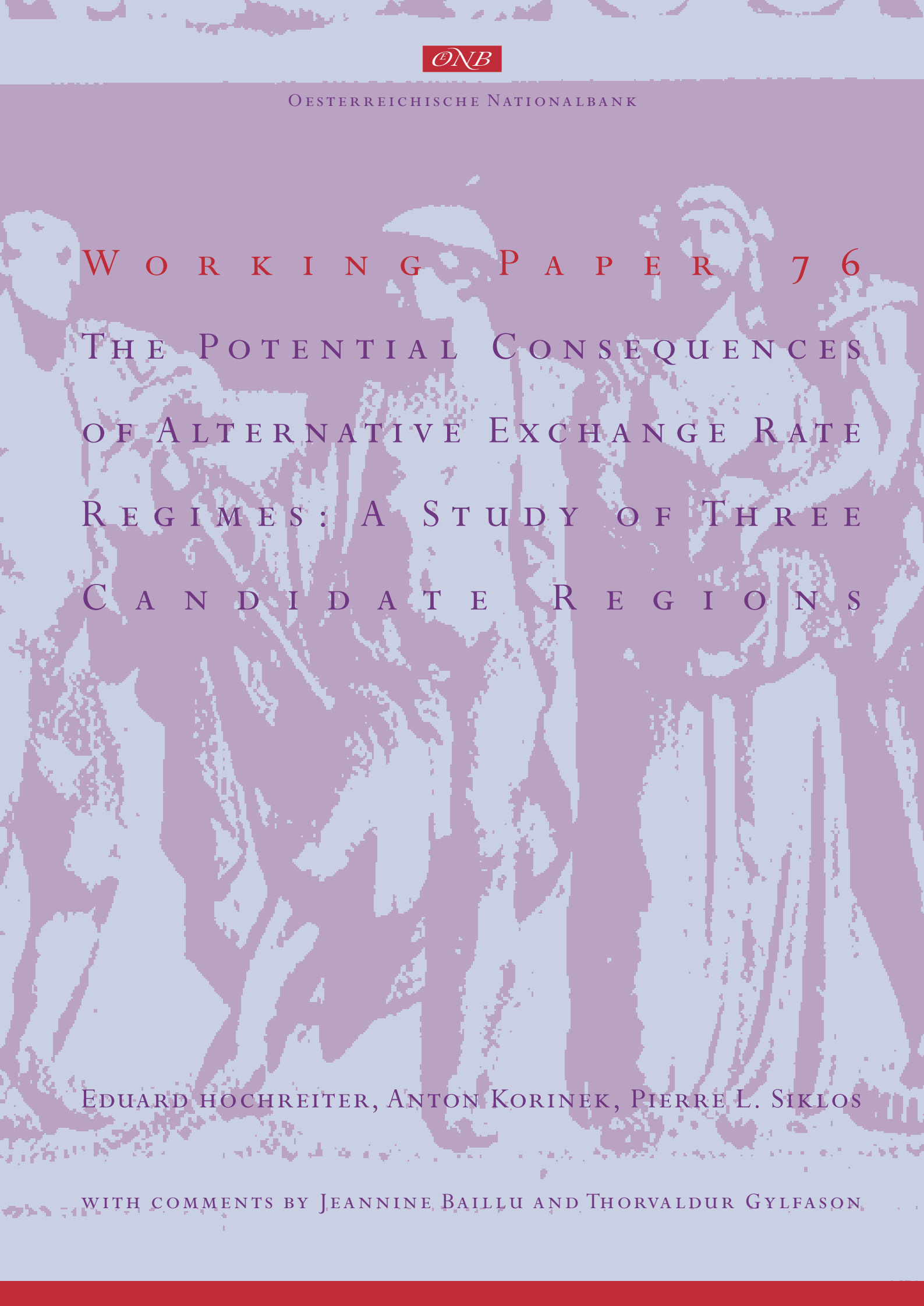


Oesterreichische Nationalbank

Working Paper 76

The Potential Consequences of Alternative Exchange Rate Regimes: A Study of Three Candidate Regions

Eduard Hochreiter, Anton Korinek, Pierre L. Siklos

with comments by Jeannine Baillu and Thorvaldur Gylfason

Statement of Purpose

The Working Paper series of the Oesterreichische Nationalbank is designed to disseminate and to provide a platform for discussion of either work of the staff of the OeNB economists or outside contributors on topics which are of special interest to the OeNB. To ensure the high quality of their content, the contributions are subjected to an international refereeing process. The opinions are strictly those of the authors and do in no way commit the OeNB.

Imprint: Responsibility according to Austrian media law: Wolfdietrich Grau, Secretariat of the Board of Executive Directors, Oesterreichische Nationalbank

Published and printed by Oesterreichische Nationalbank, Wien.

The Working Papers are also available on our website:

http://www.oenb.co.at/workpaper/pubwork.htm

Editorial

On April 15 - 16, 2002 a conference on "Monetary Union: Theory, EMU Experience, and Prospects for Latin America" was held at the University of Vienna. It was jointly organized by Eduard Hochreiter (OeNB), Klaus Schmidt-Hebbel (Banco Central de Chile) and Georg Winckler (Universität Wien). Academic economists and central bank researchers presented and discussed current research on the optimal design of a monetary union in the light of economic theory and EMU experience and assessed the prospects of monetary union in Latin America. A number of papers presented at this conference are being made available to a broader audience in the Working Paper series of the Oesterreichische Nationalbank and in the Central Bank of Chile Working Paper series. This volume contains the twelfth of these papers. The first ones were issued as OeNB Working Paper No. 64 to 72 and No. 74 to 75. In addition to the paper by Eduard Hochreiter, Anton Korinek and Pierre L. Siklos the Working Paper also contains the contributions of the designated discussants Jeannine Bailliu and Thorvaldur Gylfason.

October 10, 2002

The Potential Consequences of Alternative Exchange Rate Regimes: A Study of Three Candidate Regions*

Eduard Hochreiter
Oesterreichische Nationalbank

Anton Korinek
Columbia University

Pierre L. Siklos
Wilfrid Laurier University
and
Viessmann Research Centre on Modern Europe

* Paper presented at the conference *Monetary Union: Theory, EMU Experience, and Prospects for Latin America* organized by the Oesterreichische Nationalbank, the University of Vienna and the Banco Central de Chile, April 15–16 , 2002, Wien, and at the International Conference "*Exchange Rates, Economic Integration and the International Economy*" at Ryerson University, May 7-19, 2002. Andreas Eckner and Sarah Facey provided excellent research and programming assistance. Comments by conference participants and Jeannine Bailliu, Thorvaldur Gylfason, Heinz Herrmann, Weshah Razzak and Joob Swank are gratefully acknowledged. Part of the research for this paper was conducted while Siklos was WLU University Research Professor in 2000-2001, and Visiting Professor at UTS, Sydney, in 2001. Financial support from the Social Sciences and Humanities Research Council of Canada and Wilfrid Laurier University is gratefully acknowledged. A separate appendix is available at www.wlu.ca/~wwwsbe/faculty/psiklos/home.htm with additional results not shown in the paper. Previous versions of this paper were also presented at the University of Vienna and the first annual Viessmann Conference at WLU.

ABSTRACT

The paper examines the macroeconomic consequences of selecting alternative exchange rate regimes of countries in three regions. In particular, it studies whether Austria, the Netherlands, Canada and New Zealand made the right monetary regime choices between 1970 and 2000. We focus on the role of asymmetric shocks as a core determinant for the evaluation of various monetary regimes by studying the impact of a hard peg, a full monetary union, or floating exchange rates (with or without inflation targeting) on selected macroeconomic variables. Estimates of structural VARs are used to ascertain if the countries under review meet the essential ingredients of an optimum currency area (OCA) and thus are candidates for a monetary union. Counterfactual experiments help to study economic outcomes had these countries pursued alternative monetary strategies. We conclude that a floating regime with inflation targeting is best for Canada, a monetary union with Australia is the best course of action for New Zealand, and monetary union is the appropriate choice for the Netherlands while there are reasons to believe that Austria might have been better off with a floating regime, at least for a time. We also find that good monetary policy is not confined to any particular exchange rate regime and that political and institutional factors weigh heavily in this decision.

Keywords: Exchange rate regimes, Monetary Union, SVARs

JEL numbers: E30, F30

1. Introduction

The debate over the most appropriate monetary regime for a country has not abated over the years. Indeed, developments, such as (European) Economic and Monetary Union (EMU), have only served to stimulate more debate and raise the question whether still fewer currencies are economically desirable (e.g., Dornbusch 2001). A welcome aspect of the recent literature is the growing recognition that traditional references to the dichotomy between fixed versus flexible exchange rates is, as Robert Mundell (2000b) put it recently, an "oxymoron". Rather, the "optimal" exchange rate regime is the one most likely to produce the best conduct in monetary policy and it is not obvious, a priori, whether fixed rates are preferable over floating rates, or vice-versa.

Under a fixed exchange rate regime or a monetary union, the domestic monetary policy of the country in question, which we shall refer to as the "candidate" country, is emasculated by the monetary policy decisions of what shall henceforth be termed the "target" country. A floating regime, by contrast, is not a well-defined policy regime unless the anchor for monetary policy is clearly enunciated. In recent years, inflation targeting has become increasingly popular as the principal strategy of the central bank.

Beyond the benefits of reduced transactions costs stemming from the existence of fewer circulating currencies, there is at least another important motivating factor for giving up an independent monetary policy and choosing a monetary union over another currency arrangement. Friedman (1973, p. 59), although best known as an advocate of the floating rate regime with a domestic anchor via some money growth rule, nevertheless argued that, in some instances, "the best policy would be…to unify [a country's] currency with the currency of a large, relatively stable developed country with which it has close economic relations, and to impose no barriers to the movement of money or prices, wages, and interest rates." In this paper we ask how alternative monetary regimes might affect output growth, inflation and their volatility for groups of countries that are often viewed, in historical, economic, and political terms, as candidates for currency arrangements other than the ones they actually adopted.

We examine the macroeconomic experiences covering the last three decades in Austria, the Netherlands, Germany, Canada, the United States, New Zealand, and Australia. Austria, the Netherlands, and Germany, have, of course, been members of a

monetary union (EMU) since 1999. Canada and the US are often mentioned, especially since Robert Mundell became Nobel Laureate, as obvious candidates for some common currency arrangement. The question about the appropriateness of the current exchange rate regime has also been the focus of a considerable debate across the Tasman Sea in the past few years.

Our strategy is two-fold. We specify and estimate a structural model for each economy in question that recognizes the interdependence of various economic shocks. In addition, we also control for some of the idiosyncrasies stemming from important differences in the unsystematic component of each country's economic policies. The estimates are used to derive empirical measures of the correlation between shocks that emanate from aggregate demand (primarily fiscal policy), supply and monetary policy. We compare cases where the unsystematic components of policies are not controlled for with ones where the estimated shocks have been conditioned on such policies. We argue that such comparisons may shed important light into the conduct of policies under alternative exchange rate regimes.

