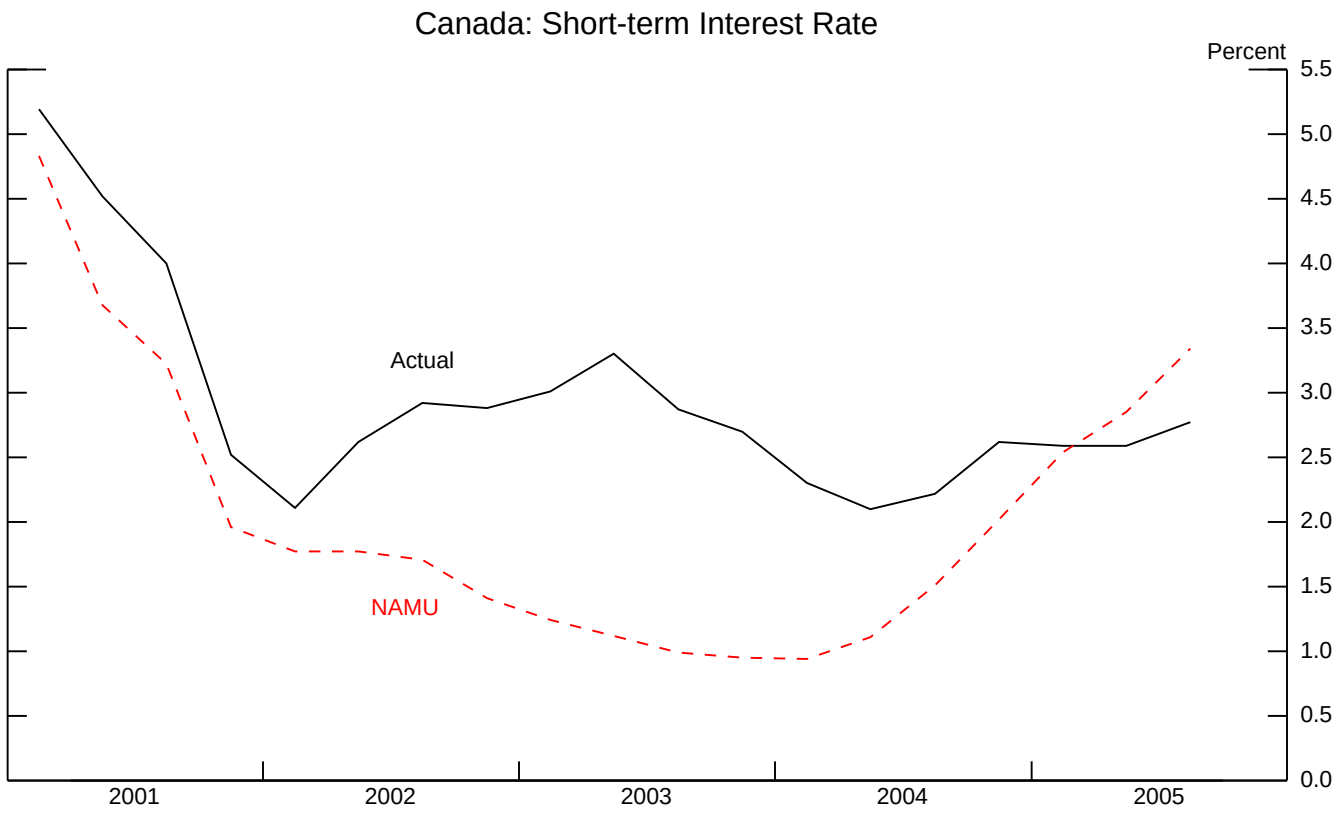

Canada: Long-term Interest Rate
Percent
6.0
5.5
5.0
4.5
4.0
3.5
Actual
NAMU
2001
2002
2003
2004
2005

Exhibit 4


Canada: Short-term Interest Rate
Percent
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Actual
NAMU
2001
2002
2003
2004
2005

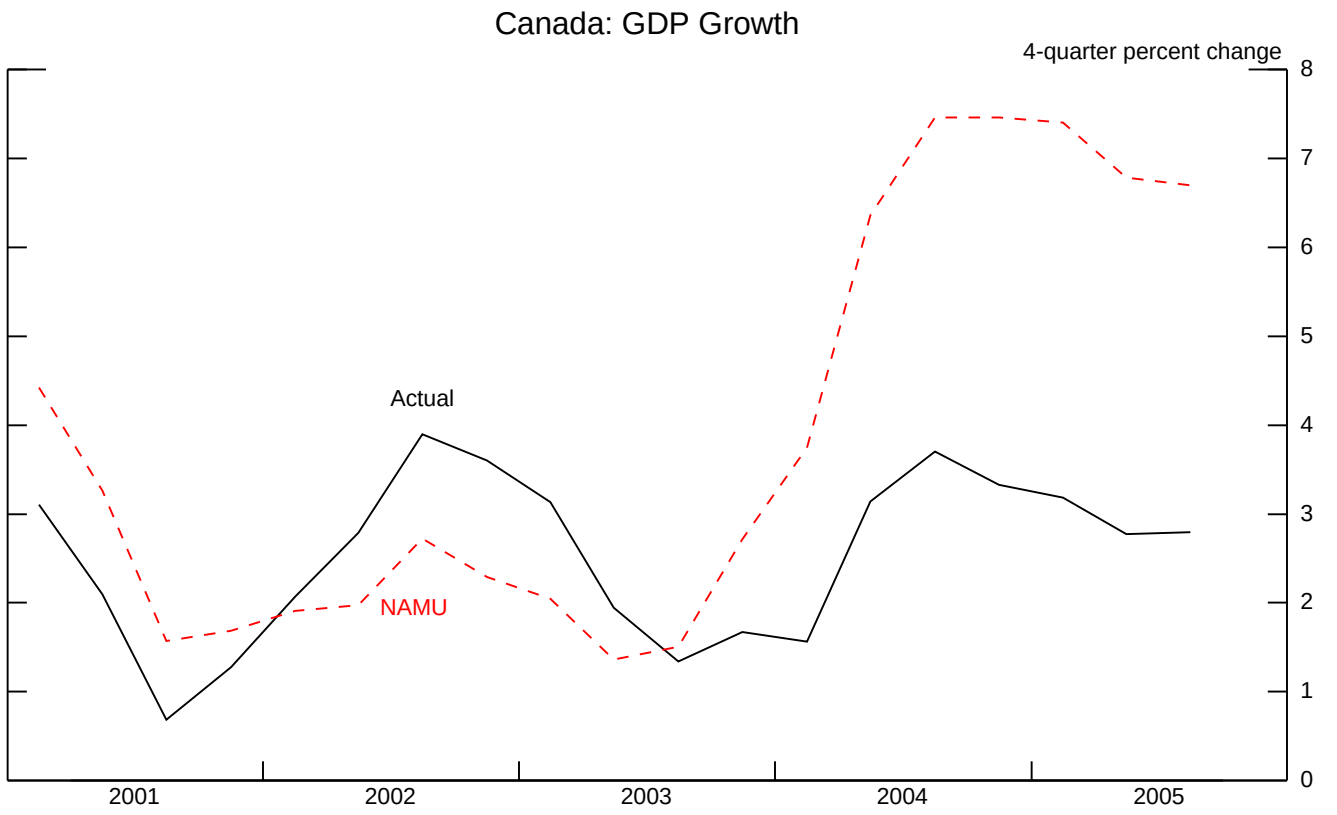
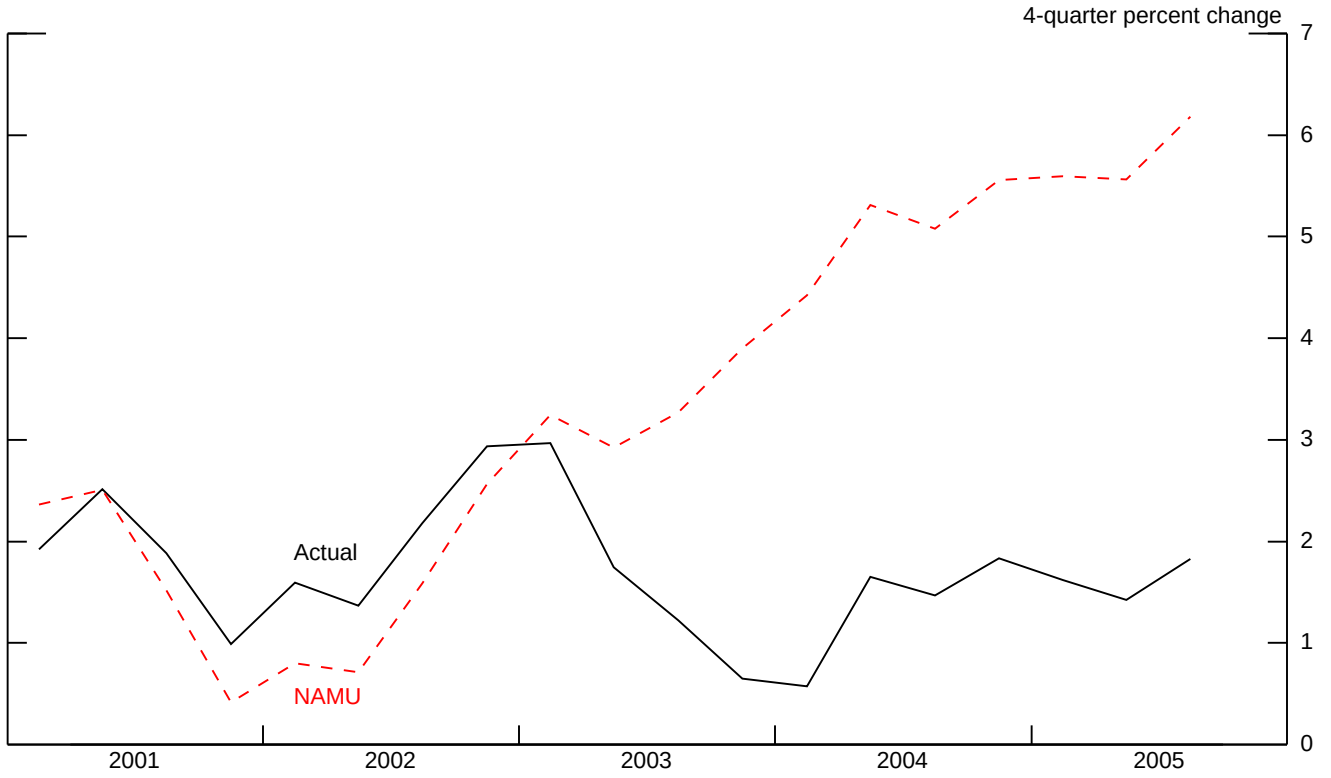

