

Working Paper 99-12 / Document de travail 99-12

## **Why Canada Needs a Flexible Exchange Rate**

by

**John Murray**

**Bank of Canada**



**Banque du Canada**

ISSN 1192-5434  
ISBN 0-662-27997-2

Printed in Canada on recycled paper

Bank of Canada Working Paper 99-12

July 1999

## **Why Canada Needs a Flexible Exchange Rate\***

by

**John Murray**

International Department  
Bank of Canada  
Ottawa, Canada K1A 0G9  
E-mail: [jmurray@bank-banque-canada.ca](mailto:jmurray@bank-banque-canada.ca)

\*Prepared for a conference hosted by Western Washington University 30 April 1999.

The views expressed in this paper are those of the author. No responsibility for them should be attributed to the Bank of Canada.



## Contents

|  |    |
|--|----|
| Acknowledgements.....  | iv |
| Abstract / Résumé.....   | v  |
| 1. Introduction.....   | 1  |
| 2. Advantages of a flexible exchange rate .....  | 2  |
| 2.1 Some important conditions .....  | 2  |
| 2.1.1 Different monetary policy objectives and policy-making ability .....                   | 2  |
| 2.1.2 Institutional and structural differences.....  | 3  |
| 2.1.3 Nominal wage-price stickiness and immobile factors of production.....                  | 3  |
| 2.1.4 Real wage-price stickiness.....  | 3  |
| 2.1.5 Shortage of policy tools .....   | 4  |
| 3. Advantages of a fixed exchange rate .....   | 5  |
| 4. All fixed exchange rates are not alike.....   | 6  |
| 5. What system would be best for Canada? .....   | 7  |
| 6. Some potential problems.....  | 15 |
| 6.1 Concerns that exchange rate movements are dominated by<br>destabilizing speculation..... | 15 |
| 6.2 Concerns that flexible exchange rates lead to loose fiscal policy.....                   | 18 |
| 6.3 Concerns that flexible exchange rates reduce world trade and investment .....            | 19 |
| 6.4 Concerns that flexible exchange rates hurt productivity.....                             | 19 |
| 7. Looking ahead .....   | 21 |
| References .....   | 23 |

## **Acknowledgements**

I would like to thank my colleagues at the Bank who provided many useful comments and suggestions on an earlier draft of the paper, in particular, Chuck Freedman, David Laidler, David Longworth, James Powell, Larry Schembri, Pierre St-Amant, and Francine Rioux. I would also like to absolve them of any responsibility for the remaining errors and oversights.

## Abstract

Increased interest has been shown in recent months regarding the feasibility and potential advantages of a common currency for Canada and the United States. This paper explores the arguments for and against such an arrangement and attempts to determine whether it would offer any significant advantages for Canada compared with the present flexible exchange rate system. The paper first reviews the theoretical arguments advanced in the economics literature in support of fixed and flexible currency arrangements. A discussion of Canada's past experience with the two exchange rate systems follows, after which there is a survey of the empirical evidence published on Canada's current and prospective suitability for some form of fixed currency arrangement with the United States. The final section of the paper examines critically a number of concerns raised about the behaviour of the current flexible exchange rate system. These concerns include its susceptibility to destabilizing speculation; the depressing effect it might have on trade and investment flows; the encouragement it might provide for lax fiscal policies; and the harmful effect it might have on productivity. On the basis of the evidence reviewed in this paper, the author concludes (i) that most of these concerns are either exaggerated or unsubstantiated; and (ii) that a flexible exchange rate continues to offer important advantages for Canada, given the significant differences that distinguish the Canadian and U.S. economies and Canadians' desire for policy independence.

## Résumé

La possibilité et les avantages potentiels d'une union monétaire entre le Canada et les États-Unis suscitent un regain d'intérêt depuis quelques mois. L'auteur de l'étude analyse les arguments pour ou contre une union monétaire entre ces deux pays et tente de déterminer si celle-ci procurerait des avantages importants au Canada par comparaison avec le régime actuel de changes flottants. L'auteur passe d'abord en revue les arguments théoriques avancés en faveur des changes fixes et des changes flottants dans la littérature économique. Il commente ensuite l'expérience vécue par le Canada en matière de changes fixes et flottants avant d'effectuer un survol des travaux empiriques publiés sur l'opportunité pour ce pays d'adhérer dans l'immédiat ou dans le futur à une forme quelconque d'union monétaire avec les États-Unis. La dernière partie de l'étude porte un regard critique sur un certain nombre d'inquiétudes que soulève le comportement du régime actuel de changes flottants. Parmi celles-ci, il convient de mentionner la vulnérabilité de ce dernier à des poussées spéculatives déstabilisatrices, l'effet négatif que le flottement des monnaies exercerait sur les échanges commerciaux et les flux de capitaux, le laxisme budgétaire qu'il encouragerait et l'incidence nuisible qu'il aurait sur la productivité. En s'appuyant sur les différents travaux qu'il examine, l'auteur arrive à la conclusion que i) ces inquiétudes sont en bonne partie exagérées ou injustifiées; ii) le maintien d'un régime de changes flottants au Canada

continue de présenter d'importants avantages, compte tenu des différences appréciables qui existent entre les économies canadienne et américaine et de la volonté des Canadiens de conserver une politique monétaire indépendante.



## 1. Introduction

Canada has operated under a flexible exchange rate for all but 10 of the last 50 years. This makes us very unusual; indeed, no other country during the post-war period has been as devoted to the flexible exchange rate system. Most countries have preferred to tie their currencies to that of another trading partner and to operate under some form of fixed exchange rate arrangement.

This global predisposition towards a fixed exchange rate is understandable. Any movement in the exchange rate, whether up or down, usually has political repercussions. Some important constituent will almost invariably be made unhappy. From a businessman's perspective, it is also a mixed blessing. If the exchange rate appreciates, exporters will complain about their lost competitiveness in international markets. If the exchange rate depreciates, importers will complain about their lost competitiveness in domestic markets (and consumers will complain about higher prices). For the public at large, the exchange rate is often a symbol of national pride, a sort of international report card. Exchange rate depreciations from their perspective are invariably bad—a sign of national inferiority. Given these harsh political realities, why would any country risk potential embarrassment by choosing a flexible exchange rate?

One of the few friends that the flexible exchange rate has had during the past 50 years has been the academic economist. This more sympathetic regard has not been shared by all members of the profession, however; nor has it remained constant over time. The painful experience of the Great Depression convinced many economists that flexible exchange rates were inherently unstable. The competitive depreciations and “beggar-thy-neighbour” trade policies that characterized this period were blamed for much of the chaos in the world economy. Subsequent disappointment with the system of pegged exchange rates that was established after the Second World War, however, soon caused them to reconsider the virtues of a more flexible exchange rate regime. In the early 1970s, the Bretton Woods system finally collapsed, and the major industrial powers once again found themselves operating under a de facto float. Some countries, such as Canada, embraced the new reality with greater enthusiasm than did others and were wary of any attempts to resurrect the old fixed exchange rate system or create a new one.

The performance of international financial markets since the collapse of the Bretton Woods system has been mixed but, on balance, supportive of the more flexible arrangements that have existed among the major industrial economies. Repeated crises in Latin America during the 1980s—and more recent difficulties in emerging countries like Mexico, Korea, Russia, and Brazil—have been useful reminders of the problems associated with more rigid currency arrangements.