Next, we use the estimates from the various estimated models to consider three counterfactual experiments. We ask what would output growth, inflation, and their variance have been if the target countries had adopted a hard exchange rate peg, a full monetary union that combines a hard peg with the target country's interest rate, or a floating exchange rate regime where either uncovered interest rate parity is used to simulate the evolution of the exchange rate or an inflation targeting regime is adopted.

We find that shock asymmetry is a feature of the data even for countries that are seemingly obvious candidates for monetary union. Nevertheless, the response of output growth and inflation to various shocks are sufficiently similar to suggest that any of the potential monetary regimes being considered can be deemed to be appropriate.

Finally, the various counterfactual experiments suggest that monetary union could provide benefits in terms of reduced inflation and reduced inflation volatility for New Zealand in particular. The same is true for the Netherlands and Austria while no discernible benefits were found for Canada from a hard peg or a full monetary union with the US.

The paper is organized as follows. First, we briefly outline the "Maastricht Model" that lies behind Economic and Monetary Union in Europe as it represents an obvious model for monetary unions of the future. Next, we briefly survey the literature on optimum currency areas as it pertains to the countries under study and the issue of shock symmetry. Section 4 then develops the structural VAR model and the methodology used to derive the counterfactual results. Section 5 discusses the data and presents the empirical evidence while section 6 concludes.

2. The Maastricht Model

The uniqueness of the Maastricht Model to monetary union is embodied in EMU proceeding without prior political union. This fact notwithstanding, the Maastricht approach points to a possible way to the establishment of a monetary union. Central to the Maastricht model are the concepts of monetary dominance (cf. Hochreiter, Schmidt-Hebbel and Winckler, 2002) and of “convergence”, as defined in Protocol 6 of the Maastricht Treaty.

Table 1 provides annual data concerning the four elements of the convergence criteria for Australia, New Zealand, Canada, the three candidate countries in our sample that do not presently belong to a monetary union, as well as the Eurozone. On almost all counts, "our" three candidate countries would currently easily meet the Maastricht convergence criteria, except for the exchange rate criterion. Regarding the original 11 EMU members there was some controversy, as the date for Stage III of EMU approached, about the extent to which all of them satisfactorily met all of the Treaty conditions. In the event, the Treaty left enough room for interpretation so that only Greece was excluded because of a failure to meet the criteria. Denmark and the UK exercised their opt-out clause, while Sweden was excluded (by its own desire) on the grounds that it technically did not meet the exchange rate criterion.

In the context of our study it is interesting to note that membership in the ERM (an adjustable peg with broad bands) was deemed instrumental in ensuring that the convergence criteria, in particular the inflation criterion, would be attained. Yet, the

candidate countries in our study that have pursued a floating exchange rate cum inflation targeting strategy performed broadly similar if not better than the EMU participants. This suggests that an exchange rate regime *per se* may not provide a clear indication of the likely overall economic performance. As Mundell (2000a) has pointed out, the pursuit of price stability, rather than the slavish adherence to a particular type of exchange rate regime, is what should pre-occupy policy makers minds. At the same time, the convergence in inflation rates apparent from the data in Table 2 also supports Mundell´s view of the feasibility of wider monetary unions in the future.

3. Optimum Currency Areas: A Selective Survey

3.1 The Nature of Aggregate Shocks and the Role of Fiscal Policy

In what follows, we focus on two basic questions surrounding the choice of monetary arrangements that are especially germane to the objectives of this paper: the impact of economic shocks under different exchange rate regimes and the influence of currency arrangements on the synchronicity of business cycles.

As indicated earlier, some of the conditions that support flexible rates include structural differences between the candidate and target countries. For example, Murray (2000) argues that, despite the highly integrated nature of, for example, the US and Canadian economies, important structural differences do remain. Canada is more exposed to external shocks than is the US. Furthermore, there must be sufficient downward rigidity of wages and prices. In the case of Canada, Fortin (1996) argues that low inflation has reduced the ability of wages and prices to be flexible. Freedman and Macklem (1998) take a contrary position, arguing that Fortin's evidence of downward nominal wage rigidity is overstated.

Ultimately, however, the principal advantage of a flexible exchange rate regime is its ability to absorb both foreign and domestic economic shocks thereby highlighting the role of monetary sovereignty. Therefore, much empirical research work has focused on whether aggregate shocks are symmetric or not. Shock symmetry refers to the distribution of the impact of some economic shock across the participating economies in a potential monetary union. If shocks are indeed highly asymmetric – read uncorrelated – then floating exchange rates act as a shock absorber; otherwise, the exchange rate does

not serve a useful corrective role and so the various micro and macro economic costs of national currency arrangements become critical. Dupasquier, Lalonde and St.-Amant (1997) address the exchange rate response issue – the fact that Canada's exchange rate has tended to appreciate in the wake of non-monetary demand shocks. They also find that the interest rate rises following such a shock. These results suggest that identified non-monetary demand shocks correspond closely to real demand shocks and that what we are seeing is the crowding out effect of these real shocks. They also observe that, following a one standard deviation non-monetary shock, the adjustment in the exchange rate is much swifter and greater than that of prices. Moreover, the adjustment in prices is statistically insignificant, while the impact of nominal exchange rates is statistically different from zero. From this perspective, it looks costly for Canada to abandon exchange rate flexibility. They also show that the nominal exchange rate contributes to facilitating macroeconomic adjustments, and that it does so mainly for real demand shocks. It might be added that theoretical models do not necessarily lead to the conclusion that the exchange acts as an automatic adjustment device. Devereux (1999) points out that it is crucial to consider whether prices are sticky in a flexible exchange rate world as well as how much cross-country coordination there is in the area of monetary policy. An extension of existing theoretical models lead to the conclusion that, in the presence of sticky prices and a cooperative peg, as opposed to a unilateral peg, a fixed exchange rate regime may welfare-dominate a floating regime.

Rose (1995), and Flood and Rose (1995), compare the volatility of different major macroeconomic variables under fixed and flexible exchange rates. The frequency and size of shocks is likely to be related to the volatility of key macroeconomic aggregates. They find that there is no significant difference in the volatility of variables such as output and inflation. Flexible exchange rates may correspond to periods of greater and more volatile shocks, but their results support the hypothesis that exchange rate flexibility has facilitated adjustment to real demand shocks as in, for example, Canada over the last few years. Without this flexibility, prices and domestic output would have been more volatile. Moreover, it is possible that exchange rate flexibility has attenuated the effects of certain shocks specific to the Canadian economy.

In a model of VAR simulations of inflation and output growth, Bayoumi and Eichengreen (1994) attempt to measure the asymmetry of contemporaneous shocks. They are able to identify permanent and transitory shocks using the Blanchard - Quah decomposition method. For Canada and the US they find that supply shocks are not highly correlated, while the degree of symmetry of shocks in regions within the US is notably higher. In a slightly more sophisticated study, taking into account the degree of symmetry of both demand and supply shocks affecting Canada and the US, Lalonde and St. Amant (1995), and DeSerres and Lalonde (1994), use models with three variables: the growth rates of output, prices and money. They remove monetary shocks from other demand shocks by imposing the restriction of long-term neutrality, that is, monetary shocks have no permanent effect on real balances. They examine contemporaneous correlations of supply shocks and non-monetary demand shocks, and conclude that shocks affecting the Canadian economy have little in common with those that affect the US. Finally, DeSerres and Lalonde (1994) find that Canada and the US are subject to significant asymmetric shocks, whereas structural shocks hitting the nine regions of the US are very similar (Lalonde and St-Amant 1995). The reported correlations in the latter case range between 50-99%. Therefore, they conclude that the US is an optimum currency area.

The likelihood that an adverse shock would have a major impact on an economy will depend on how diversified is the economy's production structure. Blundell-Wignall and Gregory (1990) argue that, in the context of large commodity price fluctuations, macroeconomic stabilization and price stability call for exchange rate flexibility. But, as in the case of a negative commodity price shock, the exchange rate will react through exchange rate depreciation, increasing the consumer price index by an amount proportional to the share of imports in consumption, thereby exacerbating inflationary pressures.

Courchene and Harris (1999) suggest that, in the case of Canada and the US, flexible exchange rates have not served their purpose in the face of a trend where trade is predominately North/South (i.e., between the US and Canada) instead of East/West (i.e., between the provinces). They state that we are witnessing the creation of large regional

trading blocs, which favor the adoption of a common currency.[1] Asymmetric shocks that would have occurred are smaller if the potential union partner is a key bilateral trading partner. There is reason to believe the same might be true for the Australia-New Zealand case (e.g., see Scrimgeour 2001). Murray (2000) and Laidler (1999) find flaws with the Courchene-Harris view. They call into question their interpretation of the structure of the Canadian and US economies. For example, Canada is far more dependent on commodities. Finally, there is evidence that a monetary union rarely takes place without a great deal of political integration and policy coordination, as is the case with EMU, a point emphasized earlier. There appears to be little public support in Canada for such integration.

It is also questionable how much support exists in the trans-Tasman case (see, however, Grimes, Holmes and Bowden, and Grimes 2000), though there have been attempts to create common currency arrangements in the past. Hargreaves and McDermott (1999) find that a currency union for New Zealand might be desirable relative to merely 'pegging' its exchange rate. Yet, while both regimes reduce macroeconomic flexibility, only the former produces sufficient (transactions) cost savings (cf. Masson and Taylor 1994).[2] Orr (1999), in contrast, concludes that the benefits of maintaining policy flexibility probably outweigh the benefits from small gains in trade volumes, and from the reduction in transactions costs that stem from a monetary union (also see McCaw and McDermott 2000). Grimes, Holmes and Bowden (2000), underline the microeconomic benefits for New Zealand in abandoning the NZD in favor of the AUD and rely on survey evidence to justify some of their arguments. In addition, recent re-examinations of the potential net benefits of an Australian-New Zealand monetary union (e.g., see Coleman 2001, Hartley 2001) suggest that the case for net gains from trade under a common currency remain unclear.

So far, the analysis has focused on the role of monetary policy as the principal means of macroeconomic adjustment in the presence of shocks under different exchange

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

[2] An issue not directly relevant to the main arguments in the present study is one's definition of a pegged versus a floating exchange rate regime. Levy-Yeyati and Sturznegger (2001) argue that conventional classifications of exchange rate regimes (e.g., IMF definitions) offer an inadequate portrayal of the actual regime in place. For a different view Kuttner and Posen (2001).

rate regimes. Yet, there is a potentially crucial role for fiscal policy. Grubel (1999) argues that the need for flexible exchange rates is overrated and all that is required is internal price adjustment, a sound fiscal policy, and internal migration. He cites the example of California and the closure of the defense-related companies when the federal government decreased its defense spending in that state.[3] While Murray (2000) concedes that flexible exchange rates could indeed be made redundant if the country has a surfeit of macroeconomic instruments, this is rarely the case. Generous fiscal transfers could be enacted when there are shocks to the economy, but they often lack the speed necessary to be effective, and are difficult to reverse once the shock has passed. Obstfeld and Rogoff (1995) conclude that there is no evidence of a reliable link between exchange rate regimes and fiscal policy. Crow (1999) argues that floating currencies do not allow fiscal policy to be irresponsible on the grounds this irresponsibility is not floated off by depreciation. Grubel (1999) and Courchene (1999) both argue that a common currency would have a positive impact on fiscal discipline.