Canada: GDP Growth
4-quarter percent change
8
7
6
5
4
3
2
1
0
Actual
NAMU
2001
2002
2003
2004
2005

Exhibit 5

Canada: CPI Price Inflation



Mexico: Long-term Interest Rate

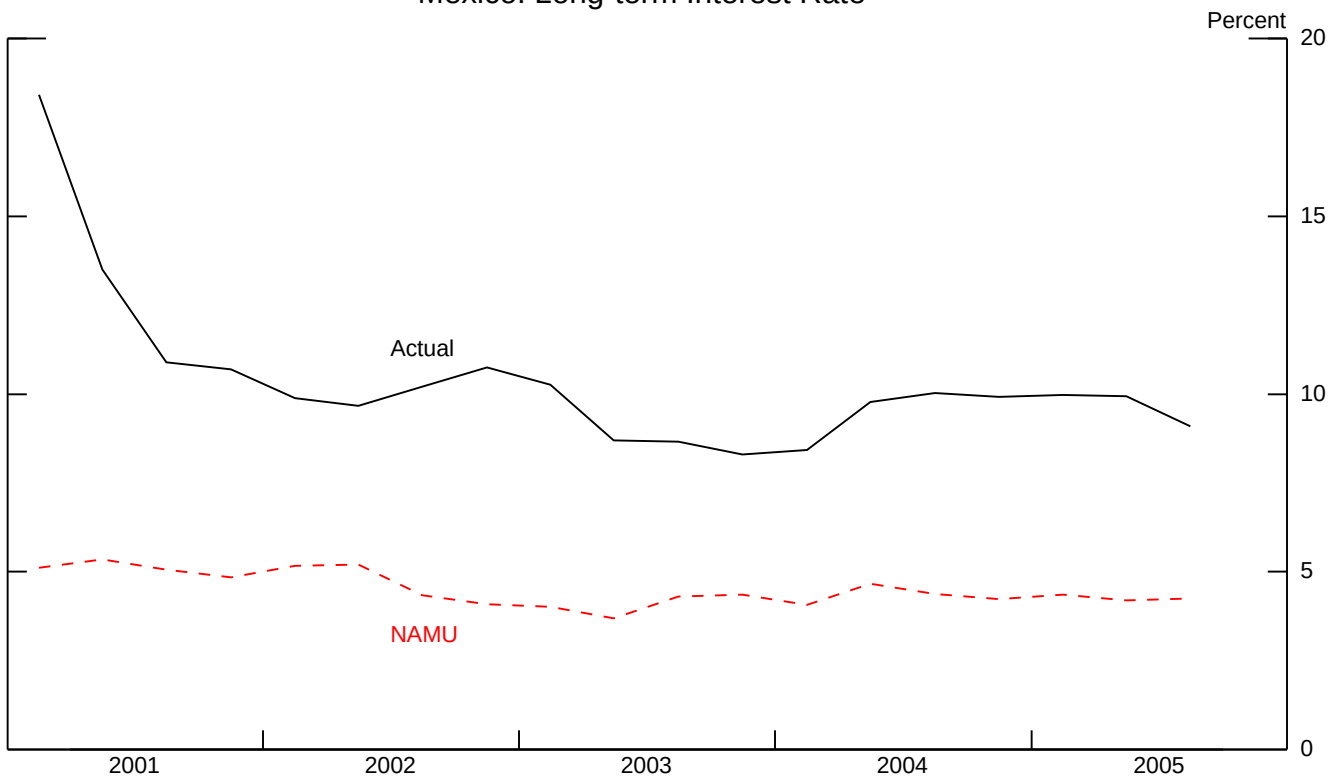
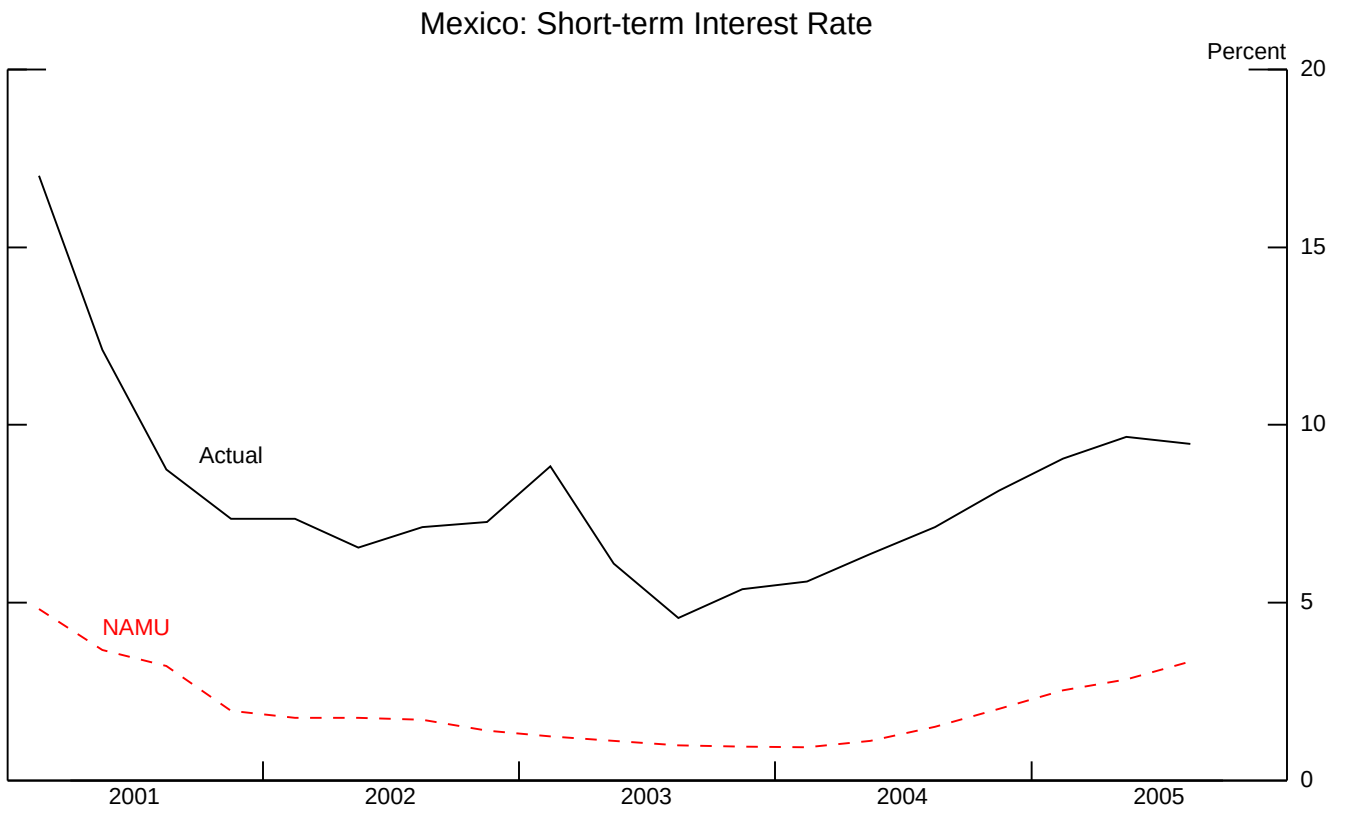