Given this disappointing experience with fixed exchange rates, the renewed interest that some Canadians have shown in a common currency with the United States might seem surprising. It can probably be credited to three factors. The first concerns Europe and the interest surrounding

the introduction of the euro earlier this year. If Europeans can have a common currency, Canadians asked, why can't we? The second is linked to the record lows that the Canadian dollar reached late last year in response to the Asian crisis and the dramatic decline in world commodity prices. Many Canadians believe that a fixed exchange rate could have prevented the depreciation and the loss in income associated with our "northern peso." The third is the official interest shown by countries such as Argentina and Mexico in establishing a common currency in the Americas. Do they know something that we don't? Is there a risk that Canada will be left behind?<sup>1, 2</sup>

The purpose of this paper is to explore these issues and to re-examine the case for a flexible exchange rate in Canada. One of the fundamental lessons of the optimum-currency-area literature is that no single currency arrangement is likely to be best for all countries at all times. Conditions change and so should the currency arrangements under which a country operates. Is Canada at such a turning point?

## **2. Advantages of a flexible exchange rate**

Flexible exchange rates provide a country with two principal advantages. The first is monetary policy independence. In a world where capital is completely mobile and free to move across international borders, it is impossible to have both a fixed exchange rate and an independent monetary policy. Policy-makers must choose between maintaining a stable exchange rate and pursuing domestic monetary policy objectives such as price stability. The two can seldom co-exist for a sustained period of time. Flexible exchange rates are the only way of preserving monetary policy autonomy.

The second advantage is the automatic buffer or cushion that flexible exchange rates can provide against economic shocks. Though this protection is seldom complete, movements in the nominal exchange rate can work to offset some of the effects of a temporary shock and facilitate the transition to a new steady state if the shock proves to be permanent.

### **2.1 Some important conditions**

#### *2.1.1 Different monetary policy objectives and policy-making ability*

The desirability and effectiveness of the exchange rate adjustment mechanism will depend on several factors. These include the monetary policy objectives of the country, the ability of the

- 
1. See Courchene and Harris (1999) and Laidler (1999).
  2. Interest in a common currency seems to take different forms in Argentina, Mexico, and Canada. Whereas Grubel (1999) and Courchene and Harris (1999) favour the introduction of a new currency that would be used jointly by Canada, the United States, and any other partner in the currency union, proponents in Argentina and Mexico appear willing to adopt the U.S. dollar.

domestic monetary policy authority to attain these objectives, and the underlying structure of the economy. If the prospective partner in a fixed exchange rate system shares the same monetary policy objectives as the home country and has shown the same skill in the conduct of monetary policy, the policy independence allowed under flexible exchange rates will be largely irrelevant—except for political considerations and the sense of sovereignty that it might convey. If the prospective partner has a history of superior policy performance, and the citizens of the home country think that the performance of their own officials is unlikely to improve, the lack of independence associated with a fixed exchange rate system might be viewed as an important advantage.

### *2.1.2 Institutional and structural differences*

The institutional and structural characteristics of a country are also likely to play a critical role in the decision to fix or float the exchange rate. If two countries have similar economic structures and are subject to the same external shocks, not much will be gained by having separate and floating currencies. Both economies will need to respond to the shocks in a similar manner, and their currencies will presumably move more or less in tandem. Little would be lost, therefore, in terms of insulation or policy effectiveness if their currencies were linked.

### *2.1.3 Nominal wage-price stickiness and immobile factors of production*

Different policy objectives, different economic structures, susceptibility to different shocks, and a (presumed) home country advantage in the conduct of monetary policy are all factors that favour the adoption of a flexible exchange rate. They are not sufficient, however, to guarantee that it will dominate other fixed exchange rate alternatives. Certain other conditions must also be satisfied. The first of these is that domestic prices and wages must show some stickiness or downward rigidity. If this is not the case, and domestic prices and wages are relatively flexible, there is no need for a flexible exchange rate. The economy can adjust to any internal or external shock with little difficulty and, in the limit, always be at full-employment. Therefore, a flexible exchange rate would offer no advantage in terms of facilitating the adjustment process. A similar situation would arise if factors of production, such as capital and labour, were perfectly mobile within (or across) countries. Resources could be effortlessly reallocated across regions and industries following a shock, reducing the need for domestic or external price adjustment. Regrettably for those proposing a return to the fixed exchange rate system, none of these conditions appears to be met in the real world.

### *2.1.4 Real wage-price stickiness*

Another necessary condition for flexible exchange rates to be both desirable and effective is that *real* prices and wages in the economy not be fixed or completely rigid. Flexible exchange rates help stabilize an economy by overcoming the stickiness that is assumed to exist in *nominal*

prices and wages, thereby allowing *real* prices and wages to re-equilibrate. If the latter cannot move for some reason, such as fixed real wage contracts, excessive union power, or other institutional rigidity, the extra degree of freedom provided by the flexible exchange rate will not be effective in restoring equilibrium.

### 2.1.5 *A shortage of policy tools*

In an ideal world, flexible exchange rates can be made redundant or unhelpful if the country already has a surfeit of macro instruments at its disposal and does not require any additional tools to help stabilize the economy. An example of this might be a system of generous fiscal transfers that could be activated whenever a region or industry was hit by an external shock. Industries faced with a temporary downturn in prices or world demand could receive government subsidies to continue their operations; workers who found themselves out of a job could receive special social assistance until conditions improved. It is possible that private capital markets might also perform this function, lending money to industries and individuals in the bad times and being repaid in good times. The additional room to manoeuvre provided by flexible exchange rates would once again be unnecessary.<sup>3</sup>

In the real world, of course, policy-makers seldom find themselves with too many policy levers. Existing tools are typically over-committed, and any additional help that policy-makers can receive is readily accepted. Discretionary fiscal measures often lack the necessary speed and focus to serve as effective stabilization tools and are difficult to reverse once the shock has passed. Additional problems arise if the shock is permanent and the fiscal expenditures inhibit necessary long-run economic adjustments. There is also a risk that trading partners might complain about the subsidies offered to certain industries under these schemes and retaliate with countervailing duties and other anti-dumping measures. In short, discretionary fiscal measures and other government actions are unlikely to be a perfect substitute for flexible exchange rates. Experience with them in Canada and elsewhere has not been very encouraging.<sup>4</sup>

Assuming that all the previous conditions have been satisfied, and a credible case can be made for a flexible exchange rate on macroeconomic grounds, what other benefits might a country such as Canada have to forego by choosing this alternative? What extra costs might it have to bear by having a flexible exchange rate rather than a fixed exchange rate? Casual observation suggests that a fixed exchange rate must offer some important advantages; otherwise, it would not be so

---

3. The low correlations observed between savings and investment rates within countries suggest that capital markets play an important stabilizing role in most domestic economies. The opposite tends to be observed between countries where, despite the much-vaunted globalization process, savings and investment rates still tend to be highly correlated. See Feldstein and Horioka (1980). Greater capital market integration between Canada and the United States would presumably reduce the costs of a monetary union. See Sorensen and Yosha (1998) and Antia, Djoudad, and St-Amant (1999).

4. A similar sceptical view on the usefulness of fiscal transfers as an adjustment mechanism is provided by Obstfeld and Peri (1998).

popular. Of the 181 countries that are currently members of the IMF, fewer than 20 can be said to operate under a truly flexible exchange rate. Indeed, logic suggests that, if there were not some offsetting disadvantages, every individual would find it in his or her interest to issue their own currency and to operate under a flexible exchange rate. Since we do not observe this phenomenon in everyday life, there must be a point at which the microeconomic advantages of a fixed currency arrangement (in this case a common currency) exceed the macroeconomic benefits of increased flexibility.