In the European context, the convergence criteria of the Maastricht Treaty and *Stability and Growth Pact* were designed to ensure sound and sustainable fiscal policy. These rules have been criticized as a nuisance or even dangerous because they are alleged to prevent fiscal policy to play its role as a shock absorber. However, once the medium term goal of the Stability Pact of a fiscal position close to balance or in surplus is satisfied, there is enough flexibility to offset "normal" regional shocks. It is somewhat ironic, however, that the German government that was the driving force behind the idea of EMU fiscal rules (foremost the SGP) turned out to be the most problematic fiscal case by 2002.[4] Eichengreen and von Hagen (1996) point out an additional danger arising from fiscal constraints within a monetary union composed of several sovereign states. Too

[3] However, California did not need to secede, since it had the benefit of US fiscal federalism, which entitled the State to financial aid inflows from other States. Sachs and Sala-i-Martin (1992) emphasize that currency unions such as the United States have less of a need for monetary policy since this transfer system works for the nine US regions. They estimated that over 1970-1988, a $1 decline in a region's income led to a 33 to 37 cent fall in tax payments to Washington and a 1 to 8 cent increase in transfer receipts. Thus, at least a third of a region's economic bad luck is offset by this federal fiscal system. In Europe, while there are hardly any transfers on a EU wide level (limit of taxation of 1.27% of EU wide GDP), there exist large national fiscal safety nets.

[4] As this is written both Germany and Portugal averted the "early warning" as foreseen in the Maastricht Treaty. It remains to be seen whether the pledges of future spending controls will be met See, for example, Norman (2002), and Barber (2002).

much fiscal discipline can impede other, more flexible, attempts at coordinating stabilization policies. More importantly, the EU is not designed for wide-ranging union-wide tax transfers and so risk sharing at the fiscal level is rather limited (Gramlich and Wood 2001). However, while such transfers on a EU wide level are not possible to any large extent (limit of taxation of 1.27% of EU-wide GDP), there exists a large and well-established transfer system at the level of national states. At the same time the net benefit of such transfer systems is not clear. Kletzer and von Hagen (2001) argue that the welfare effects of such sinsurance schemes is ambiguous (cf. Hochreiter, Schmidt-Hebbel and Winckler 2002) and thus, might even be unnecessary.

3.2 *Business Cycle Synchronicity*

Increased synchronicity of business cycles is a relevant argument in support of OCAs. Frankel and Rose (1998) argue that a currency union can lead to increased economic integration (also see Rose and Engel 2000) which will tend to synchronize business cycles.[5] However, they also believe that international trade patterns are endogenous, and having a fixed exchange rate will lead trade relations to become more intense between two countries (also, see Rose and van Wyncoop 2001).[6] This means that, as a currency union increases trade, the shocks the union partners face will become more symmetric over time.[7] Bayoumi and Eichengreen (1992) conclude that the degree of asymmetry is considerably smaller if only the sub-set of EU countries that have traditionally maintained close economic and monetary links with Germany is considered. On the other hand, Hochreiter and Winckler (1995) show that, throughout the 1970s and 80s, shocks hit the Austrian economy asymmetrically vis-á-vis the German economy. Empirical evidence does not support the view that shocks have become more symmetric

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

[6] Pakko and Wall (2001) question the methodology employed by Rose (2000), as does Persson (2001) and suggest that the gains from trade in a currency union are considerably smaller or possibly insignificant. See, however, Rose (2001b). There are well-established transfer systems at the level of the national states.

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

over time.[8] Wyplosz (2001) estimates a three variable VAR and open economy Taylor type policy rules and finds that business cycles in Germany and France, in particular, have become more synchronous. Moreover, greater market integration in Europe may have contributed to reducing the overall heterogeneity in business cycle and monetary policies.

Turning to other evidence, in a series of counterfactual experiments that rely on the Reserve Bank of New Zealand's model, Drew, Hall, McDermott and St. Claire (2001) report that the output gap would have been higher had New Zealand adopted the AUD.[9] Lafrance and St. Amant (1999) find that business cycles may become more similar if demand shocks dominate, countries are subject to common external shocks, or intra-industry trade dominates. As a consequence, a monetary union between Canada and the US appears more costly from the point of view of shock asymmetry than from the perspective of business cycle asymmetry. A possible explanation is that the US business cycle is quickly transmitted to Canada, due to the size of the US economy and the tight economic relationship between the two countries. Hence, the two countries' business cycles are more correlated than previously suggested. Exchange rate flexibility may also have made the two countries business cycles more symmetric by smoothing the effect of asymmetric shocks between the two countries.

Melitz and Weber (1996), and Dupasquier, Lalonde, and St.-Amant (1997) point out that, when dynamics are taken into account, the US and Canadian economies exhibit a much greater degree of symmetry. They find that the correlation between Canadian and US shocks is not very different overall from what we observe for European countries. This conclusion differs from the findings of Lalonde and St. Amant (1995), Bayoumi and Eichengreen (1994) or DeSerres and Lalonde (1994), who reported a more marked symmetry between European countries than between Canada and the US.

4. Model Specification, Estimation, and Counterfactual Experiments

A critical issue is, given a *different* set of unsystematic policies, would the outcomes for inflation and output have been different in the candidate economies in

[8] The authors do qualify this by stating that due to data problems, and limited statistical significance, an earlier version of their paper had found increased symmetry of shocks in the 1980's versus the 1970's.
[9] Monetary policy would also have been looser thanks to a flatter yield curve inherited from Australia.

question had a different monetary regime been in place? Identification of systematic and unsystematic components of monetary and fiscal policies is therefore important.

In the present study we focus on the role of the exchange rate regime and we distinguish between a pegged exchange rate with no currency union, thereby permitting different interest rate policies, a monetary union in which the interest rate in candidate and target economies are identical, and a floating exchange rate where exchange rates and interest rates are permitted to float but are constrained to satisfy the uncovered interest rate parity (UIP) condition.[10] As an alternative to the UIP constraint we also examine what would have happened if all candidate countries had adopted a target for inflation while permitting the exchange rate to float freely. We do so by "forcing" inflation to meet the specified inflation target.[11] In the case of Australia, Canada, and New Zealand, numerical inflation targets were officially announced in the 1990s (cf. Siklos 2002 for the precise dating).

We estimate a structural VAR of the form

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

The vector $\mathbf{Z} = [\mathbf{N; M}]$, consisting of two sub-vectors **N** and **M**, is given by [y, g; r, π, ξ]', where y is output growth (real GDP), *g* is the share of government (consumption) expenditures relative to GDP, *r* is a short-term domestic and foreign real interest rate[12], π is the inflation rate, and ξ is the nominal rate of currency depreciation.[13]

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

[11] This counterfactual raises a number of difficult questions for, unless a central bank is a "strict" inflation targeter (in the words of Svensson) then it would be preferable to force the target to be met over a specified – but equally unobservable – target horizon. Although not entirely satisfactory, we opted to model the inflation "forecast" as a smoothed series derived by applying a Hodrick-Prescott filter with a large weight (4800) to actual inflation. However, for the sample when Australia, Canada, and New Zealand actually adopted numerical inflation targets the relevant figures are used. Cf. Collins and Siklos (2001).

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

[13] An alternative would have been to specify and estimate a joint model for each of the candidate-target groups of countries. We feel, however, that the presence of a foreign (i.e., the target country's) interest rate accomplishes the same objective, as well as producing a relatively parsimonious model. Indeed, our approach allows a better focus on the role of *key* policy instruments that exist outside a monetary union. We chose to use the nominal instead of the real exchange rate because their overall time series properties are roughly the same when expressed n first differences, and it is doubtful that the real exchange rate series are comparable across the countries considered. In this connection, see Obstfeld and Rogoff (1996, pp. 606-608.

The first two series in **Z** are the non-monetary variables, while the remaining three are the monetary indicators. A data appendix provides data sources and definitions. $\boldsymbol{\varepsilon}^{\mathbf{M}}$, $\boldsymbol{\varepsilon}^{\mathbf{N}}$ are vectors of monetary and non-monetary innovations. The estimation of five equations yields a total of five shock series. However, for expositional purposes, we classify them here into these two groupings (see below). r^* is the real interest rate of the target country, and c is a commodity price index. R and B are level shift and impulse dummies that define unsystematic changes in monetary regimes that are anticipated.[14] The significance of these dummies cannot be under-emphasized. They essentially accomplish two objectives. First, they are meant to deal with the Lucas critique. Second, they convey the notion that the locus of this study's interpretation of what is meant by a "regime" focuses on the choice between a fixed versus a floating exchange rate policy.[15] Hence, the model is conditioned, among other things, not only on common unsystematic shocks but also on the idiosyncratic shocks that appear to be independent of the choice of exchange rate regimes but can, potentially, influence the success of chosen policies under the respective exchange rate regime. An alternative strategy would be to allow the data, as it were, to find the location of the "breaks" (e.g., as in Burdekin and Siklos 1999, and Hoover and Jordá 2001). We chose not to adopt this strategy because it tends to select dates that are close to ones that an historical analysis would have selected in any event, as well as because the location and the number of estimated breaks can be sensitive to the technique employed.

The identifying long-run restrictions are such that in

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

A is lower triangular and **B** is a diagonal matrix. The identification approach essentially adopts the Blanchard and Quah (1989) strategy of long-run identifying restrictions. Restricting the matrix of long-run responses to be lower triangular, aggregate supply shocks (i.e., output) can have permanent effects but aggregate demand or policy shocks are not permitted to have a long-run impact on output. Similarly, monetary policy shocks (e.g., interest rates, exchange rates) are not permitted to have a long-run impact on

[14] A complete list of the dummies is relegated to an appendix.

[15] As noted earlier, the choice of a floating exchange rate regime does not by itself fulfill the definition of a policy regime for it must be accompanied by a policy to anchor the price level either via some form of

output, inflation, and fiscal policy. Fiscal shocks are permitted to have a long-run effect on all variables save output. A separate appendix provides the details.

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

Next, we generate forecasts of the variables in the model by imposing hypothetical constraints on the residuals of the VAR. They define four counterfactual scenarios: (1) a candidate country pegs its exchange rate to that of the target country; (2) a full monetary union consisting of a fixed exchange rate and adopting the nominal interest rate of the target country; (3) adopting a floating exchange rate under the constraint that uncovered interest parity holds in equilibrium. (4) Adopting a floating exchange rate regime, where inflation is "forced" to meet the specified inflation target (π^*) every period (see n. 11). We provide results for the first three counterfactual cases by setting $\xi=0$ in scenario (1), $\xi=0$ *and* $r=r^*$ in scenario (2), while $R=R^*+\xi$ holds in scenario (3), where R and R* are nominal short-term interest rates, other things held constant. Finally, in scenario (4), we set $\pi_t= \pi_t^*$.