Exhibit 6


Mexico: Short-term Interest Rate
Percent
20
15
10
5
0
Actual
NAMU
2001
2002
2003
2004
2005

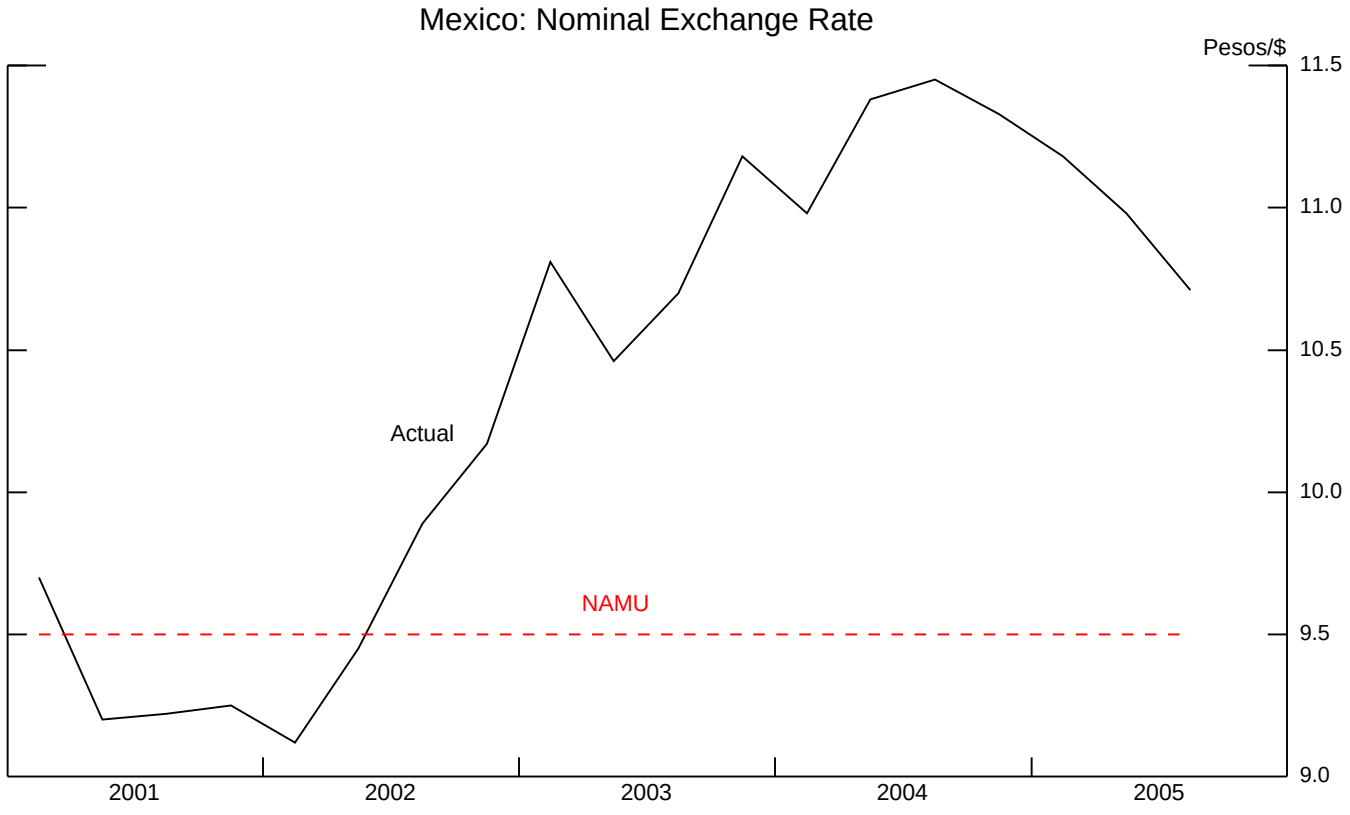
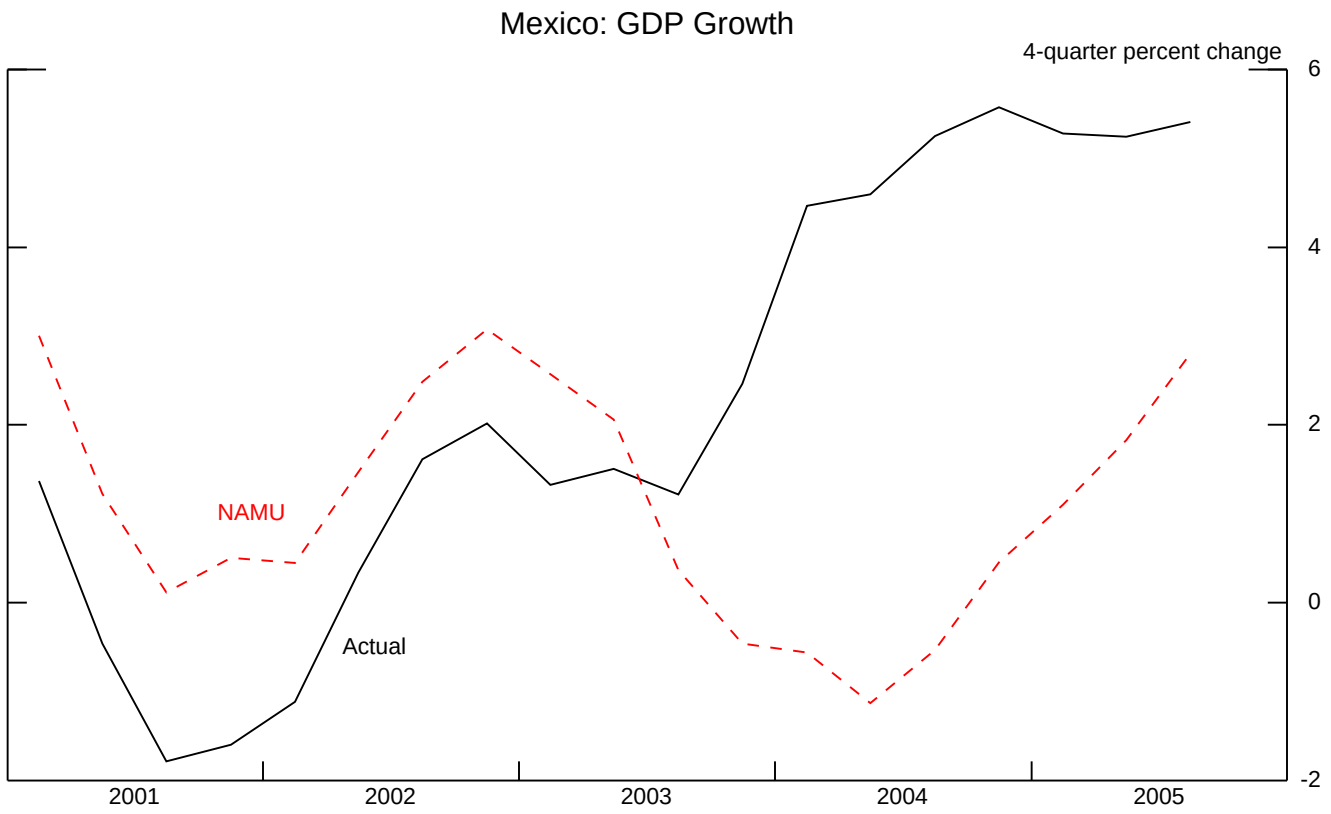