### **3. Advantages of a fixed exchange rate**

The advantages of a fixed exchange rate, as suggested above, are largely microeconomic. Some of them are evident and easily measured, such as the reduced transactions costs associated with converting and hedging currencies. Others are less obvious, but potentially more important. They are linked to the improved efficiency and increased welfare that can result from reduced uncertainty and better economic decision-making. In this regard, they are much like the advantages that central banks often cite in support of domestic price stability.

By extending the domain over which a given currency operates, fixed exchange rates can improve the operation of the price system and enhance the usefulness of money as a medium of exchange, unit of account, and store of value. Fixed exchange rates facilitate price comparisons across currencies, thereby promoting increased competition and a more efficient allocation of resources. They also tend to reduce the cost of cross-border transactions and can eliminate (or at least reduce) the risk of holding assets denominated in different currencies.

Were it not for one important caveat, therefore, it would clearly be optimal for everyone in the world to operate under a fixed exchange rate system and, in the limit, to use the same currency. (Fixed exchange rates alone are not sufficient to maximize the microeconomic benefits, since they would still involve converting one currency into another for transactions purposes and their parity values could always be changed, thereby introducing some exchange rate uncertainty.)

The one complication that has been discussed earlier is the difficulty that an economy might experience trying to re-equilibrate after a macroeconomic shock. If an economy is subject to serious and frequent macroeconomic disturbances, and the nominal exchange rate is not allowed to adjust to help offset them, the resulting economic pressures are typically shifted onto other variables. Since prices and wages in most real-world economies are relatively sticky, and factors of production have difficulty moving between countries, the result is often greater variability in output and employment than would have been the case if the exchange rate had been allowed to move. The exchange rate uncertainty and destabilizing economic forces that one had hoped to eliminate by fixing the currency may simply manifest themselves elsewhere—in a less obvious but potentially more damaging form.

#### **4. All fixed exchange rates are not alike**

Much of the previous discussion has implicitly assumed that all fixed exchange rate systems are alike. In reality, of course, they can take many different forms that range from softer, more pliant systems (such as adjustable pegs) to harder, more rigid systems (such as currency boards and common currencies). The practical differences between them can be significant.

Common currencies and currency boards involve a more serious commitment on the part of the government. This is their strength as well as their weakness. Because they are harder to unwind, they are also more credible. Uncertainty is thereby reduced and transactions costs are minimized. Unfortunately, this frequently implies a complete loss of monetary policy independence or, at best, a sharing of this responsibility with another sovereign state. This awkward political feature has proved difficult for many countries to accept as has been the implied inability of the monetary authority to change exchange rate parities in response to serious shocks. There is a natural tension between a country's desire to maximize the benefits of a fixed exchange rate system via the adoption of a common currency or currency board and the need to preserve some degree of policy autonomy and self-determination.<sup>5</sup>

The Bretton Woods system, established after the Second World War, tried to effect a Solomon-type compromise to overcome this problem. Under the new system, countries were obliged to declare a parity value for each of their currencies in terms of gold and U.S. dollars. A narrow band was also established to either side of parity, so that currencies could move in response to minor and transient shocks. If the exchange rate pressures continued, however, and threatened to push a currency outside the bands, countries were obliged to resist them through active exchange market intervention and appropriate adjustments to their domestic policy settings. In the event of a serious and permanent shock, which could not be accommodated through exchange market intervention or acceptable domestic policy adjustments, the country would be allowed to change the parity value of its currency.<sup>6</sup> The multilateral nature of this decision was designed to prevent capricious and self-interested actions that might destabilize the system. While some exchange rate uncertainty would still exist owing to these periodic devaluations, it was hoped that the risks and transactions costs associated with the Bretton Woods system would be relatively modest and that the resulting stability would promote world trade and development.

History has shown that, instead of combining the best features of the fixed and flexible exchange rate systems, the Bretton Woods system managed to deliver the worst of both worlds. The system was neither flexible enough to prevent periodic crises, nor strong enough to prevent its own collapse. Necessary adjustments to exchange rate parities proved difficult to negotiate and

---

5. Laidler (1999) these and other related issues in greater detail, and highlights the importance of accountability, as distinct from independence, in the conduct of monetary policy.

6. In theory, the adjustment process was supposed to be symmetric, with both surplus and deficit countries contributing. But, in practice, only devaluations occurred.

were always delayed until it was too late. In the interim, countries were required to sacrifice their domestic economic objectives in the interest of short-run exchange rate stability. In the end, however, market forces inevitably prevailed and eventually triggered an exchange rate crisis. The continuous, and at times disquieting, movements of a flexible exchange rate system had simply been replaced by periods of artificial calm, punctuated every two or three years by a major currency collapse.

Experience since the end of the Bretton Woods system has only confirmed the view that an adjustable peg is the least sustainable of all exchange rate systems. Countries are forced to choose, therefore, between two extreme solutions—a completely free exchange rate system and a common currency (or its close cousin, a currency board). There would appear to be no viable middle ground.

## **5. What system would be best for Canada?**

In many respects, Canada and the United States would seem to be well suited to a common currency. The two economies are highly integrated and share many important characteristics. They are in close geographic proximity; their citizens travel extensively between the two countries; and they share similar values, culture, and history. Exports account for 45 per cent of Canada's GDP, and over 80 per cent of its exports go to the United States. Indeed, as we are often reminded, most Canadian provinces have more trade with the United States than they do with one another. Few of the countries entering into the European monetary union (EMU) earlier this year were as open as Canada or as dependent on any one trading partner. Surely, it is argued, two countries that are so inexorably bound, and growing ever more integrated, should be natural candidates for a common currency.

The gains to Canada from a common currency in terms of reduced transactions costs and the elimination of currency risk could be substantial. Conservative estimates of the savings, focusing only on the transactions costs that are incurred in the Canadian foreign exchange market, are approximately \$3.0 billion annually. Discounted at a 4 per cent real rate of interest, the implied present value of the foreign exchange savings alone would be \$75.0 billion dollars, or roughly one-tenth of Canada's current GDP. (This does not include any savings that might be realized in the form of lower borrowing costs, improved economic efficiency, increased competition, and better investment decisions.)<sup>7</sup> Are the benefits of monetary policy independence and increased macroeconomic stability worth the cost?

With regard to monetary policy independence, the evidence is at best ambiguous (see Graph 1). The United States has enjoyed slightly better inflation performance than Canada over

---

7. It is important to note, however, that the potential loss of seigniorage could reduce these savings by 50 per cent or more. For the United States, of course, this would represent an additional advantage, unless some sort of sharing arrangement were worked out with Canada.

the last 30 years, but by a very small margin (a cumulative difference of 3 per cent, or roughly 0.1 per cent per annum). Moreover, there is no guarantee that this superior performance will continue. Unlike many of the countries that entered into the EMU, Canada could not expect to trade on the reputation of a North American “Bundesbank.” Neither has our inflation record been as disappointing as that of Italy, Portugal, or Spain. In short, it is unlikely that a common currency would ever be viewed as a necessary defence against bad domestic monetary policy.<sup>8</sup>

**Graph 1**

**CPI Inflation Rates (y/y)**



While the inflation objectives of the monetary authorities in Canada and the United States appear to be similar, only those of Canada have been made explicit in the form of announced inflation targets. There is no equivalent and convincing commitment to price stability on the part of U.S. authorities.<sup>9</sup> To the extent that enhanced accountability and transparency improve monetary policy outcomes, one might expect superior inflation performance in Canada in the future.