A natural objection to any such counterfactual is that the structure and coefficient estimates of the model need not be invariant under the specified scenarios. In other words, the choice of regime results in a structural shift that cannot be adequately replicated in the data.[16] Although no technique can fully accommodate the potential implications of the type of policy change we are contemplating here, the impact of this criticism is somewhat mitigated by making allowances for the fact that, for example, in the case where the exchange rate is pegged, other shocks were estimated under conditions where the ε in (1) would not have left ξ unaffected. Consequently, one should view the

---

monetary targeting, uncovered interest rate parity, or an inflation target. The specification of the dummy variables reflects this view.

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

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

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

5. Empirical Results

5.1 Correlation of Structural Shocks and Impulse Responses

As noted previously, it is likely that the symmetry of shocks will be sensitive to the treatment of the stationarity of the time series under investigation. As a result, Table 2 displays two sets of correlations. Part (i) is based on a SVAR where the series are in first differences but inflation and the real interest rate are assumed to be stationary. Part (ii) treats the real interest rate as being difference stationary, while the remaining variables are unchanged in form from part (i). Finally, we provide separate estimates of the correlation coefficients depending upon whether unsystematic components of economic

policies are taken into account. Details about the construction, justification, and specification of the relevant dummy variables are relegated to an appendix.

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

The correlations of supply and monetary shocks appear to be the most sensitive of all to the time series specification of the real interest rate series. However, if we assume that first differencing is adequate, and this is generally viewed as the transformation of choice, then the correlation of structural shocks is rather modest though most significant in the Austria-Germany and Netherlands-Germany pairings. Also, note that the correlation of monetary shocks is generally positive and significant with the exception of a couple of cases for the Canada-US pairing and one case for the New Zealand-Australia group.[17]

Part (B) of the Table allows us to determine whether conditioning the results on unsystematic policies has a significant impact on the results. If we examine the case where inflation and the real interest rate are stationary, we find that ignoring the unsystematic component of economic policies often leads to a downward bias in estimates of the correlation of aggregate supply shocks for Canada-US and NZ-Australia

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

while the opposite is true for the monetary shocks between Germany and Austria or the Netherlands. This is generally also true when the real interest rate is assumed to be difference stationary. Nevertheless, and this is especially apparent for the Austria-Germany and Netherlands-Germany pairings, shocks are more highly correlated when the control dummies are included. Hence, conditioning on unsystematic policies can have a significant result on the degree of shock asymmetry estimated from the data.

It is also interesting to examine the impact of our results for a couple of sub-samples. We first consider a sample that excludes the 1990s. The last decade is thought to be a historically unusual one because of the popularity of inflation control objectives and the relative absence of aggregate supply shocks (e.g., Mankiw 2001). Next, we consider SVAR estimates for the 1990s period alone. The results are shown in Tables 3 and 4. Aggregate supply shocks and monetary shocks are ordinarily less highly correlated for the 1990s when unsystematic shocks are not controlled for. When estimates are conditioned on these shocks the impact is country group specific. For example, aggregate supply shocks and monetary shocks become less highly correlated for the Netherlands-Germany or Austria-Germany pairings while the opposite holds for the Canada-US and NZ-Australia parings. Note, however, that this result is again sensitive to the time series treatment of the real interest rate series. Non-monetary aggregate demand shocks are also lower in the 1970-1989 sample in most cases. Given that the 1970-1989 sample contains the period of high inflation and much of the subsequent disinflation, it is probably reasonable to suggest that the correlation of monetary policy shocks has *fallen* during the 1990s, despite the growing convergence in monetary policies among the industrial countries (e.g., see Siklos 2002), if we are not prepared to condition our estimates on unsystematic shocks. In other words, despite seemingly similar monetary policies there are sufficient differences (perhaps in the timing of monetary policy actions?) and that these are reflected in lower correlations in monetary shocks. Once we control for unsystematic shocks the picture is less clear regarding differences between the 1970s and 1980s versus the 1990s. Note also that, in almost half of the cases considered, shocks that were positive in the 1970-1989 sample turn negative in the most recent sub-sample. Finally, we consider the impact of adding commodity prices as an exogenous variable in the SVARs for the Canada-US and NZ-Australia groupings. Interestingly, this addition

generally increases the correlation of all Canada-US shocks while only aggregate supply shocks are positively affected in the NZ-Australia case.

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

Figures 1 through 4 consider the impulse responses derived from the SVAR considered. Only the impulse responses from the SVARs for the candidate countries are shown to conserve space. To facilitate their interpretation the plots show the *accumulated* response to various shock combinations. Although there are a large number of results we highlight the main features. Moreover, we restrict our attention to the full sample estimates despite likely sub-sample differences because, as the discussion above makes clear, there is no obvious delineation between the various decades considered. Also, the span of the data is considerably longer for the 1970-2000 period which, given the size and complexity of the restrictions imposed, is likely to yield more useful results.

For *Austria*, shown in Figure 1, it is notable that monetary and exchange rate shocks have a quantitatively small or neutral impact on output. On the other hand, aggregate supply shocks have a permanent effect on all the variables in the system. In contrast, exchange rate shocks have little impact whatsoever. Not surprisingly, monetary shocks have a permanent impact especially on inflation. The results are broadly similar for the *Netherlands*, as shown in Figure 2. However, aggregate supply shocks have a declining impact on inflation over time unlike the experience for Austria. More importantly, perhaps, the cumulated exchange rate and interest rate response to a

monetary shock is, respectively, permanent and temporary in the case of the Netherlands whereas the same shocks have relatively less impact for Austria. Turning to the case of *Germany* (not shown), there are only a few differences in the impulse responses relative to the candidate countries considered for an alternative monetary arrangement. Fiscal, (non-monetary) demand, and monetary shocks have a non-permanent effect on German output growth. This is usually not the case for the Netherlands, for example while the results for Austria broadly parallel those for Germany. However, unlike Austria for example, monetary shocks in Germany have a permanent impact on the exchange rate and the interest rate.

If we consider now a comparison between *Canada* (Figure 3) and the *US* (not shown) a few features are worth emphasizing. First, exchange rate shocks, while persistent, have only temporary effects on the other variables in the system for Canada. For the US, the impact is generally of a more permanent nature. However, while a fiscal shock is seen to have a permanent effect on Canada's inflation rate, the same is not true for the US. In addition, a fiscal shock has a positive but diminishing impact on output growth in Canada the impact is negative in the US and begins to decline after about 20 quarters. The same interpretation applies to the impact of an aggregate supply shock on interest rates in Canada versus the US. That is, the impact of a supply shocks is negative and rising for Canada and positive, but stable after 20 quarters for the US. Moreover, while aggregate supply shocks permanently reduce US inflation, there is no long-run impact on Canadian inflation. Perhaps this is because such shocks have a permanent impact on US real interest rates while Canadian real interest rates fall in the face of aggregate supply shocks.

Finally, Figure 4 considers the case for *New Zealand* (*Australia* is not shown). Of all the country groupings considered, the similarity of responses to various shocks is, surprisingly perhaps, the greatest among all the country pairs considered. Nevertheless, there are differences between the two countries, as well as one notable difference between New Zealand, Australia and the other countries considered here. First, a comparison between New Zealand and Australia reveals that monetary shocks have a permanent impact on fiscal policy in Australia while the impact is transitory in the New Zealand case. Finally, it is also worth noting that, for New Zealand, exchange rate shocks

have a temporary impact on domestic inflation, and a positive but diminishing effect in the case of Australia. This is unlike the experience of most of the other countries considered save perhaps Germany.

5.2 Counterfactual Experiments

Once again, as there are a large number of results, we have chosen to summarize them in a series of figures. Figures 5 to 7 plot separately for inflation, output growth, and the real interest rate, the *range* of estimates obtained under the various experiments carried out, shown as vertical lines in the figures, together with the mean "forecast" obtained from the VAR with the impact of the unsystematic shocks described earlier, also removed, shown as a horizontal line. Separate estimates for the full sample, as well as the sub-samples described earlier, were also carried out. These are also shown in the various figures. As the additional restrictions imposed to obtain the estimates based on the various counterfactuals were previously discussed we need not do so here. As for removing the impact of unsystematic shocks we are of two minds. Since there is no reason to believe that past unsystematic shocks will be reproduced in the future in exactly the same way as in the past, as a comparison of the 1970s and 1980s versus the 1990s demonstrates, these effects should be removed when conducting inferences based on the counterfactuals. On the other hand, it is highly likely that some unsystematic shocks will appear in the future. On balance, however, we believe that the chosen approach is likely to be more "realistic" for our purposes.

We begin with inflation (Figure 5). With the exception of the 1970-1989 sample for Canada and New Zealand, the inflation rate based on the various counterfactual experiments encompass the forecast generated from the VARs using actual data. Moreover, no clear winner emerges from the various regimes considered across samples and country groupings. Nevertheless, it appears that monetary union or a floating regime with UIP would have produced lower inflation for Canada in the 1970s and 1980s while it is unclear whether monetary union with the US would have resulted in better inflation performance in the 1990s as the results are sensitive to the chosen specification. It is interesting to note that inflation in the Netherlands would have generally been higher under a float with UIP but lower under the same conditions for Austria. Figure 6 displays the estimates for output growth. For Canada, an inflation targeting regime would have

produced higher output growth had it been in place during the 1970s and 1980s but it is not the case that monetary union would necessarily have delivered better inflation performance in the most recent decade. In the case of New Zealand, monetary union with Australia throughout the full sample or the 1990s would have led to higher than actual output growth while a floating regime during the decade of the 1970s and 1980s would have led to considerably lower output growth performance. There is little difference between the existing exchange rate regime's impact on output growth and inflation targeting for Austria in either the full sample or the 1970-1989 period. In the case of the Netherlands inflation targeting in the full sample would have boosted output growth a little while a floating regime would have delivered better economic performance during the decade of the 1970s and 1980s. Figure 7 compares real interest rate estimates under the various scenarios considered. A pegged exchange rate would have led to generally higher real interest rates in Canada while a float under UIP conditions or monetary union during the 1990s would have resulted in lower real interest rates for New Zealand. In the case of Austria and the Netherlands, an inflation targeting regime would almost always have led to marginally lower real interest rates in both countries while a float vis-á-vis Germany, under conditions of UIP, would have produced higher than actual real interest rates.

Finally, we turn to the relationship between the variance and inflation and output growth and the real interest rate (relevant plots are relegated to an appendix). These are meant to provide some idea of the trade-offs between the key variables that appear in the so-called new trade-offs and can serve as a guide of "good conduct" in a monetary regime. An indicator of the success of a particular regime should be negatively correlated with the variance of inflation, output growth or real interest rates. For the most part and inflation targeting regime would have delivered a better output-inflation volatility trade-off than the actual data while a pegged exchange rate system would have produced the least favorable trade-off. The picture is somewhat less clear as far as the volatility of real interest rates since the results are clearly sample sensitive. Hence, if the 1990s alone are considered a monetary union would have led to a superior inflation-real interest rate trade-off while estimates for the 1970-1989 would have placed an inflation targeting regime ahead of the other scenarios considered. Turning to the case of New Zealand we

find that the least favorable inflation-output volatility trade-off takes place under a floating regime with UIP. Interestingly, the most favorable trade-offs are in an inflation targeting environment except when the 1990s are considered in which case monetary union with Australia would have delivered a relatively superior inflation-output volatility combination.