Mexico: Nominal Exchange Rate
Pesos/$
11.5
11.0
10.5
10.0
9.5
9.0
Actual
NAMU
2001
2002
2003
2004
2005

Exhibit 7


Mexico: GDP Growth
4-quarter percent change
6
4
2
0
-2
NAMU
Actual
2001
2002
2003
2004
2005

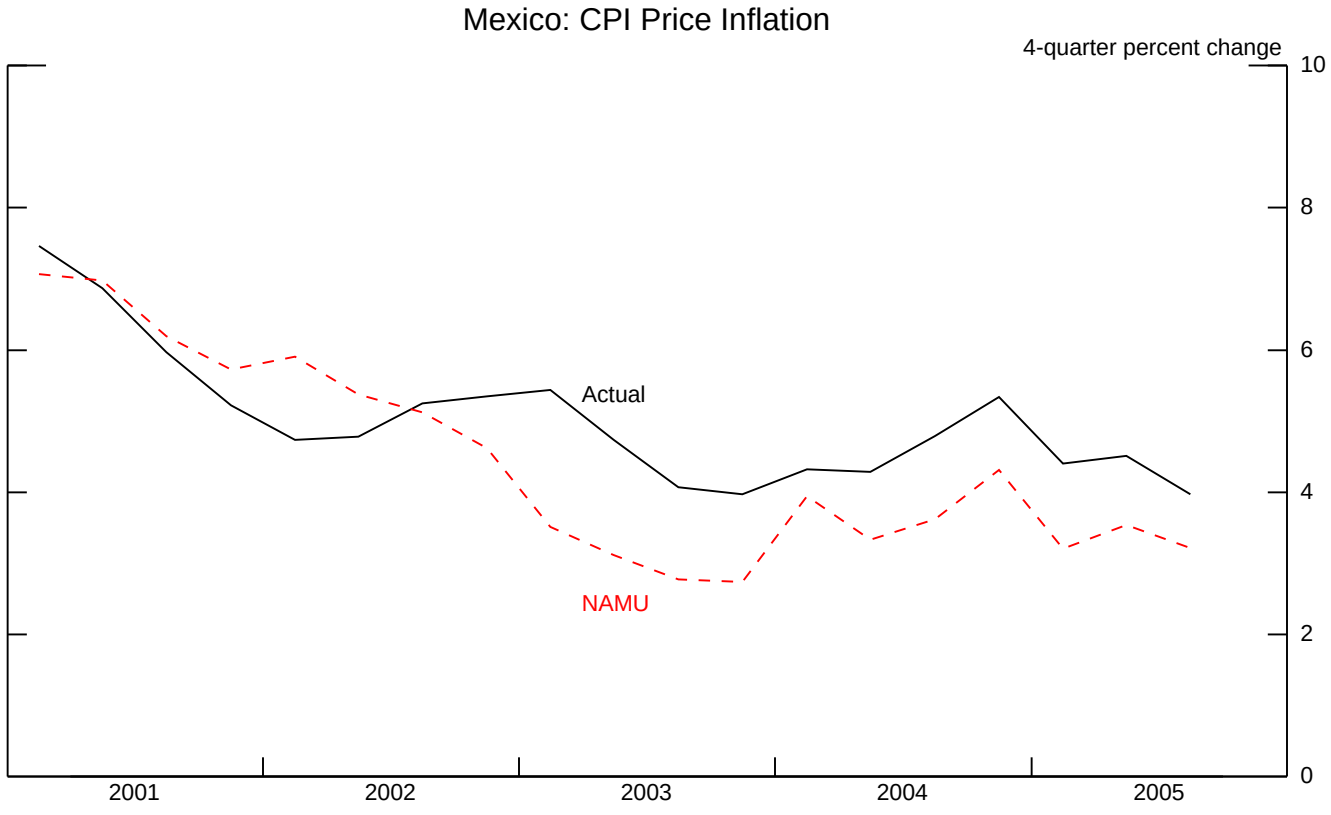
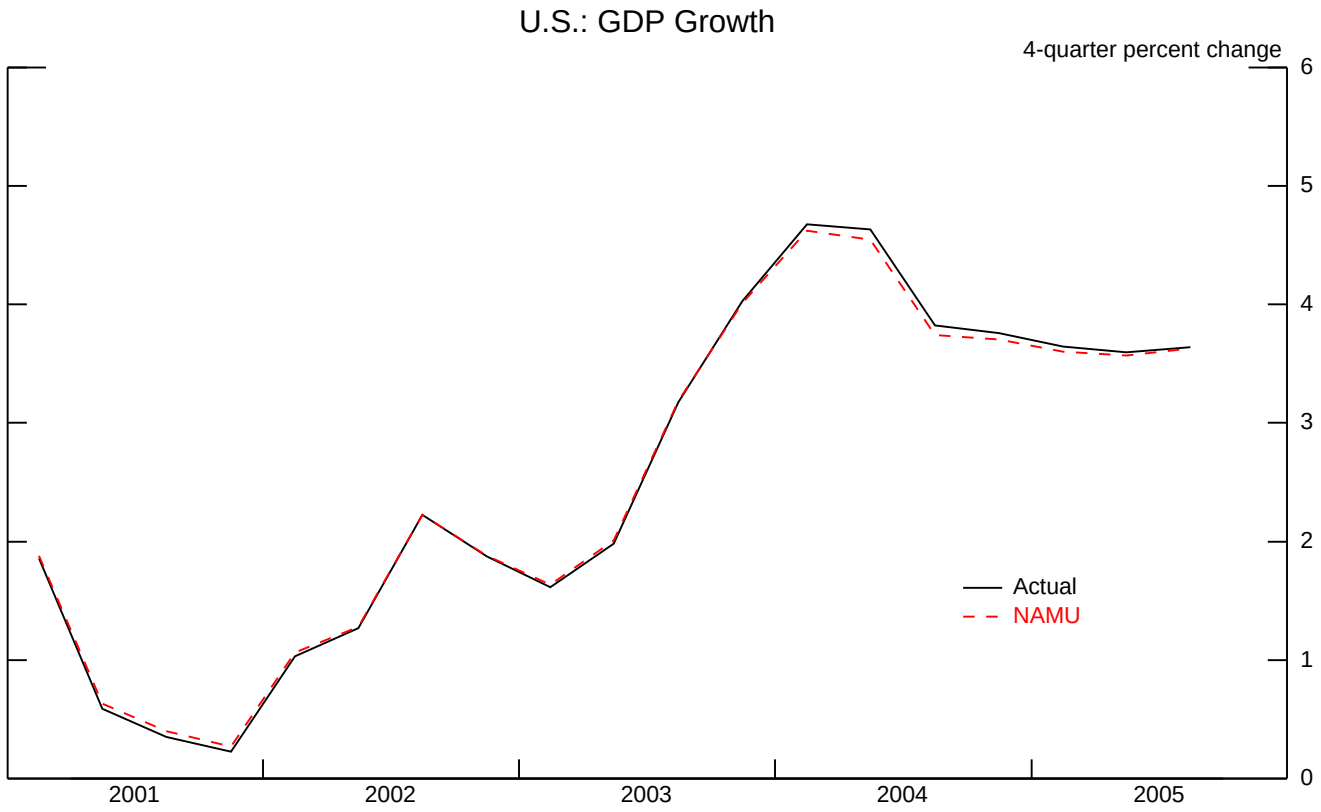