8. Indeed, Canada has managed to achieve a lower inflation rate than the United States for the past eight years.

9. The Fed has an explicit mandate to pursue growth and employment, as well as price stability. The latter has never been defined, however, or couched in terms of an explicit inflation target. Neither is there any suggestion as to what weights the Fed should attach to different, and possibly conflicting, objectives in the short run.



One thing is absolutely clear: Canadians would have very little say over the conduct of monetary policy under a currency union with the United States. If the United Kingdom were to join the EMU, it would be one of 12 countries setting monetary policy, all with roughly equivalent voting power. In addition, the GDP weights of the major participants would not be as seriously unbalanced as those of Canada and the United States. It is unrealistic to think that Canadians would ever have anything more than a token voice in a Canada-U.S. currency union. Expanding the size of the currency block to include all of the Americas would improve the situation, but not by enough to counterbalance the importance of the world's largest economy. Whether the United States would see any advantage in such an arrangement, and be willing to cede any of its economic power, is another question. Whether Canadians would ever accept such a "colonial" relationship is also unclear.<sup>10</sup>

The strongest case for monetary policy independence and a flexible exchange rate, however, rests with the different structures of the Canadian and U.S. economies, not with the political forces that might be at play under a currency union. Despite the highly integrated nature of the two economies, empirical work suggests that important structural differences remain. Canada is more exposed to external shocks than the United States and often sees its terms of trade improve in response to a sudden increase in world commodity prices.<sup>11</sup> The United States, in contrast, typically experiences a deterioration in its terms of trade whenever there is an increase in world commodity prices.

Although Canada's terms of trade, taken on their own, tend to be relatively stable, they always move in the opposite direction to those of the United States in response to commodity price shocks (see the last two rows in Table 1). As a result, movements in the *relative* terms of trade between Canada and the United States tend to be more exaggerated than movements in their individual or *absolute* terms of trade (see the first and third rows of Table 1). They also move in different directions vis-à-vis other G-10 countries. While the terms of trade for the United States are positively correlated with those of the G-10, the terms of trade for Canada display a large negative correlation.

---

10. The implications for Canadian policy independence and accountability are explored in Laidler (1999).

11. See Roger (1991).

**Table 1: Absolute and relative terms of trade for Canada and the United States**

|  | Canada | United States |
|--|--------|---------------|
| Absolute terms of trade variability <sup>a</sup>                 | 7.7    | 12.1          |
| Absolute terms of trade correlation with G-10 <sup>b</sup>       | -0.85  | 0.63          |
| Relative terms of trade variability <sup>c</sup>                 | 17.5   | 9.1           |
| Absolute terms of trade correlation with oil price               | 0.85   | -0.89         |
| Absolute terms of trade correlation with non-oil commodity price | 0.87   | -0.92         |

*Source:* Roger (1991)

- a. Standard deviation of the terms of trade for each country
- b. Calculated as the correlation against the trade-weighted average terms of trade of the other G-10 countries plus Switzerland
- c. Terms of trade relative to a trade-weighted average of the other G-10 countries plus Switzerland

Although Canada has become much less reliant on natural resources during the post-war period, commodities still account for more than 10 per cent of its GDP (roughly the same percentage as in 1971) and 35 per cent of its merchandise exports. These are not small numbers.

Other econometric research published over the last few years provides even more convincing evidence of the deep structural differences separating the two economies. Structural vector autoregressions (VARs) and variance decomposition techniques have been applied to Canadian and U.S. data by several outside academics, such as Bayoumi and Eichengreen (1994), as well as a number of economists within the Bank of Canada, such as DeSerres and Lalonde (1994).<sup>12</sup> Their results have shown that Canada and the United States are subject to significant asymmetric shocks. As a consequence, it is unlikely that they would form an optimum (or perhaps even viable) currency area.

Interesting extensions of this work have applied the same VAR methodology to other regions and countries, in the expectation that their experiences might serve as useful benchmarks for the situation in Canada and the United States. These areas included Mexico, the major countries in Europe, and a number of different regions within Canada and the United States. The objec-

---

12. See also Lalonde and St-Amant (1995); Dupasquier, Lalonde, and St-Amant (1997).

tive in each case was to see which of the regions or countries might form an optimum currency area. The principal results are summarized below.

- (i) The structural shocks hitting Canada, Mexico and the United States share very few common characteristics (see Table 2).

The common components in the VAR analyses conducted by Lalonde and St-Amant (1995) for the three North American economies seldom exceeded 10 per cent. This suggests that the monetary authorities in each country need to respond to domestic and external shocks in a very different manner and that a flexible exchange should help the adjustment process.<sup>13</sup> They are not, therefore, obvious candidates for a common currency.

- (ii) The structural shocks hitting the nine regions of the United States are all very similar.

The common components reported by Lalonde and St-Amant for the nine regions comprising the United States were all quite large (varying between 50 and 99 per cent). The sole exception is New England. Macroeconomic stability across the regions should not be significantly affected, therefore, by the fact that the regions are forced to operate under a common currency and under a common monetary policy directed by the Federal Reserve. The United States, in other words, is a natural currency area.<sup>14</sup>

- (iii) The structural shocks hitting the six regions of Canada also share a strong common component with one another, but their contemporaneous correlation with U.S. shocks is very small (see Table 3).

While the common components shared by the six regions in Canada are smaller than those reported for the nine regions in the United States, they are still much higher than the common components between any one of the Canadian regions and the U.S. economy taken as a whole. A common currency seems to be a viable arrangement for Canada, therefore, even if the relationships linking the different regions are not as strong as those for the United States.

- (iv) The structural shocks hitting many of the countries participating in the EMU have smaller common components than the six regions in Canada (see Table 4).

Many of the countries participating in the EMU, particularly those on the periphery, bear a far weaker relationship with France, Germany, and Italy, than do the outlining regions of

---

13. The common components obtained from the VAR analyses measure the extent to which the shocks in different regions are contemporaneous correlated and determined by a shared, underlying factor.

14. Some authors have suggested that operating under a common currency forces regions to become more similar. (See Frankel and Rose [1996].) As a result, their suitability for an optimum currency area is impossible to determine ex ante. Krugman (1993), on the other hand, has suggested that monetary union might lead to greater specialization and make asymmetric shocks more likely.

Canada with Ontario and Quebec. This would suggest that macroeconomic stabilization and the conduct of monetary policy within the EMU may prove difficult. It is important to note, however, that they have larger common components with one another than Canada does with the United States, and therefore represent a more viable currency area than would Canada and the United States.

The main message that one should take from all of this is that the present currency arrangements in Canada and the United States make a great deal of sense, and that attempts to create a currency union similar to the EMU might pose a serious problem.