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

6. Conclusions

The paper estimates and analyzes structural models that allow not only for the interdependence of shocks but also permit a role for fiscal policy. Three groups of countries were chosen because they stand in stark contrast with each other concerning the value their policy makers attach to an independent monetary policy. One the one hand, Austria, the Netherlands, and Germany chose a path leading to monetary union in 1999. At the other end of the spectrum, Canada, the US, New Zealand and Australia have long defended their choice of floating exchange rate regimes. Nevertheless, these same countries are also mentioned as prime candidates for some form of future currency union.

The evidence in this paper suggests that the degree of shock symmetry is not as great as one might expect, especially after allowance is made for the unsystematic elements of each country's policies. Indeed, impulse responses, while confirming several similarities between the candidate and target economies, also suggest important differences. Thus, for example, if Canada and New Zealand were to give up on an autonomous monetary policy the historical impact of some shocks, notably those originating from exchange rate changes, fiscal policy, as well as some supply shocks,

would be substantially different under a monetary union or a hard peg. Even Austria and the Netherlands, both of which have chosen full monetary union face asymmetric shocks. Countering such effects, however, are gains from a reduction in inflation for Canada and New Zealand under either a hard peg or a monetary union and, in the case of New Zealand, higher economic growth than under the existing monetary policy framework.

The paper also investigates the impact of alternative monetary regimes on the volatility of inflation and economic growth. Canada's choice of inflation targeting seems justified and monetary policy would not be improved by the adoption of an alternative regime. The results for New Zealand are less clear-cut but there is some evidence that monetary union with Australia might have improved economic performance. While the Netherlands appears to have made the right choice in opting for monetary union an inflation targeting regime might have been best for Austria.

Needless to say, all counterfactual experiments are speculative. Nevertheless, by focusing on candidate-target countries that appear, broadly speaking, to have performed in a rather similar fashion at a macroeconomic level, despite institutional and other differences, we avoid some of the criticisms that have been leveled at other studies that have examined these issues. Yet, considerable problems remain. First, the adoption of a full monetary union is made under the presumption that there are no separate adjustment costs. Second, the mere assumption that a seamless adoption of a different monetary regime than the one presently in existence is a rather strong one. We need to be aware that monetary decision-making might be considerably altered under each arrangement, a facet our counterfactuals cannot cope with. Finally, our results are no doubt partly driven by the preference shown for price stability in the 1990s. Unfortunately, price stability cannot be taken as a permanent feature of the economic landscape.

Ultimately, the message of this paper, insofar as the countries under study are representative of countries in similar circumstances more generally, is that good monetary policy is possible under any of the exchange rate regimes considered. Additionally, we find that economic integration can be as much a feature of floating regimes as the interdependence that is generated via a pegged exchange rate arrangement. If this is true, then the core differences that matter in deciding which monetary regime is more appropriate for some countries but not others are political or institutional.

References

Ballabriga, F., M. Sebastian, and J. Valles (1999), "Interdependence of EC Economies: A VAR Approach", mimeo.

Barber, T. (2002), "Germany Faces Threat Over Budget Deficit", *Financial Times*, 18 February, available at **www.ft.com**

Bayoumi, T. and B. Eichengreen (1992), " Shocking Aspects of European Monetary Union." *CEPR Discussion Paper* No. 643.

----------(1994), "One Money or Many?" Analyzing the Prospects for Monetary Unification in Various Parts of the World. Princeton Studies in International Finance No. 76, Princeton NJ.

Blanchard, O.J., and D. Quah (1989), "The Dynamic Effects of Aggregate Demand and Supply Disturbances", *American Economic Review*, 79 (September): 655-673.

Blundell-Wignall, Adrian, and Robert G. Gregory (1990), "Exchange Rate Policy in Advanced Commodity-Exporting Countries: Australia and New Zealand", in V. Argy and

Bordo, M., B. Eichengreen, D. Klingebiel, and M. Soledad Martinez-Peria (2001), "Is the Crisis Problem Growing More Severe?" *Economic Policy* 32 (April): 51-82.

Burdekin, Richard C.K., and Pierre L. Siklos (1999), "Exchange Rate Regimes and Shifts in Inflation Persistence: Does Nothing Else Matter?, *Journal of Money, Credit and Banking* 31 (May): 235-47.

Chriszt, M. (2000), "Perspectives on a Potential North American Monetary Union", *Economic Review,* Federal Reserve Bank of Atlanta (Fourth Quarter): 29-38.

Coleman, Andrew (2001), "Three Perspectives on an Australasian Monetary Union", in *Future Directions in Monetary Policy in East Asia*, Reserve Bank of Australia.

Collins, S. and Pierre L. Siklos (2001), "Optimal Reaction Functions, Taylor's Rule and Inflation Targets: The Experience of the Dollar Bloc Countries", working paper, Wilfrid Laurier University, available at www.wlu.ca/~wwwsbe/faculty/psiklos/home.htm.

Courchene, T. (1999), "Alternative North American Currency Arrangements: A Research Agenda." *Journal of Canadian Public Policy* 25:3.

Courchene, T. and R. Harris (1999), "From Fixing to Monetary Union: Options for North American Currency Integration." *CD Howe Institute Commentary* 127.

Crow, J. (1999), "Canadian Exchange Rate Policy." *Canadian Public Policy 25:3.*

DeSerres, A. and R. Lalonde (1994), "Symetrie des chocs touchant les régions canadiennes et choix d'un réime de change" *Bank of Canada Working Paper No.* 94-9.

Devereux, M.B. (1999), "Fix, Float, or Single Currency? The Choice of Exchange Rate Regime", working paper, University of British Columbia, September.

Dornbusch, R. (2001), "Fewer Monies, Better Monies", NBER working paper 8324, June.

Drew, Aaron, Viv Hall, John McDermott, and Robert St. Clair (2001), "Would Adopting the Autralian Dollar Provide Superior Monetary Policy for New Zealand?" Reserve Bank of New Zealand Discussion Paper DP2001/03, August.

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.

Eichengreen, Barry and J. von Hagen (1996), "Fiscal Policy and Monetary Union: Is there a Tradeoff Between Federalism and Budgetary Restrictions?", NBER working paper 5517, March.

Flood, Robert, and Andrew K. Rose (1995), "Fixing Exchange Rates: A Virtual Quest for Fundamentals", *Journal of Monetary Economics* 36: 3-37.

Fortin, Pierre (1996), "The Great Canadian slump." *Canadian Journal of Economics* 29: 761-787.

Freedman C. and T. Macklem (1998), "A Comment on 'The Great Canadian Slump '" *Canadian Journal of Economics.* 31, 646-665.

Frankel, Jeffrey A. and Andrew K. Rose (1998), "The Endogeneity of the Optimum Currency Area Criteria," *The Economic Journal* 108 (July), 1009-1025.

Friedman, M. (1973), *Money and Economic Development* (New York: Praeger).

Gramlich, Edward M., and Paul R. Wood (2001), "Fiscal Federalism and European Integration: Implications for Fiscal and Monetary Authorities", in Mark Braimbridge and Philip Whyman (Eds), *Fiscal Federalism and European Integration* (London: Routledge), forthcoming.

Grimes, A. (2000), "Case for a World Currency: Is an ANZAC Dollar a Logical Step?", Victoria Economic Commentaries (October): 17-26.

Grimes, A., F. Holmes, and R. Bowden (2000), "An ANZAC Dollar? Currency Union and Business development" (Wellington, New Zealand: Institute for Policy Studies).

Grubel, Herbert (1999), "The Case for the Amero." *The Fraser Institute*, Critical Issues Bulletin.

Gruen, David (2000), "The Australian Economy in the 1990s", Reserve Bank of Australia *Bulletin* (October): 1-6.

Hargreaves, D and J. McDermott (1999), "Issues Relating to Optimal Currency Areas: Theory and Implications for New Zealand." *Reserve Bank of New Zealand:* Bulletin 26:3.

Hartley, Peter (2001), *Monetary Arrangements for New Zealand,* monograph for the New Zealand Business Roundtable, May.

Hochreiter, Eduard, Schmidt-Hebbel, Klaus and Winckler, Georg (2002), "Monetary Union: European Lessons, Latin American Prospects", mimeo.

Hochreiter, Eduard and Winckler, Georg (1995), "The Advantage of Tying Austria's Hands: The Success of Austria's Hard Currency Policy", *European Journal of Political Economy* 11: 83-111.

Hoover Kevin D., and Oscar Jordá (2001), "Measuring Systematic Monetary Policy", *Review* of the Federal Reserve Bank of St. Louis, 83 (July/August): 113-38.

Kletzer, Kenneth and von Hagen, Jürgen (2001): "Monetary Union and Fiscal Federalism", mimeo, ZEI, July.

Kuttner, Kenneth and Posen, Adam (2001), "Beyond Bipolar: A Three-Dimensional Assessment of Monetary Frameworks", *International Journal of Finance and Economics* (forthcoming).

Lafrance, R. and P. St.-Amant (1999), "Optimal Currency Areas: A Review of the Recent Literature." *Bank of Canada Working Paper* 99-16.

Laidler, D. (1999), "Canada's Exchange Rate Options." *Journal of Canadian Public Policy,* 25:3.

Lalonde, R. and P. St-Amant (1995), "Optimum Currency Areas: The Case of Mexico and the United States." Centre for Latin American Studies. *Monetary Affairs (*July-December): 93-128.

Levy-Yeyati, Eduardo, and Federico Sturzenegger (2001), "Exchange Rate Regimes and Economic Performance", *IMF Staff Papers* 47(Special Issue): 62-98.

Mankiw, N. Gregory (2001), "US Monetary Policy During the 1990s", Harvard Insitute of Economic Research, Discussion Paper 1927, August.

Masson, P. and M. Taylor (1994), "Optimal Currency Areas: A Fresh Look at the Traditional Criteria." In Pierre Siklos (Ed.), *Varieties of Monetary Reforms, lessons and Experiences on the road to Monetary Union* (Boston: Kluwer): pp 23-44.

McCaw, Sharon and J. McDermott (2000), "How New Zealand Adjusts to Macroeconomic Shocks: Implications for Joining a Currency Area", Reserve Bank of New Zealand *Bulletin* 63 (March): 35-51.

Melitz J. and A. Weber (1996), "The Costs/Benefits of a Common Monetary Policy in France and Germany and Possible Lessons for Monetary Unions." *CEPR Working Paper* No. 1374.

Mundell, R. (2000a), "A Reconsideration of the Twentieth Century", *American Economic Review,* 90 (June): 327-40.

Mundell, R. (2000b), "Friedman v. Mundell on Exchange Rates", *National Post* (11 December), available at www.nationalpost.com/features/duel/monday.html .

Murray, J. (2000), "Why Canada Needs a Flexible Exchange Rate." *North American Journal of Economics and Finance* 11 (August): 41-60.

Norman, P. (2002), "EU Finance Ministers Endorese Deficits Compromise", *Financial Times*, 12 February, available at www.ft.com

Obstfeld, M. and K. Rogoff (1996), *Foundations of International Macroeconomics* (Cambridge, Mass.: The MIT Press).