Mexico: CPI Price Inflation
4-quarter percent change
10
8
6
4
2
0
Actual
NAMU
2001
2002
2003
2004
2005

Exhibit 8


U.S.: GDP Growth
4-quarter percent change
6
5
4
3
2
1
0
Actual
NAMU
2001
2002
2003
2004
2005

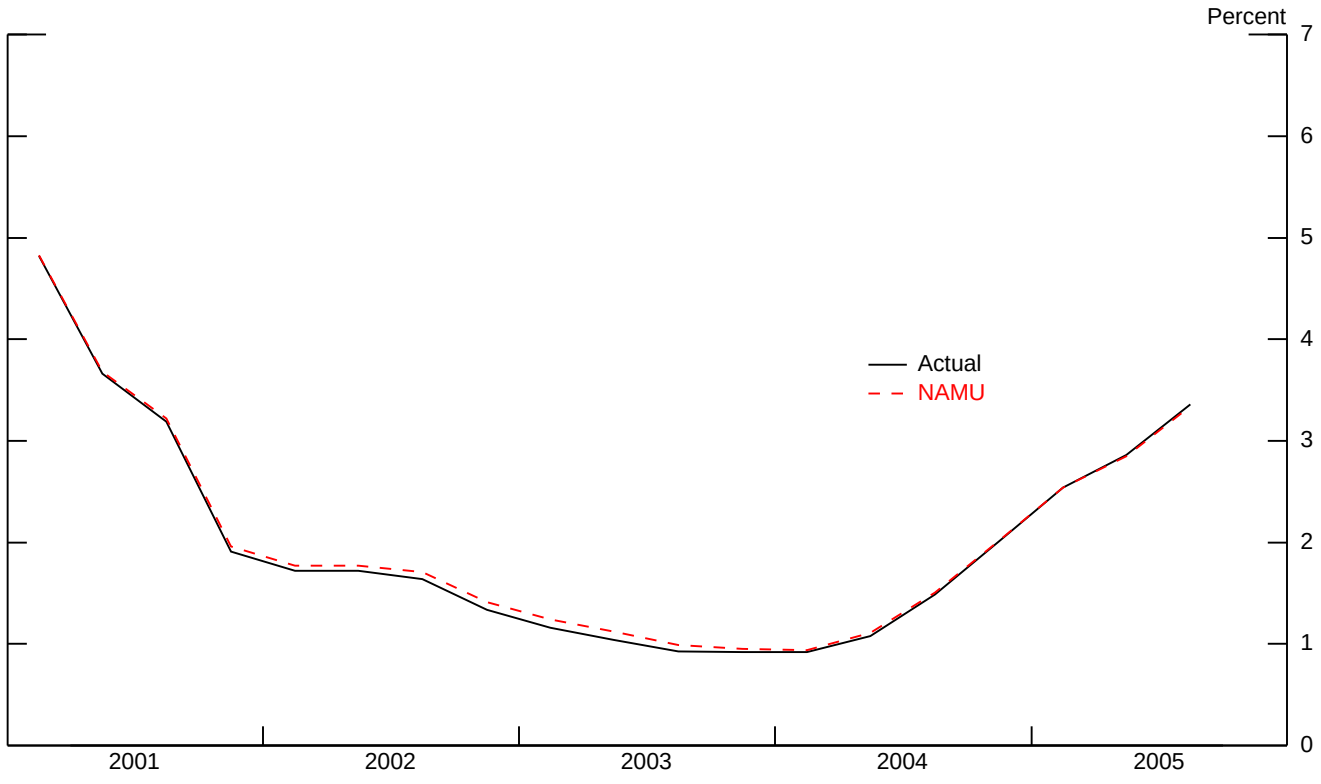

U.S.: Short-term Interest Rate
Percent
7
6
5
4
3
2
1
0
Actual
NAMU
2001
2002
2003
2004
2005

Exhibit 9

Indicators of Nominal Convergence

	U.S.	Canada	Mexico
Core CPI Inflation (2005)	2.2%	1.4%	3.1%
Nominal Long-term Interest Rate (Jan. 2006)	4.4%	4.0%	8.2%
Real Long-term Interest Rate (Jan. 2006)	2.2%	2.6%	5.1%
Dollar Sovereign (EMBI+) Spread (Jan. 2006)	0	--	120bp