**Table 2: Decomposition of the structural shocks hitting Canada, Mexico and various regions of the United States**

**Relative contribution of common component (%)**

| Regions and countries | Demand shocks  | Supply shocks  | Monetary shocks |
|-----------------------|----------------|----------------|-----------------|
| Mexico                | 6 <sup>a</sup> | 2 <sup>a</sup> | 0 <sup>a</sup>  |
| Canada                | 13             | 3 <sup>a</sup> | 5 <sup>a</sup>  |
| New England           | 56             | 0 <sup>a</sup> | 71              |
| Middle Atlantic       | 86             | 59             | 97              |
| Northeast Central     | 83             | 76             | 93              |
| Northwest Central     | 85             | 71             | 94              |
| South Atlantic        | 85             | 89             | 99              |
| Southeast Central     | 95             | 89             | 96              |
| Southwest Central     | 50             | 64             | 95              |
| Northwest Pacific     | 66             | 62             | 80              |
| Southwest Pacific     | 76             | 67             | 92              |

*Source:* Lalonde and St-Amant (1995)

a. Shocks that are not statistically related to the common component (5 per cent significance level)

**Table 3: Decomposition of structural shocks in Canada**

| Supply shocks<br>Relative contribution of three components (%) |                           |                        |                 |
|--|---------------------------|------------------------|-----------------|
| Regions and countries  | Exogenous American shocks | Common Canadian shocks | Specific shocks |
| Atlantic   | 0*                        | 49                     | 50              |
| Quebec   | 2*                        | 56                     | 42              |
| Ontario  | 8                         | 48                     | 43              |
| Prairies   | 1*                        | 16                     | 82              |
| Alberta  | 0*                        | 23                     | 76              |
| British Columbia   | 1*                        | 20                     | 78              |

| Real demand shocks<br>Relative contribution of three components (%) |                           |                        |                 |
|---|---------------------------|------------------------|-----------------|
| Regions and countries   | Exogenous American shocks | Common Canadian shocks | Specific shocks |
| Atlantic  | 2*                        | 41                     | 56              |
| Quebec  | 1*                        | 11                     | 88              |
| Ontario   | 5                         | 10                     | 84              |
| Prairies  | 0*                        | 61                     | 38              |
| Alberta   | 4                         | 57                     | 39              |
| British Columbia  | 0*                        | 1                      | 98              |

| Monetary shocks<br>Relative contribution of three components (%) |                           |                        |                 |
|--|---------------------------|------------------------|-----------------|
| Regions and countries  | Exogenous American shocks | Common Canadian shocks | Specific shocks |
| Atlantic   | 4                         | 76                     | 20              |
| Quebec   | 5                         | 83                     | 11              |
| Ontario  | 6                         | 81                     | 12              |
| Prairies   | 4                         | 81                     | 14              |
| Alberta  | 3*                        | 51                     | 46              |
| British Columbia   | 8                         | 83                     | 8               |

\*Shocks that are not statistically related to the common component (5 per cent significance level)

**Table 4: Decomposition of structural shocks in Europe**

| Countries      | Relative contribution of common components (%) |               |
|----------------|--|---------------|
|                | Real demand shocks                             | Supply shocks |
| Germany        | 51   | 51            |
| France         | 22   | 12            |
| United Kingdom | 13   | 18            |
| Italy          | 5*   | 5*            |
| Spain          | 12   | 25            |
| Netherlands    | 26   | 13            |
| Belgium        | 20   | 14            |
| Switzerland    | 37   | 44            |
| Austria        | 11   | 12            |
| Sweden         | 4  | 1*            |
| Norway         | 0*   | 0*            |
| Portugal       | 28   | 5*            |
| Greece         | 0*   | 7*            |

*Source:* Chamie, DeSerres, and Lalonde (1994)

\* Shocks that are not statistically related to the common component (5 per cent significance level)

Robert Mundell, the originator of the optimum currency area concept, together with various other proponents of a currency union, has observed that the current political boundaries between Canada and the United States bear little resemblance to those that economists might draw if they were asked to construct an optimum currency area in North America. The dividing line between the two currency areas would in all likelihood run north-south, as opposed to east-west, recognizing that the western provinces of Canada probably have more in common with their counterparts in the western United States than they do with their partners in the east. While this might be true, it is also largely irrelevant. The political boundaries of the two countries are not likely to be redrawn in the near future (at least in the manner suggested above). The real issue, therefore, is whether the Canadian economy, taken as a whole, responds differently than does the

U.S. economy to common external shocks. The answer, based on the evidence presented above, appears to be yes.

## 6. Some potential problems

Many of the economists who advocate a currency union with the United States do so, not because of the microeconomic advantages that might be realized, nor because they disagree with the macroeconomic analysis presented above, but because they believe that flexible exchange rates cannot be trusted. More specifically, they do not believe that flexible exchange rates help re-equilibrate economies following a shock. They also claim that flexible exchange rates encourage bad behaviour and undermine economic efficiency. The validity of these concerns is reviewed in the next section.

### 6.1 Concerns that exchange rate movements are dominated by destabilizing speculation

Critics of flexible exchange rates often claim that they are subject to excessive volatility and rarely move in response to market fundamentals. Instead, they are driven by destabilizing speculators, whose tremendous resources allow them to push currencies up or down in response to the latest rumours and market whim.

A different and more positive story, however, is suggested by the econometric evidence drawn from the experience of the Canadian dollar over the last 25 years. Using an equation that was first developed in the early 1990s, two Bank of Canada economists, Robert Amano and Simon van Norden (1993), have shown that it is possible to explain most of the long-run movements of the Can\$/US\$ exchange rate with a simple error-correction model and three fundamental variables: the Canadian-U.S. inflation differential, the relative price of energy, and the relative price of non-energy commodities. (A fourth variable, the difference between short-term interest rates in Canada and the United States, is added to the equation to help it track higher-frequency movements in the exchange rate.)

$$\Delta \ln(rpfx) = \alpha(\ln(rpfx)_{t-1} - \beta_0 - \beta_c comtot_{t-1} - \beta_e entot_{t-1}) + \Upsilon(rdifff)_{t-1}$$

where:  $rpfx$  = real bilateral exchange rate  
 $comtot$  = commodity terms of trade  
 $entot$  = energy terms of trade  
 $rdifff$  = Canada-U.S. short-term interest rate differential.

Not only does the equation fit the data with surprising accuracy, it is also remarkably robust (see Table 5).

**Table 5: Real bilateral exchange rate**

| Variable   | Estimation period              |                   |                    |                   |
|------------|--------------------------------|-------------------|--------------------|-------------------|
|            | 1973Q2-86Q1                    | 1973Q2-91Q4       | 1973Q2-94Q4        | 1973Q2-97Q2       |
| $\alpha$   | -0.192<br>(-3.10) <sup>a</sup> | -0.149<br>(-3.67) | -0.1497<br>(-4.05) | -0.134<br>(-4.14) |
| $\beta_0$  | 2.415<br>(3.98)                | 1.602<br>(4.06)   | 2.483<br>(6.86)    | 2.700<br>(7.58)   |
| $\beta_c$  | -0.498<br>(-4.67)              | -0.384<br>(-5.22) | -0.525<br>(-6.72)  | -0.561<br>(-6.99) |
| $\beta_e$  | 0.059<br>(1.25)                | 0.141<br>(2.83)   | 0.079<br>(2.01)    | 0.070<br>(1.64)   |
| $\Upsilon$ | -0.528<br>(-2.28)              | -0.470<br>(-2.75) | -0.574<br>(-3.36)  | -0.570<br>(-3.77) |
| $R^2$      | 0.276                          | 0.251             | 0.239              | 0.228             |
| $D - W$    | 1.265                          | 1.217             | 1.249              | 1.319             |