Obstfeld M. and K. Rogoff (1995), "The Mirage of Fixed Exchange Rates." *Journal of Economic Perspectives* 9:73-96.

Orr, Adrian (1999), "Issues Relating to Optimal Currency Areas: Theory and Implications for New Zealand", Reserve Bank of New Zealand, June.

Pakko, Michael R., and Howard J. Wall (2001), "Reconsidering the Trade-Effects of a Currency Union", *Review* of the Federal Reserve Bank of St. Louis, 83 (September/ October): 37-46.

Persson, T. (2001), "Currency Unions and Trade: How Large is the Treatment Effect?", *Economic Policy* 33 (October): 433-48.

Rose, Andrew K. (1995), "After the Deluge: Do Fixed Exchange Rates Allow Intertemporal Volatility Trade-off? *CERP Discussion Paper* No. 1240.

---------- (2000), "One Money, One Market: The Effect of Common Currencies on Trade," *Economic Policy*, 15 (30): 7-46.

Rose, Andrew K., and E. van Wyncoop (2001), "National Money as a Barrier to International Trade", *American Economic Review* 91 (May): 386-90.

Rose, Andrew K., and Charles Engel (2000), "Currency Unions and International Integration, NBER working paper 7872, September.

Sachs, Jeffrey, and Xavier Sala-I-Martin (1992), "Fiscal Federalism and Optimum Currency Areas: Evidence for Europe from the United States", in M. Canzoneri, V. Grilli and P.R. Masson (Eds.), *Establishing a Central Bank: Issues in Europe and Lessons from the US* (Cambridge: Cambridge University press), pp. 195-219.

Scrimgeour, Dean (2001), "Exchange Rate Volatility and Currency Unions: Some Theory and New Zealand Evidence", Reserve Bank of New Zealand Discussion Paper DP2001/04, August.

Siklos, Pierre L. (2002), *The Changing Face of Central Banking: Evolutionary Trends Since World War II* (Cambridge: Cambridge University Press), forthcoming.

Wyplosz, Charles (2001), "A Monetary Union in Asia? Some European Lessons", in *Future Directions for Monetary Policies*, Reserve Bank of Australia.

Table 1 The Maastricht Model[18]

COUNTRY YEAR	INFLATION (CPI)	FISCAL 1 (DEFICIT)	FISCAL 2 (DEBT)	INTEREST RATE
Australia				
1998	0.9	0.6	33.0	5.5
1999	1.5	1.0	26.1	6.1
2000	4.5	-0.2	26.6	6.3
New Zealand				
1998	1.3	1.4	38.6	6.3
1999	0.1	0.3	37.1	6.4
2000	2.6	0.5	34.7	6.9
Canada				
1998	0.9	0.5/1.0	116.2/64.9	4.89
1999	1.7	1.6/0.8	111.6/61.0	6.18
2000	2.7	3.2/1.8	104.9/51.8	5.35
Eurozone				
1998	1.8 (0.7)	-2.2	76.9	4.8 (4.8)
1999	1.3 (0.5)	-1.3	74.8	4.7 (4.8)
2000	2.5 (1.6)	0.3	72.4	5.4 (5.4)

Sources: ECB, OECD Economic Outlook Volume 2001/1, No. 69, June,; IMF Staff Country Report No.00/139, and others listed below.

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

1998: Sweden (0.4%), France (0.8%), Austria (0.9%); average: 0.7%
1999: Sweden (0.3%), France (0.5%), Austria (0.6%); average: 0.5%
2000: Sweden (1.3%), France (1.7%), Germany (1.9%); average: 1.6%

Deficit: OECD Economic Outlook, Annex Table 30. For Canada from Bank of Canada *Banking and Financial Statistics*, Table A2.

Debt: OECD Economic Outlook, Annex Table 34 with the exception of New Zealand: Source: IMF Staff Country Report No.00/139, Table 12 (these terms refer to fiscal years). For Canada from www.fin.gc.ca.

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

1998: Sweden (5.0%), France (4.7%), Austria (4.7%); average: 4.8%
1999: Sweden (5.0%), France (4.6%), Austria (4,7%); average: 4.8%
2000: Sweden (5.4%), France (5.4%), Germany (5.3%); average: 5.4%.

---

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

(1) **Inflation criterion:** an inflation rate not more than 1 1/2% higher than those of the three best performing EU countries over the latest 12 months).

(2) **Fiscal convergence criteria:** These criteria restrict the government budget deficit and the government debt to certain levels. A country which wants to participate in the EMU may not have
-- a government **budget deficit** higher than 3 % of GDP,
-- a government **debt ratio** of more than 60 % of GDP or sufficiently fast approaching that level.

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

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

Table 2 Correlation of Structural Shocks, 1970-2000

(A) Ignoring Unsystematic Shocks

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

(B) Conditional on Unsystematic Shocks

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

Notes:

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

Table 3 Correlation of Structural Shocks, 1970-1989

(A) Ignoring Unsystematic Shocks

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

(B) Conditional on Systematic Shocks

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

Table 4 Correlation of Structural Shocks, 1990-2000

(A) Ignoring Unsystematic Shocks

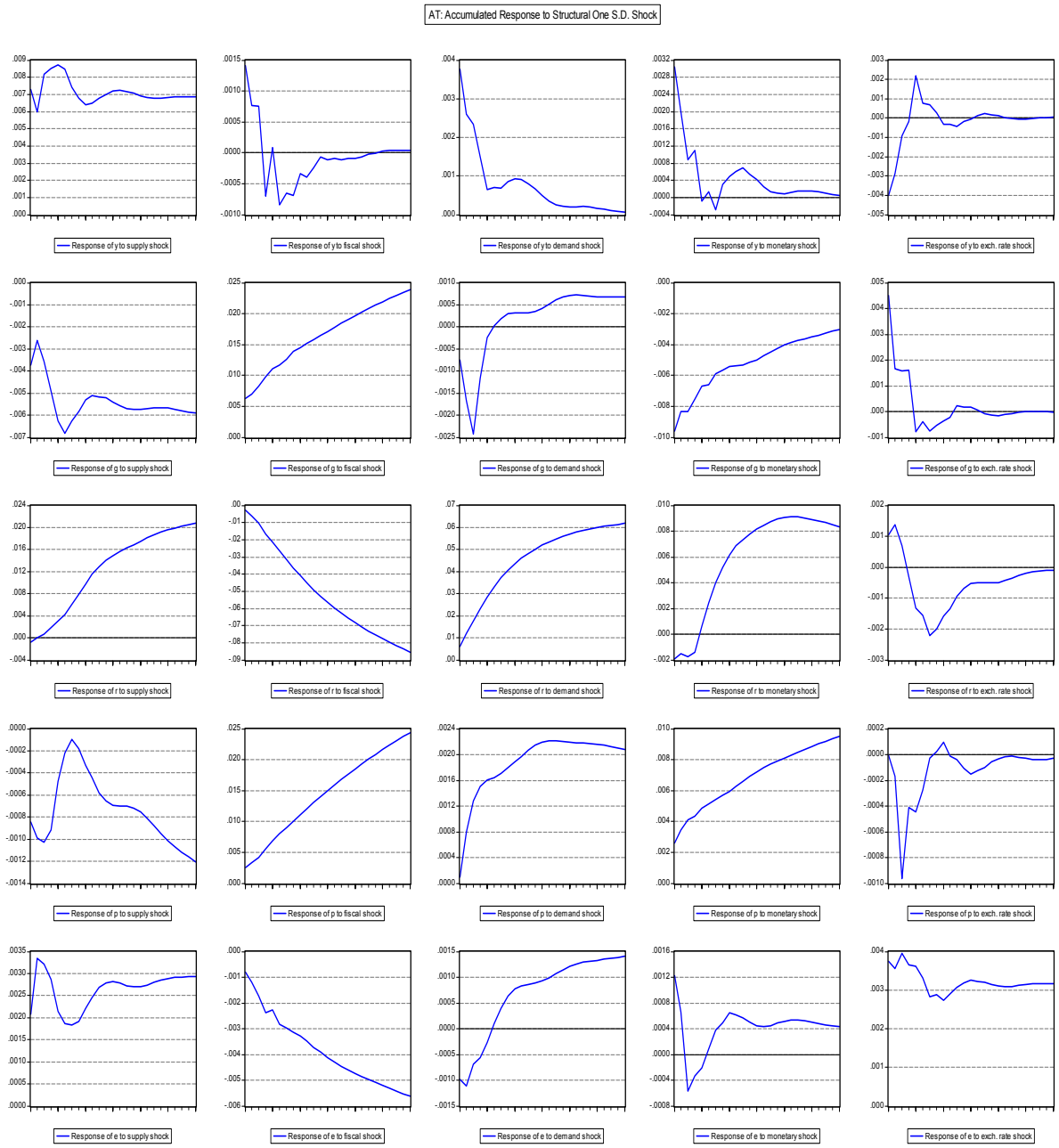
Candidate-Target Countries	Sources of shocks		
	Supply	Demand (non-monetary)	Monetary
(i) Inflation, Δg and *r* are stationary			
Canada-US	-0.15	0.15	-0.06
Canada-US[#]	*-0.07*	*0.25*	*-0.15*
NZ-Australia	-0.06	0.33	0.17
NZ-Australia	*-0.15*	*0.24*	*-0.02*
Netherlands-Germany	0.19	-0.10	0.03
Austria-Germany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