Inflation Rates

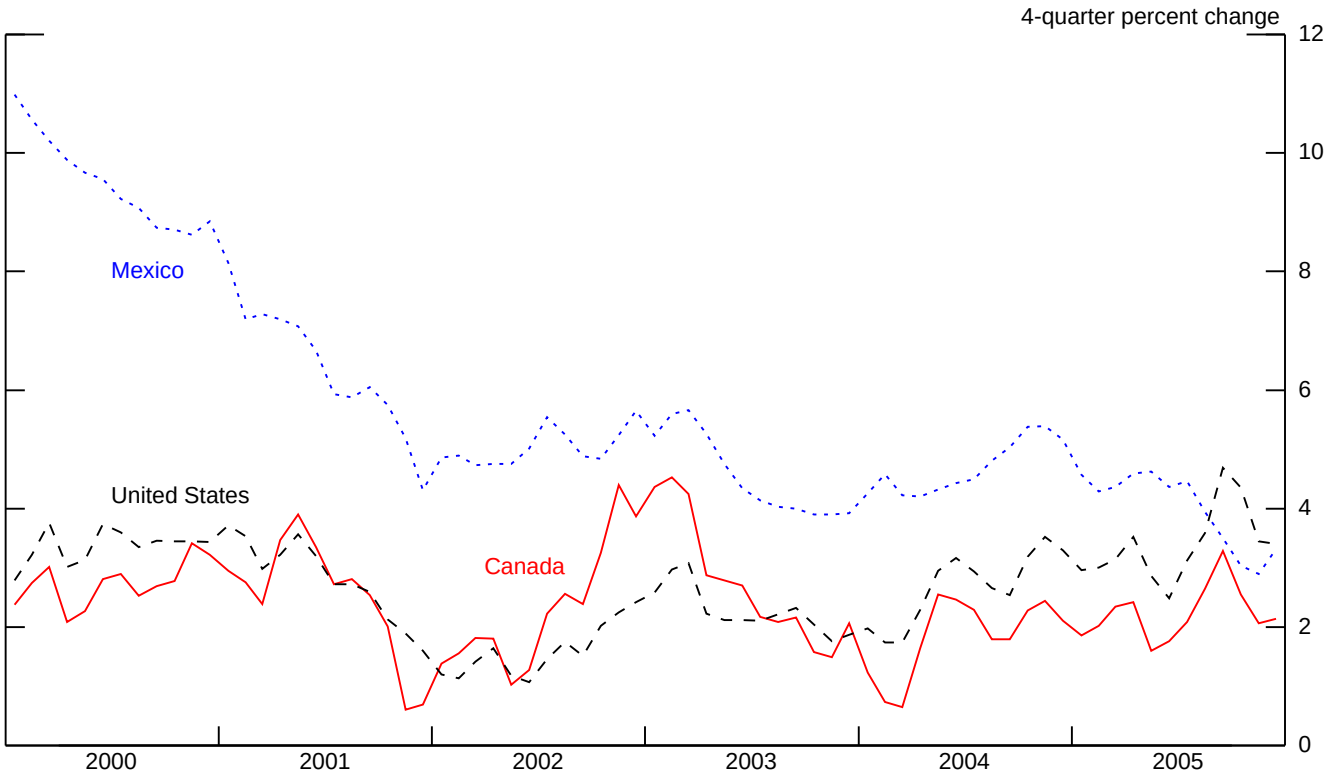
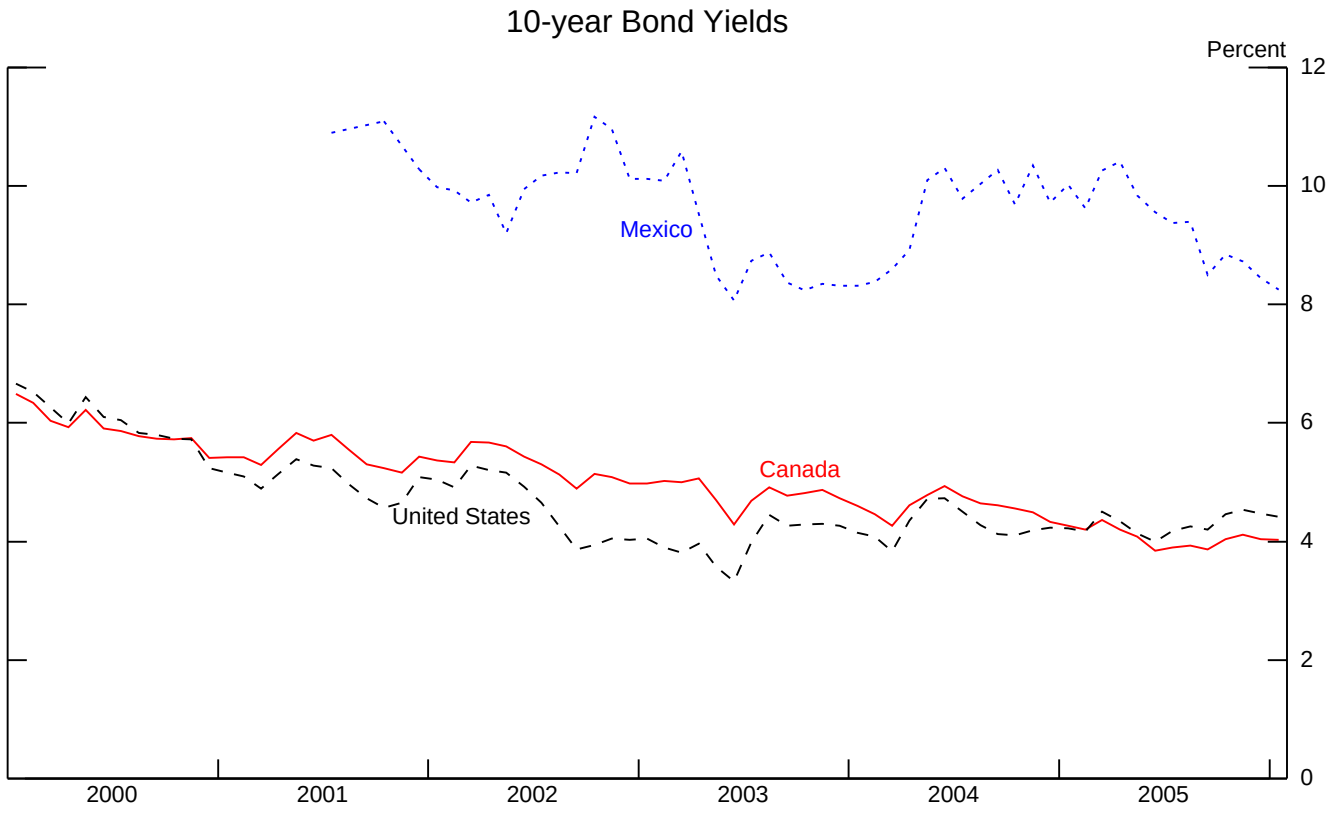


Exhibit 10


10-year Bond Yields
Percent
12
10
8
6
4
2
0
Mexico
Canada
United States
2000
2001
2002
2003
2004
2005

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Sven Arndt has written a very comprehensive piece dealing with the pros and cons of currency union type arrangements in North American that highlights, among other issues covered, the differential forces that are at work in North America relative to, say, the recent European experience. Rather than trying to analyze the issues relying solely on the well-known optimum currency area criteria, Arndt instead points out that the forces of economic integration that are at work in North America are just as likely to be market driven as they are driven by government led policies that seek to deepen the ties between the major trading partners. By far, these market driven forces historically have originated in the manufacturing sector, although the Free Trade Agreement between Canada and the US has also greatly enhanced labor mobility between Canada and the US. The deepening of integration at the level of the service industry is also being driven by market imperatives. While there is no sign of movement to a common currency, or even the US currency, Arndt effectively suggests that this additional step for Canada, the US and Mexico, is the 'final frontier' of economic integration.