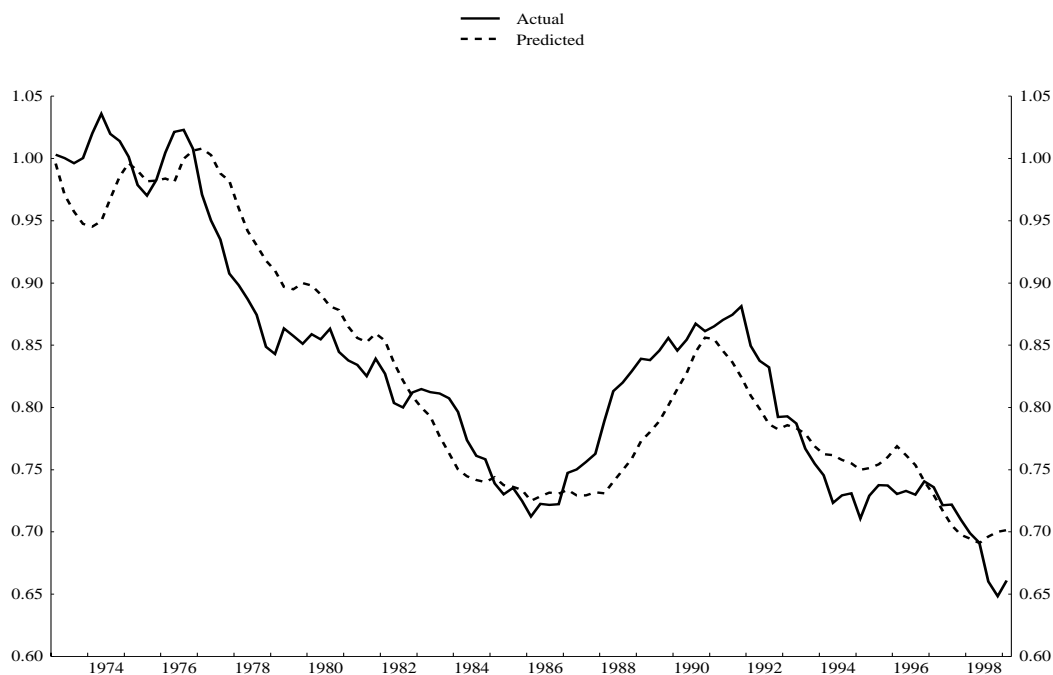
a. *t*-statistic

A dynamic simulation, based on parameters estimated over the 1973Q2-1997Q2 period and projected out to 1999Q1, is shown in Graph 2. As the reader can see, all the major movements in the exchange rate appear to be driven by these few fundamental variables, not by destabilizing speculation. While there are periods—such as the present (1998Q3 to 1999Q1)—where the exchange rate seems to be over- or undervalued relative to its predicted value, these differences are seldom large and usually disappear after a short period of time. Additional research conducted at the Bank has shown that episodes of increased volatility in the exchange rate are often characterized by *stabilizing* speculative activity, which pushes the exchange rate back towards its equilibrium level and helps to stabilize the macroeconomy. Destabilizing noise trading tends to dominate the market during more tranquil periods and lends a sort of inertia momentum to the exchange rate. This in turn causes the exchange rate to gradually drift away from its fundamentals. At a certain point, however, the discrepancy between the actual and equilibrium rates becomes large enough that stabilizing traders enter the market and push the Canadian dollar back to where it should be (see Murray, van Norden, and Vigfusson [1996]). Authorities should be wary, therefore, of resisting exchange rate movements.



## Graph 2

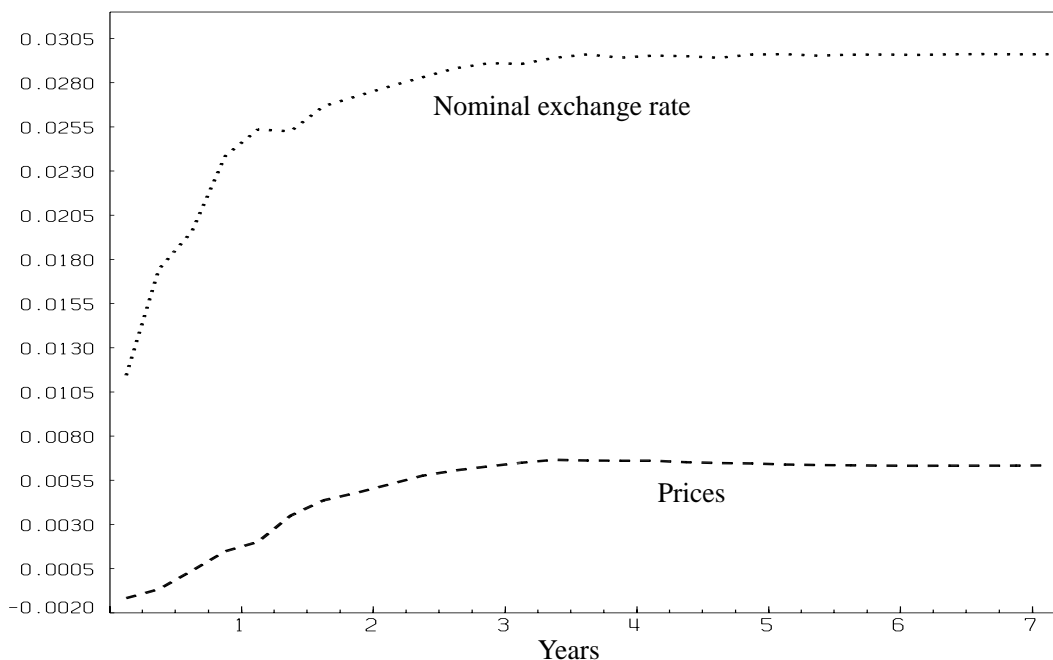
### U.S. - Canada Exchange Rate



It is one thing to show that Canada experiences asymmetric shocks creating a potential role for a flexible exchange rate and that exchange rate movements appear to be driven by two or three fundamental variables. But do these movements actually help stabilize the economy? Graph 3 shows the response of the nominal exchange rate and domestic prices to a one-standard deviation shock in aggregate demand. As the graph indicates, both the exchange rate and the price level have tended to rise (appreciate) in the wake of a demand shock. However, the response of the exchange rate has typically been much larger and faster than that of domestic prices, suggesting that it speeds the adjustment process. It would be costly, therefore, for Canada to move to a fixed exchange rate regime.

### Graph 3

Response of nominal exchange rate and prices to a real demand shock



## 6.2 Concerns that flexible exchange rates lead to loose fiscal policy

It is often argued that flexible exchange rates lead to loose fiscal policies—undisciplined governments can finance their spending simply by printing money and letting the exchange rate depreciate to preserve their country's international competitiveness. While the freedom provided by flexible exchange rates can easily be abused, empirical evidence concerning the assumed disciplinary effect of fixed exchange rates is not very strong. Casual inspection of the fiscal policies of several Latin American countries just prior to the debt crisis of the 1980s, or of certain European countries throughout most of the post-war period, does not suggest that fixed exchange rates have served as much of a fiscal deterrent. Italy and Belgium, for example, managed to accumulate two of the highest debt-to-GDP ratios in the industrialized world under a fixed exchange rate. It is also difficult to explain the recent improvement in Canada's fiscal position, if one believes that flexible exchange rates invariably lead to excessive spending. Binding governments in a currency union, as opposed to an adjustable peg arrangement, might provide more effective discipline. It is interesting to note, however, that the architects of EMU still found it necessary to impose additional fiscal constraints on their governments in the form of the Stability and Growth Pact.