(B) Conditional on Systematic Shocks

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

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

Figure 1 Impulse Responses from the Structural VAR: Austria*



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

Figure 2 Impulse Responses from the Structural VAR: Netherlands

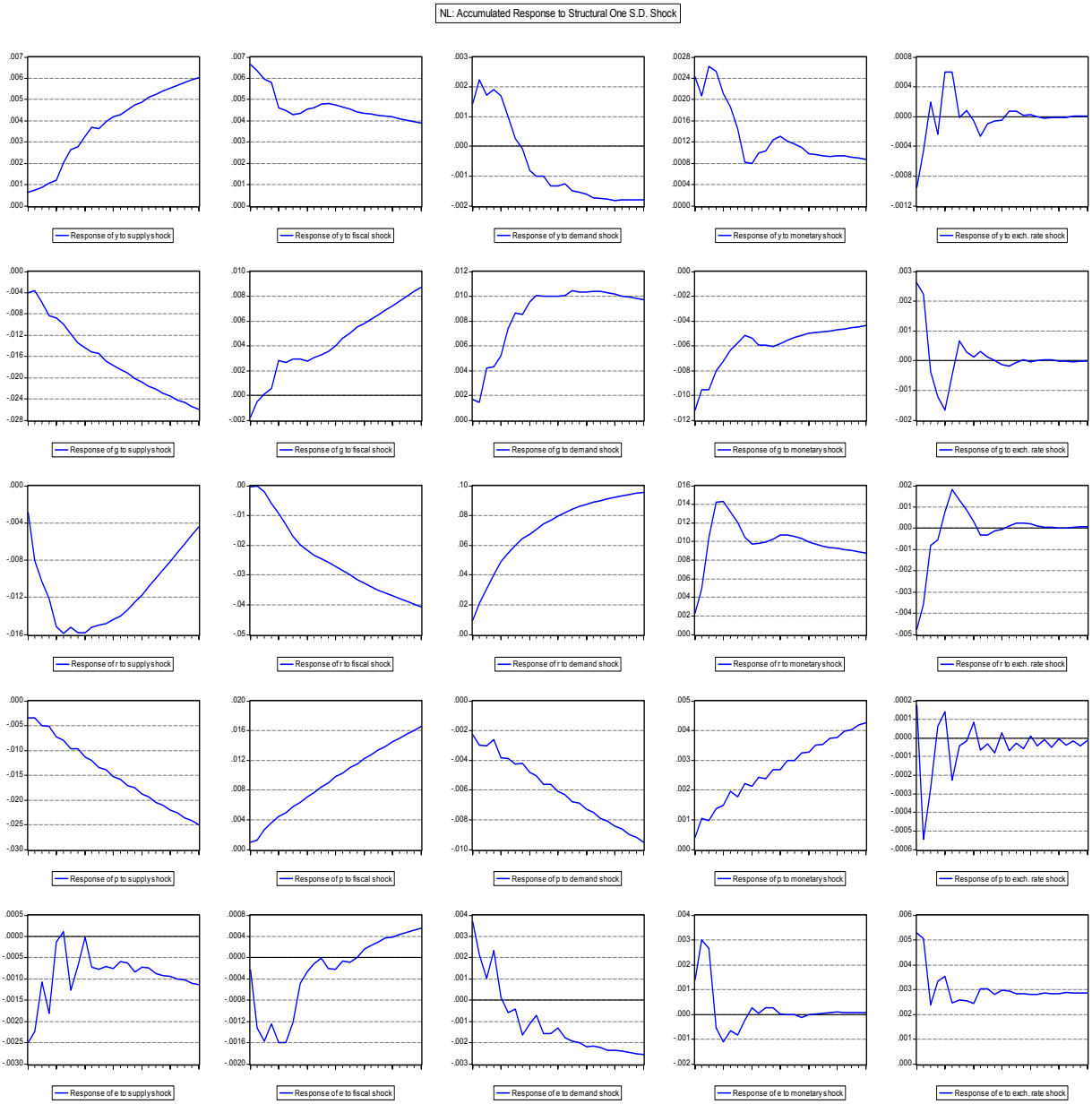


Figure 3 Impulse Responses from the Structural VAR: Canada

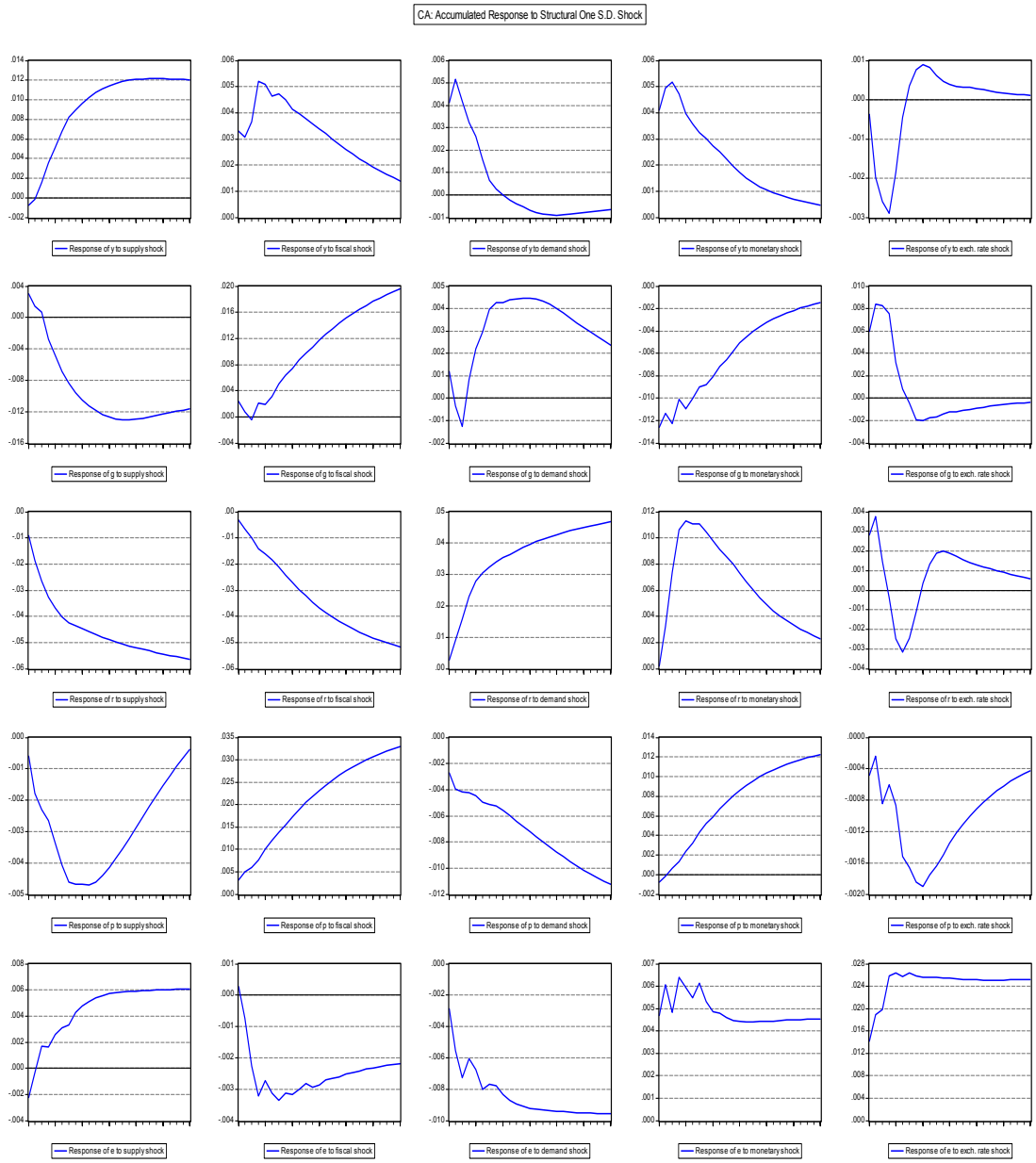


Figure 4 Impulse Responses from the Structural VAR: New Zealand

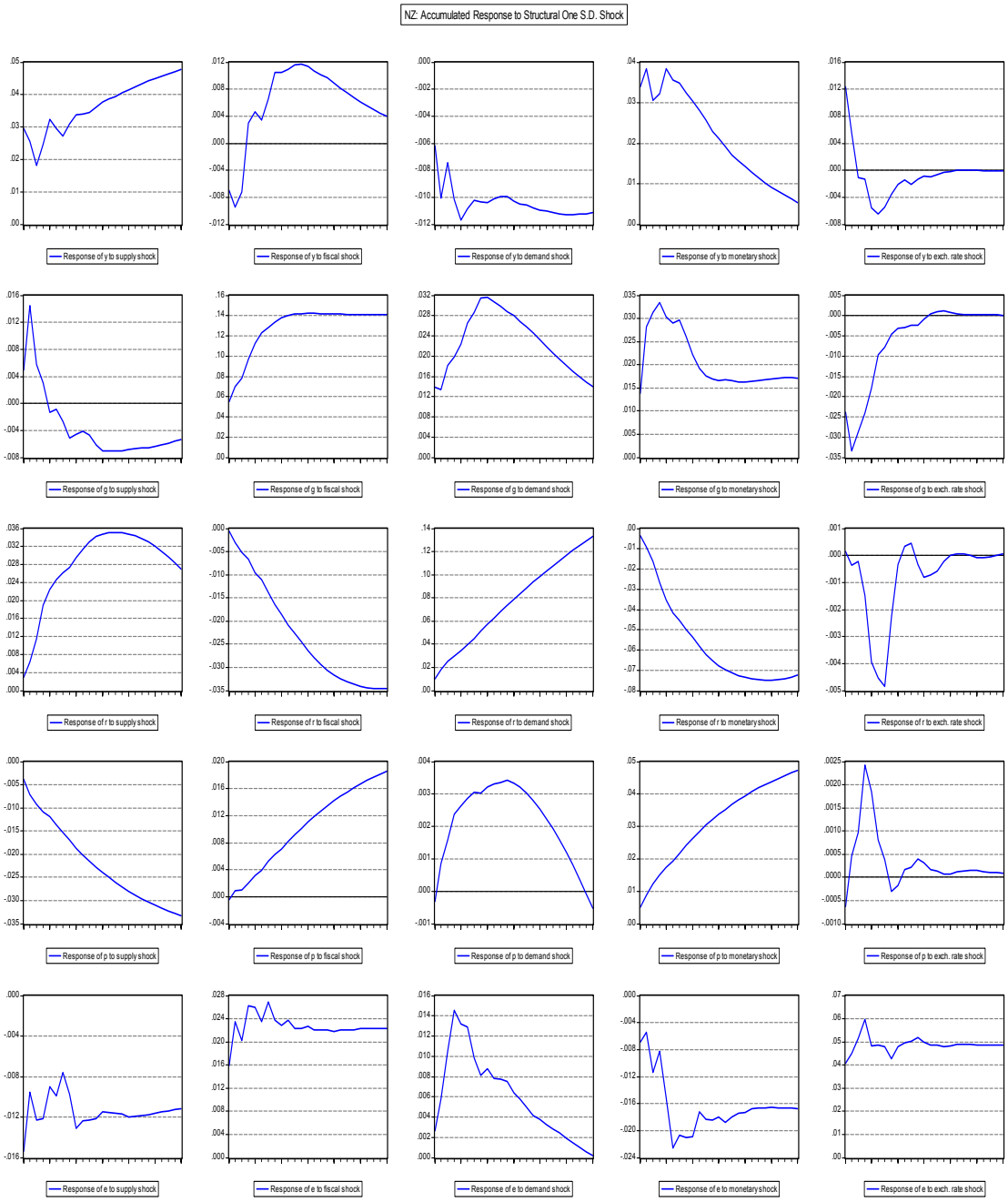
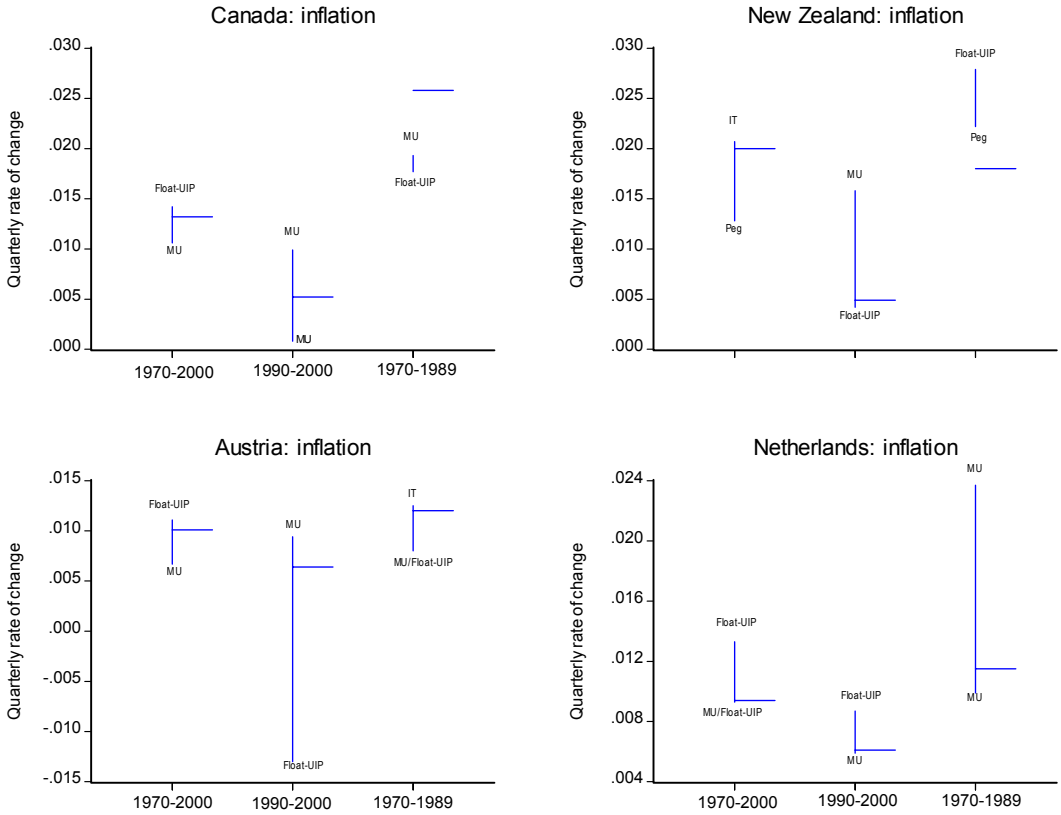
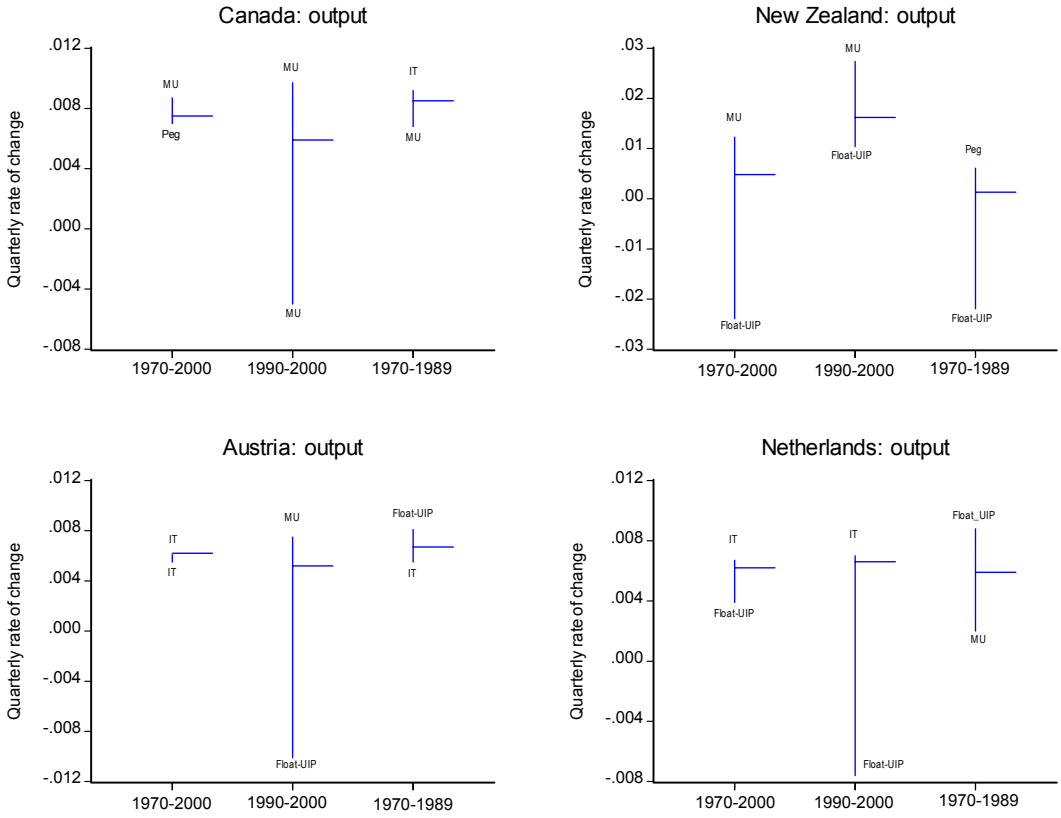