Arndt's attempt to contrast the North American versus European attitudes toward common currency arrangement over the past few decades, are mostly right on the mark. However, it is useful to remind students of economic integration on both sides of the Atlantic that, in Europe at least, monetary cooperation was viewed as the most politically feasible way of encouraging both political and economic integration. In contrast, there is no comparable vision or even desire for political or monetary integration. Instead, markets and, later, politicians have felt it far more desirable to facilitate economic integration by permitting the free flow of goods and services across borders.

Since the paper covers a large number of issues I will restrict my comments to five points raised by the paper, as a means either to amplify some of the issues discussed by Arndt, or to cast some doubts on the strength of other arguments. They are: the importance of an independent monetary policy, the current level of satisfaction with ongoing trade relations in North America, whether the European experience with Maastricht and the Stability and Growth Pact offer any lessons, the current state of pass-

through effects and their implications for the future potential for currency union, and regional business cycle asymmetries influenced by trade integration. To conserve space, I will focus attention on the Canada-US experience only.

Arndt cites the Bank of Canada's research that purports to support the view that a floating exchange rate insulates the domestic economy against external shocks. As valuable as this research is, it does not necessarily provide convincing evidence about the relative advantage of the flexible regime against a regime that instead pegs the exchange rate, presumably in a gradual fashion as did the Europeans in anticipation of an eventual monetary union. Figure 1 draws on Siklos (2006). It shows the results of counterfactual experiments that attempt to estimate the impact of an exchange rate objective that would force Canada, and two other archetypical floaters, Australia and New Zealand, to eventually peg their exchange rate to their US counterpart. Any exchange rate objective delivers lower economic growth than the current floating regime. In contrast, Siklos (2006) shows that any inflation targeting regime, which must operate under a floating exchange rate, always produces relatively stronger economic growth (not shown). Since the effects are permanent, it is precisely this type of result that reinforces in the minds of North American policymakers, and the more public more generally, the clear benefits of exchange rate flexibility.

It is also sometimes alleged that, in spite of a floating exchange rate, the Bank of Canada follows lock step the policies of the US Federal Reserve. Figure 2 plots key US and Canadian interest rates, together with the exchange rate. There is visually little evidence that the Bank of Canada follows the lead of the US central bank. Hence, this is unlikely to be a convincing vehicle to push for increased monetary integration.

A more serious issue is the performance of existing trading arrangements, most notably NAFTA (North American Free Trade Agreement) that North Americans have heralded as the model for the rest of the world to follow. As Arndt points out, the recent anniversary of NAFTA has allowed critics to raise growing unhappiness with the dispute resolution mechanism that was thought to be able to protect both economies against unfair economic practices and policies. But, in Canadians eyes, it is the US that has flagrantly ignored the dispute resolution panel's decisions, despite being dominated by

Americans. Combined with what are thought to be high compliance costs, Arndt is right to call into question whether the much vaunted market driven North American economic integration model might be due for a reversal. However, even if this possibility exists, there is no evidence that European attempts at removing trade barriers have been any more successful. Indeed, it would have been useful for Arndt to briefly discuss the European experience in this connection.

The centerpiece of the European movement toward monetary union consist, first and foremost, of the Maastricht Treat and, secondly, the Stability and Growth Pact (SGP). How important is such rule making behavior? As shown in Table 1, which updates the same Table presented in Hochreiter and Siklos (2004), good conduct in fiscal and monetary policies need not rely on such agreements. Canada would pass the Maastricht and SGP conditions with flying colors. Instead, loss of reputation, and the force of financial markets, will do just as well. Of course, Canada is a small open economy and this must be factored into the analysis. Nevertheless, rules are not enough. There must be a genuine commitment to agree to policies that foster convergence. The original members of the euro area had this but it is open to question whether future members awaiting entry into the euro area will display the same level of commitment to such rules, especially the SGP.

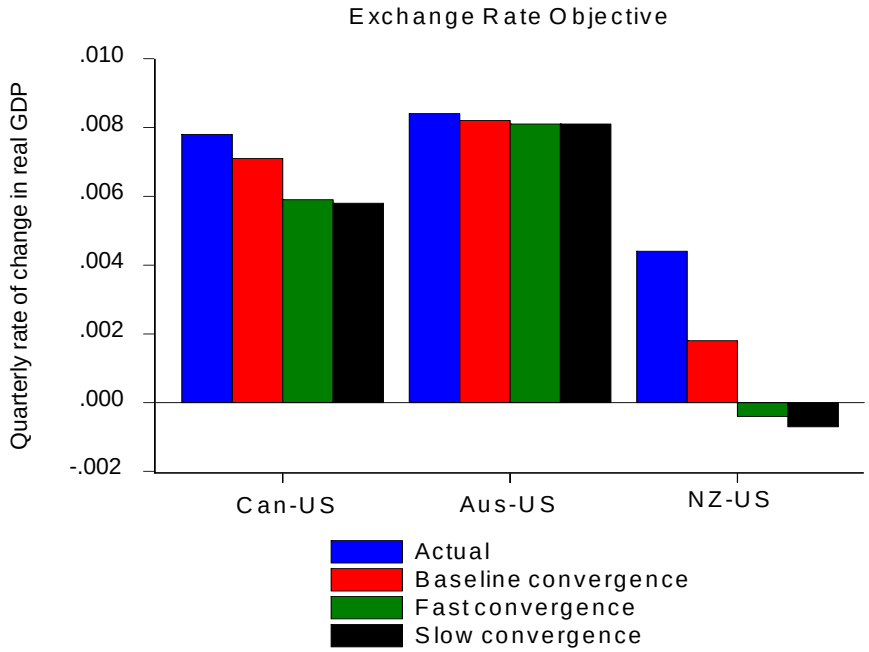
Arndt asks whether the apparent reduction in pass-through effects in Canada, and elsewhere, effectively lowers the costs of monetary integration. While the answer is, possibly, in the affirmative the proximate reason for the reduction in pass-through effects is likely the success of the inflation targeting regime. Moreover, the reduction in pass-through effects has taken place in a relatively benign macroeconomic environment. It is still useful to have the floating exchange rate regime for those types of shocks that will transmit through the Canadian economy.

An intriguing possibility, not fully developed by Arndt, is the impact of the strong degree of integration, especially in the manufacturing sector, on the coherence or lack thereof, in regional business cycles. Because integration tends to be vertical (i.e., North to South), that is, between Canadian regions and US regions there is scope for greater rather than fewer asymmetries across Canada as a result of the deepening of cross-border

trading arrangements. Although provincial real GDP data have a number of problems associated with them, Figure 3 provides a plot of real GDP growth for select provinces since the early 1980s. There is indeed a great deal of apparent asymmetry in real economic performance across provinces. Whether these differences have been exacerbated since the Free Trade Agreement in the late 1980s is an empirical question, but the data suggest another aspect of the debate over monetary integration that would likely be considered if policy makers chose to go the route of currency unification.