### 6.3 Concerns that flexible exchange rates reduce world trade and investment

A third common criticism of flexible exchange rates is that their uncertain movements discourage world trade and investment activity. While the argument has a certain intuitive appeal, the theoretical and practical support for such a claim is also very weak. In theory, an increase in price variability has an ambiguous effect on economic behaviour. As with many price changes, there is both an income and a substitution effect. Depending on an agent's utility function, therefore, an increase in price variability can lead to more or less of a risky activity being undertaken.

As a practical matter, the empirical evidence reported to date has been unable to uncover any significant or consistent relationship between the variability of exchange rates and the volume of world trade. (See Côté (1994).) The evidence on investment activity is more limited but suggests a similar conclusion. The recent growth in world trade and investment flows certainly does not indicate that this has been a serious problem. In fact, some academics and policy-makers have called for the introduction of Tobin taxes and other restrictive measures to limit international capital flows because they believe that there is too much investment activity—at least of a certain type.

### 6.4 Concerns that flexible exchange rates hurt productivity

The latest, and potentially most serious, charge levelled at flexible exchange rates concerns their effect on productivity. Although the argument can take various forms, the most recent version starts with the presumption that Canadian firms, unlike their U.S. counterparts, are “satisficers” rather than profit maximizers and are content to earn just enough money to stay in business. Since flexible exchange rates automatically adjust to preserve international competitiveness, Canadian firms do not have to invest in the latest labour-saving technology or production techniques to realize their limited business objectives. Moreover, they have no incentive to get out of declining industries, such as natural resources, and into more profitable areas, such as computers. Canadians, as a result, have seen their standard of living decline, both in absolute terms and relative to the United States, and are likely to fall even further behind their southern neighbours unless they move to a common currency.

What the critics fail to realize is that exchange rate depreciations are not the cause of Canada's declining economic welfare, but simply the symptom. Moreover, currency depreciations never offset all the decline in world commodity prices or other external shock that the country might have experienced. As a consequence, capital and labour still have an incentive to move into other sectors, like manufacturing, which not only benefit from the depreciation but have experienced an increase in the relative price of the goods and services that they produce.<sup>15</sup> In

---

15. Indeed, owing to the change in relative prices, capital and labour would have an incentive to move out of the commodity sector even if the exchange rate offset all of the decline in commodity prices.

short, all the relevant price signals are still operative and pushing the economy in the right direction.

Two other problems with the productivity argument are (i) the assumption that a common currency would suddenly force Canadian firms to become more efficient, and (ii) the assumption that declining commodity prices necessarily imply declining profits. If Canadian firms are inherently lazy and undermotivated, a flexible exchange rate is the least of their concerns. Under these circumstances, a common currency is unlikely to have much curative effect; the problems would be more fundamental in nature. More importantly, it is a mistake to assume that the road to prosperity is paved with computers, and that natural resource industries are intrinsically unproductive and unprofitable. Indeed, the trend decline that we have witnessed in commodity prices over the past 25 years is largely a reflection of the sharp productivity increases that the resource industries in Canada and elsewhere have enjoyed during this period, not declining demand. Neither do declining prices necessarily denote declining profits. If they did, computers would be the last area that one would want to enter.

The biggest flaw in productivity debate, however, is the presumption that productivity growth in Canada has fallen behind that of the United States. While earlier data painted a rather grim picture, more recent evidence suggests that Canadian performance has been roughly equal to that of the United States, and perhaps superior. This is especially true if one focuses on multi-factor productivity, as opposed to labour productivity, and includes the entire business sector in the sample, as opposed to just the manufacturing sector. Even if one believed that Canadian productivity performance had been deficient, it is doubtful that the variability of the Canadian dollar would be the culprit. Deeper policy problems and institutional biases, such as the level and structure of taxes and onerous government regulations, would be more likely suspects.

More detailed analysis of Canada's economic performance at the two-digit industry level indicates that any slippage in our productivity has been specific to two manufacturing industries—computers and electronic equipment. Even then, the story is more one of U.S. success than Canadian failure. These industries appear to have achieved remarkably high rates of productivity growth in the United States and account for a much larger share of manufacturing output in the United States than they do in Canada. (It is also worth noting that there is some question about the reliability of the hedonic price indices that the U.S. authorities use to calculate productivity and output in these sectors.) If a flexible exchange rate were the source of the productivity problem, it would be surprising if it affected only two industries and left all the other manufacturers in Canada unaffected.

McCallum (1998a,b) has published some work showing that there is a high positive correlation between lagged movements in the Canadian dollar and changes in Canadian productivity relative to that of the United States. He is careful to note, however, that correlation does not imply causation, and that movements in both variables were likely driven by other, omitted variables.

Granger-causality tests recently completed by David Dupuis and David Tessier at the Bank of Canada show that, once cyclical factors are controlled for, the causality runs from changes in productivity to changes in the exchange rate rather than the reverse.

## 7. Looking ahead

The evidence that we have reviewed so far tends to support Canada's decision to operate under a flexible exchange rate. Contrary to the fears expressed by many observers, the flexible exchange rate does not appear to have misbehaved or subverted Canada's economic performance. Indeed, it is hard to imagine how certain sectors of the economy would have coped with the Asian crisis and the dramatic decline in world commodity prices without a depreciating Canadian dollar. It is unlikely that Canada would have recorded the strong growth rates that it did in 1997 and 1998 without this assistance.

Still, it must be admitted that the microeconomic benefits related to a common currency have not been as thoroughly investigated as those on the macro side. The bold experiment launched by the 11 countries participating in the EMU may have a great deal to teach us in this regard. Although it was initiated more for political reasons than for any expected economic benefits, its economic effects will still warrant close attention.

It is also possible that the Canadian economy will change in ways that make a common currency more attractive in the future. As we become more closely integrated with the U.S. economy, and the importance of trade continues to expand, the advantages of a common currency should also increase.<sup>16</sup> If prices and wages become more flexible, or labour begins to move more freely across national borders, the need for a flexible exchange rate will also decline. If the U.S. government continues to implement sound monetary policies and were to announce inflation targets consistent with our own, the case for an independent monetary policy would also be weakened.

Unfortunately, it is doubtful that many of these conditions will be met in the foreseeable future. In the meantime, we will have to closely monitor developments in Canada and elsewhere, and take comfort from the fact that a flexible exchange rate is at least a workable, if not optimal, policy option.

---

16. Care must be taken with this argument, however, as more trade could also lead to greater specialization, thereby increasing the need for a flexible exchange rate to help us deal with asymmetric shocks (see Krugman [1993]).



## References

- Amano, R. and S. van Norden. 1993. "A Forecasting Equation for the Canada-U.S. Dollar Exchange Rate." In *The Exchange Rate and the Economy*, Proceedings of a conference held at the Bank of Canada, 22–23 June 1992, 207–265. Ottawa: Bank of Canada.
- Antia, Z., R. Djoudad, and P. St-Amant. 1999. "Inter-provincial and International Risk Sharing in Canada." Bank of Canada. Photocopy.
- Bayoumi, T. and B. Eichengreen. 1994. "One Country or Many Analysing the Prospects for Monetary Unification in Various Parts of the World." Princeton University, Princeton Studies on International Finance, No. 76.
- Chamie, N., A. DeSerres, and R. Lalonde. 1994. "Optimum Currency Areas and Shock Asymmetry: A Comparison of Europe and the United States." Bank of Canada Working Paper No. 94–1.
- Côté, A. 1994. "Exchange Rate Volatility and Trade: A Survey." Bank of Canada Working Paper No. 94–5.
- Courchene, T. and R. Harris. 1999. "From Fixing to NAMU: Redressing Canada's Sinking Float." Queen's University Working Paper.
- Crow, J. 1999. "Any Sense in a Canadian Dollar?" University of Toronto, Policy and Economic Analysis Program Policy Study 99–1A.
- DeSerres, A. and R. Lalonde. 1994. "Symétrie des chocs touchant les régions canadiennes et choix d'un régime de change" Bank of Canada Working Paper No. 94–9.
- Dupasquier, C., R. Lalonde, and P. St-Amant. 1997. "Optimum Currency Areas as Applied to Canada and the United States." In *Exchange Rates and Monetary Policy*, Proceedings of a conference held by the Bank of Canada, October 1996, 131–170. Ottawa: Bank of Canada.
- Dupuis, D. and D. Tessier. 1999. "Analyse empirique du lien entre la productivité et le taux de change." Forthcoming.
- Feldstein, M. and C. Horioka. 1980. "Domestic Savings and International Capital Flows." *Economic Journal* 90: 369–379.
- Fenton, P. and J. Murray. 1993. "Optimum Currency Areas: A Cautionary Tale." In *The Exchange Rate and the Economy*, Proceedings of a conference held at the Bank of Canada, 22–23 June 1992, 485–531. Ottawa: Bank of Canada.
- Fortin, P. "Imiter l'Europe...de la bonne manière." *L'actualité*, 15 March 1999.
- Frankel, J. and A. Rose. 1996. "The Endogeneity of the Optimum Currency Area Criteria." NBER Working Paper No. 5700.
- Grubel, H. 1999. "The Case for the Amero: The Merit of Creating a North American Monetary Union." Simon Fraser University. Photocopy.
- Kenen, P. 1969. "The Theory of Optimum Currency Areas: An Eclectic View." In *Monetary Problems of the International Economy*, edited by R. Mundell and A. Swoboda, 41–60, Chicago: University of Chicago Press.

- Krugman, P. 1993. "Lessons of Massachusetts for EMU." In *Adjustment and Growth in the European Monetary Union*, edited by F. Torres and F. Giavazzi, 241–261. New York: Cambridge University Press.
- Laidler, D. 1999. "The Exchange Rate Regime and Canada's Monetary Order." Bank of Canada Working Paper No. 99–7.
- Lalonde, R. and P. St-Amant. 1995. "Optimum Currency Areas; The Case of Mexico and the United States." Centre for Latin American Studies. *Money Affairs* (July-December): 93–128.
- McCallum, J. 1998a. "Drivers of the Canadian Dollar and Policy Implications." *Current Analysis* (Royal Bank of Canada, August).
- . 1998b. "Government Debt and the Canadian Dollar." *Current Analysis* (Royal Bank of Canada, September).
- McKinnon, R. 1963. "Optimum Currency Areas." *American Economic Review* 53: 717–725.
- Mundell, R. 1961. "The Theory of Optimum Currency Areas." *American Economic Review* 51: 657–665.
- Murray, J. and L. Schembri. 1999. "Commentary on 'Towards a North American Common Currency: An Optimal Currency Area Analysis'," by T. Courchene. Bank of Canada. Photocopy.
- Murray, J., S. van Norden, and R. Vigfusson. 1996. *Excess Volatility and Speculative Bubbles in the Canadian Dollar: Real or Imagined?* Technical Report No. 76. Ottawa: Bank of Canada.
- Obstfeld, M. and G. Peri. 1998. "Regional Non-adjustment and Fiscal Policy: Lessons for EMU." Center for International and Development Economics Research, University of California, Berkeley, Working Paper 98-096.
- Powell, J. 1999. *A History of the Canadian Dollar*. Forthcoming.
- Roger, S. 1991. "Terms of Trade Movements in Major Industrial Countries." Bank of Canada Working Paper No. 91–2.
- Sorensen, B. and O. Yosha. 1998. "International Risk Sharing and European Monetary Unification." *Journal of International Economics* 45: 211–238.
- Thiessen, G. 1998–1999. "The Euro: Its Economic Implications and Its Lessons for Canada." Remarks to the Canadian Club of Ottawa, Ottawa, Ontario, 20 January 1999. Reprinted in *Bank of Canada Review* (Winter): 117–23.



Bank of Canada Working Papers  
Documents de travail de la Banque du Canada

Working papers are generally published in the language of the author, with an abstract in both official languages. *Les documents de travail sont publiés généralement dans la langue utilisée par les auteurs; ils sont cependant précédés d'un résumé bilingue.*

**1999**

- |       |   |  |
|-------|---|--|
| 99-12 | Why Canada Needs a Flexible Exchange Rate   | J. Murray                                |
| 99-11 | Liquidity of the Government of Canada Securities Market: Stylized Facts and Some Market Microstructure Comparisons to the United States Treasury Market | T. Gravelle                              |
| 99-10 | Real Effects of Collapsing Exchange Rate Regimes: An Application to Mexico  | P. Osakwe and L. Schembri                |
| 99-9  | Measuring Potential Output within a State-Space Framework   | M. Kichian                               |
| 99-8  | Monetary Rules When Economic Behaviour Changes  | R. Amano, D. Coletti, and T. Macklem     |
| 99-7  | The Exchange Rate Regime and Canada's Monetary Order  | D. Laidler                               |
| 99-6  | Uncovering Inflation Expectations and Risk Premiums from Internationally Integrated Financial Markets   | B.S.C. Fung, S. Mitnick, and E. Remolona |
| 99-5  | The Quantity of Money and Monetary Policy   | D. Laidler                               |
| 99-4  | An Intraday Analysis of the Effectiveness of Foreign Exchange Intervention  | N. Beattie and J-F. Fillion              |
| 99-3  | Forecasting GDP Growth Using Artificial Neural Networks   | G. Tkacz and S. Hu                       |
| 99-2  | Capital Gains and Inflation Taxes in a Life-cycle Model   | C. Leung and G.-J. Zhang                 |
| 99-1  | Dynamic Employment and Hours Effects of Government Spending Shocks  | M. Yuan and W. Li                        |

**1998**

- |       |  |   |
|-------|--|---|
| 98-23 | Résultats empiriques multi-pays relatifs à l'impact des cibles d'inflation sur la crédibilité de la politique monétaire  | P. St-Amant et D. Tessier               |
| 98-22 | A Non-Paradoxical Interpretation of the Gibson Paradox   | S. Coulombe                             |
| 98-21 | Une nouvelle méthode d'estimation de l'écart de production et son application aux États-unis, au Canada et à l'Allemagne | R. Lalonde, J. Page et P. St-Amant      |
| 98-20 | Evaluating Alternative Measures of the Real Effective Exchange Rate  | R. Lafrance, P. Osakwe, and P. St-Amant |

Copies and a complete list of working papers are available from:

*Pour obtenir des exemplaires et une liste complète des documents de travail, prière de s'adresser à:*

Publications Distribution, Bank of Canada  
234 Wellington Street Ottawa, Ontario K1A 0G9

Diffusion des publications, Banque du Canada  
234, rue Wellington, Ottawa (Ontario) K1A 0G9

E-mail / Adresse électronique: [publications@bank-banque-canada.ca](mailto:publications@bank-banque-canada.ca)

WWW: <http://www.bank-banque-canada.ca/>

FTP: [ftp.bank-banque-canada.ca](ftp://ftp.bank-banque-canada.ca) (login: anonymous, to subdirectory/pub/publications/working.papers/)