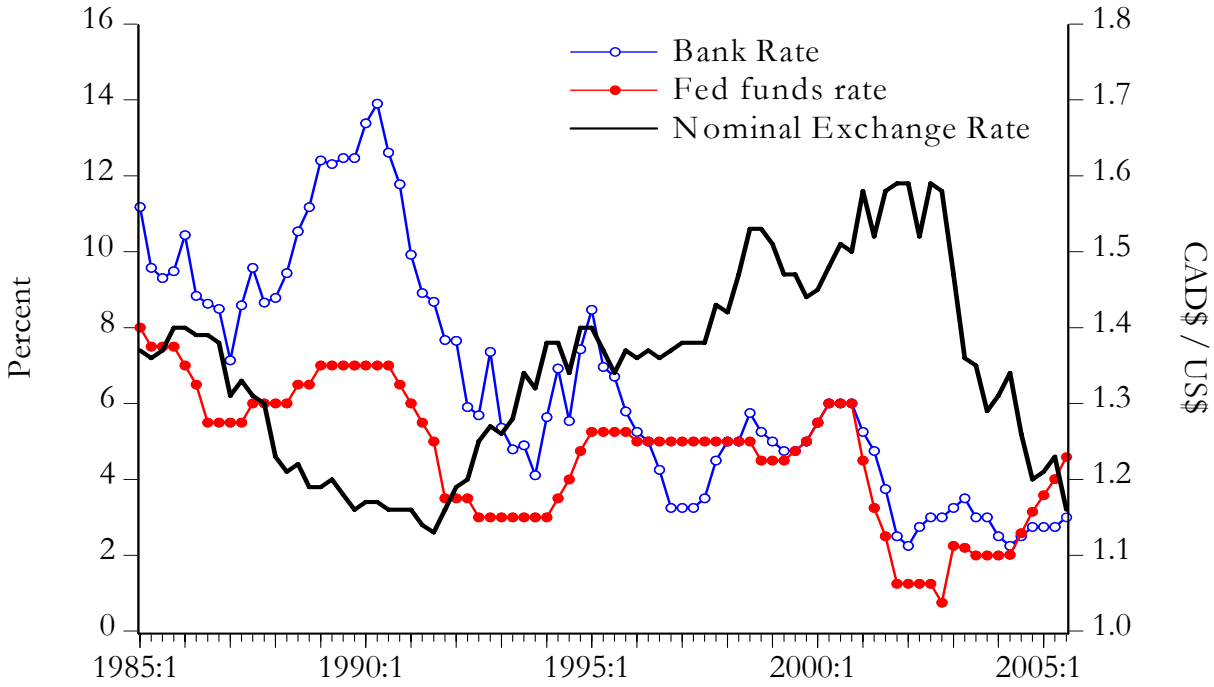
Arndt's paper reminds us that the question of monetary and economic integration is perennially of interest to policymakers and the public. Ironically, whereas monetary integration may be the last frontier of economic integration for North America, there are ever present signs that the deep forces of economic integration might unravel if growing resentment over how NAFTA actually settles trade disputes are not addressed. At the same time the unqualified success of monetary union in Europe is about to face several important tests. Recent members of the European Union, who must eventually join the euro area, are balking at some of the restrictions of Maastricht and the SGP. In addition, there is the problem of managing a single monetary policy for 30 or more rather diverse members. Not surprisingly then, there are whispers of the possibility of an unraveling of the euro area. No doubt the issues covered in this paper will continue to prompt more research and reflection in future.

Figure 1. Counterfactual Experiments



Note: Drawn from Siklos (2006). The bars show quarterly real GDP growth for Canada, Australia, and New Zealand, under three different assumptions about how quickly the nominal exchange rate of each of these countries converge to a pegged exchange rate as a prelude to monetary union. The sample is from the late 1970 to 2001.

Figure 3. Indicators of Monetary Conditions in Canada



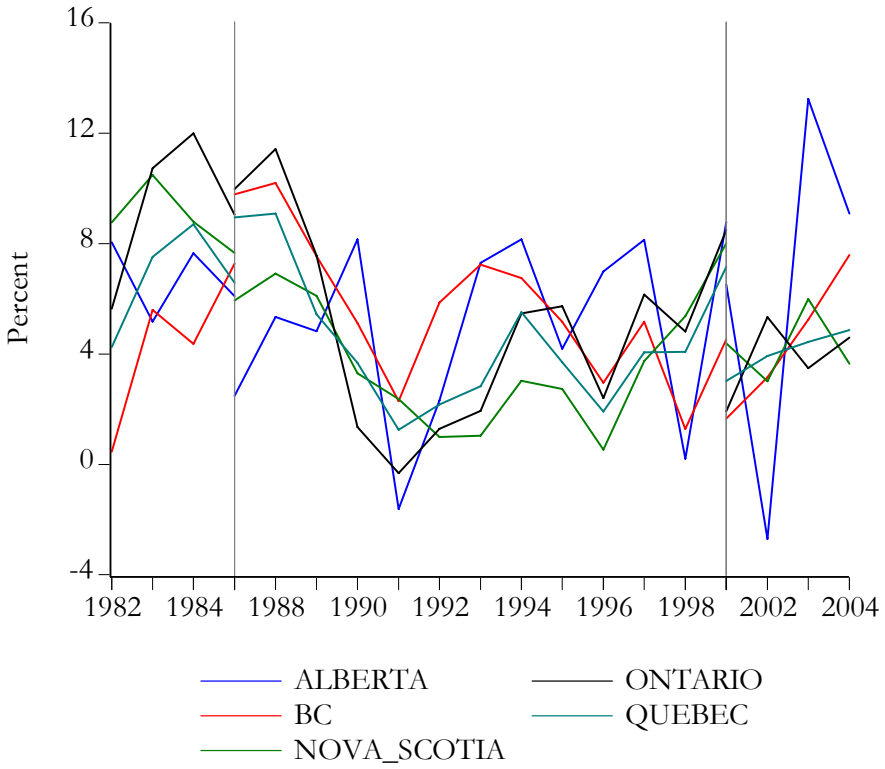
Note: Data are from www.bankofcanada.ca. The 'Bank rate' is the target overnight interest rate in Canada after April 1994.

Table 1. A Maastricht for Canada?

Canada	INFLATION (CPI) % p.a.	FISCAL 1 (DEFICIT) % of GDP	FISCAL 2 (DEBT) % of GDP	INTEREST RATE in %
1998	0.9	0.5/1.0	64.9	4.89
1999	1.7	1.6/0.8	61.0	6.18
2000	2.7	2.9/1.9	44.8	5.35
2001	2.6	0.7/1.1	40.5	5.44
2002	2.2	-0.1/0.8	37.9	4.88
2003	2.2	0.0/0.1	34.3	4.66
2004	2.1	0.7/0.6	32.2	4.39

Note: Data update a similar Table in Hochreiter and Siklos (2004). See their paper for sources and details. The first deficit figure (under FISCAL 1) includes Provinces, the other is for the federal government only. The interest rate data refer to the long-term interest rate objective of the Maastricht Treaty.

Figure 3. Provincial Economic Growth Since 1982



Note: Data are estimates of the rate of change in real Gross Provincial GDP for the Provinces shown. Data are from CANSIM II. The vertical bars omit two years of data due to relatively large changes in the growth rate in Alberta's real provincial GDP.

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