Figure 5 Counterfactuals: Inflation



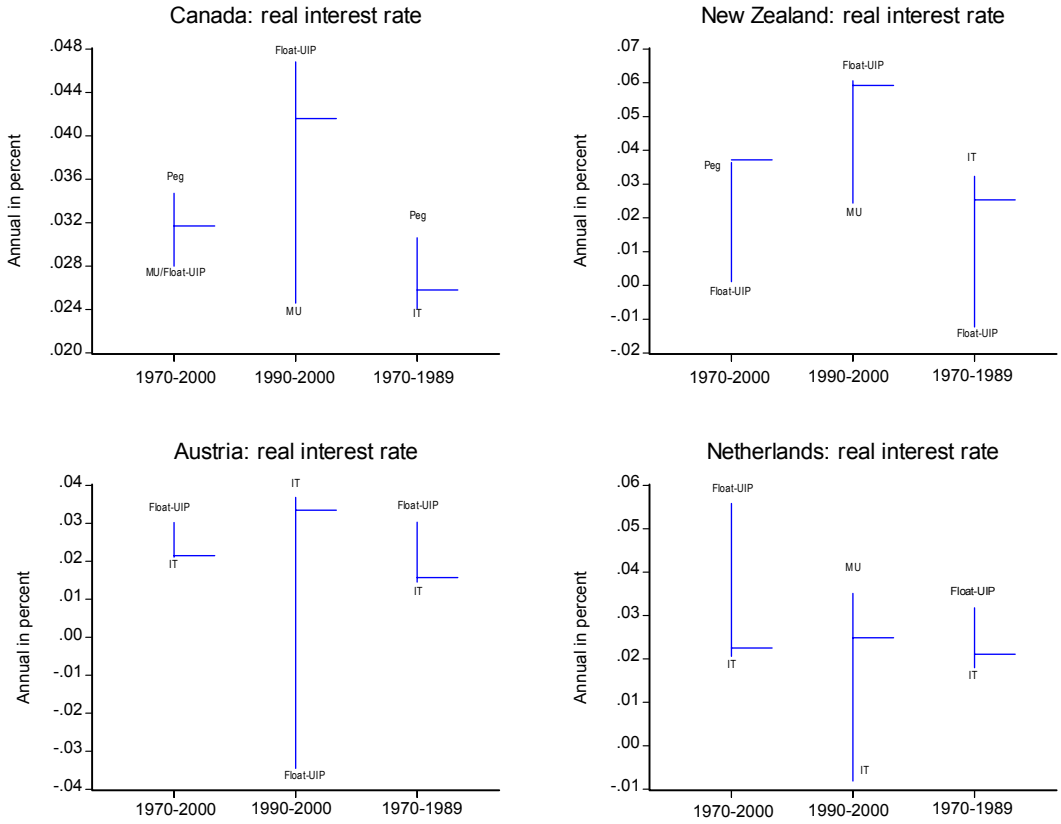
Note: The vertical lines show the maximum and minimum mean quarterly rates of change forecasted from the counterfactual "unrestricted" version of the VAR (see equation (1)). The labels indicated which monetary regime produced the largest or smallest mean growth rates, regardless whether unsystematic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

Figure 6 Counterfactuals: Output Growth



Note: See notes to Figure5.

Figure 7 Counterfactuals: Real Interest Rate Levels



Note: See notes to Figure 5.

Discussion

Jeannine Bailliu

1. Introduction

I enjoyed reading this paper and found it to be an interesting attempt to revisit the issue of the potential consequences of adopting different types of exchange rate regimes. In this paper, the authors examine the historical experience of a small group of industrialized countries (Austria, the Netherlands, Canada, and New Zealand) to ascertain whether they made the right choice by selecting the exchange rate regime that they did over the past thirty years based on macroeconomic grounds. In addition, they also consider what would have happened to each country had they had selected a different type of regime.

They do this by estimating a structural vector autoregression (SVAR) with five endogenous variables and two exogenous variables. They also estimate a variant of this model that includes some additional exogenous variables, namely dummy variables that are designed to capture anticipated but unsystematic changes in monetary policy regimes. By making certain long–run restrictions on the model, the authors obtain estimates of aggregate demand, supply and monetary shocks for each country, and then examine the correlations of the different structural shocks between each candidate country and the corresponding target country to ascertain whether shocks are judged to be symmetric or asymmetric. They also use estimates from the models to consider counterfactual experiments where it is assumed that the country adopted a different type of exchange rate regime that they actually did and then they compare this to what actually happened.

My comments are organized as follows. First, I will make a few short comments on the section that provides an overview of economic developments in the sample economies. Next, I will raise some points related to dollarization. Finally, I will make several comments related to the methodology.

2. Overview of Economic Developments in Sample Economies

In section 2 of the paper, the authors provide an extensive overview of major economic developments in their sample economies. There is a substantial amount of useful and interesting information in this section, but I would recommend that this section be condensed as the information is probably a little more detailed than is needed given that there are seven economies being described.

In the sub–section on Canada, the authors characterize Canadian monetary policy in the early 1990s (p.11) as one in which "...the Canadian authorities seemingly pursued low inflation policies at the expense of higher unemployment." I would disagree with this characterization. It is difficult to imagine the Bank of Canada pursuing such a policy given that it is generally accepted that there is no long–run tradeoff between inflation and unemployment. I believe a more accurate depiction of this episode is that there was a monetary policy regime shift in the early 1990s when Canada adopted an inflation–targeting framework for monetary policy as a means of reducing inflation and achieving price stability. Although it was recognized that there

might be short–term costs to achieving price stability, it was also believed that there would be benefits in the longer–run as this policy would be more conducive to sustained economic growth.

3. Dollarization

Next, I would like to address two points related to dollarization that were raised in Section 3 in the paper where the authors provide a selective survey of the optimum currency area literature. The first point relates to how the extent of private market dollarization should be measured in an economy. The second point relates to the determinants of private market dollarization, and in particular, the role of the government in this process.

In section 3.1, there is a discussion of the degree of private market dollarization in Canada where the claim is made that "Currently around 40% of business transactions in Canada are conducted in USD" (p. 18). From this sentence, the reader is left with the impression that Canada is a highly-dollarized economy, which I believe is misleading. I would argue that even though Canada is economically integrated with the United States, it is not heavily dollarized. I think that getting a sense of what percentage of business transactions by Canadians are conducted in U.S. dollars is a difficult undertaking because hard data are not available so one must make an educated guess (which is what the authors do). Assuming that this 40% figure is accurate, I would argue that it does not capture *dollarization* but rather *globalization*.

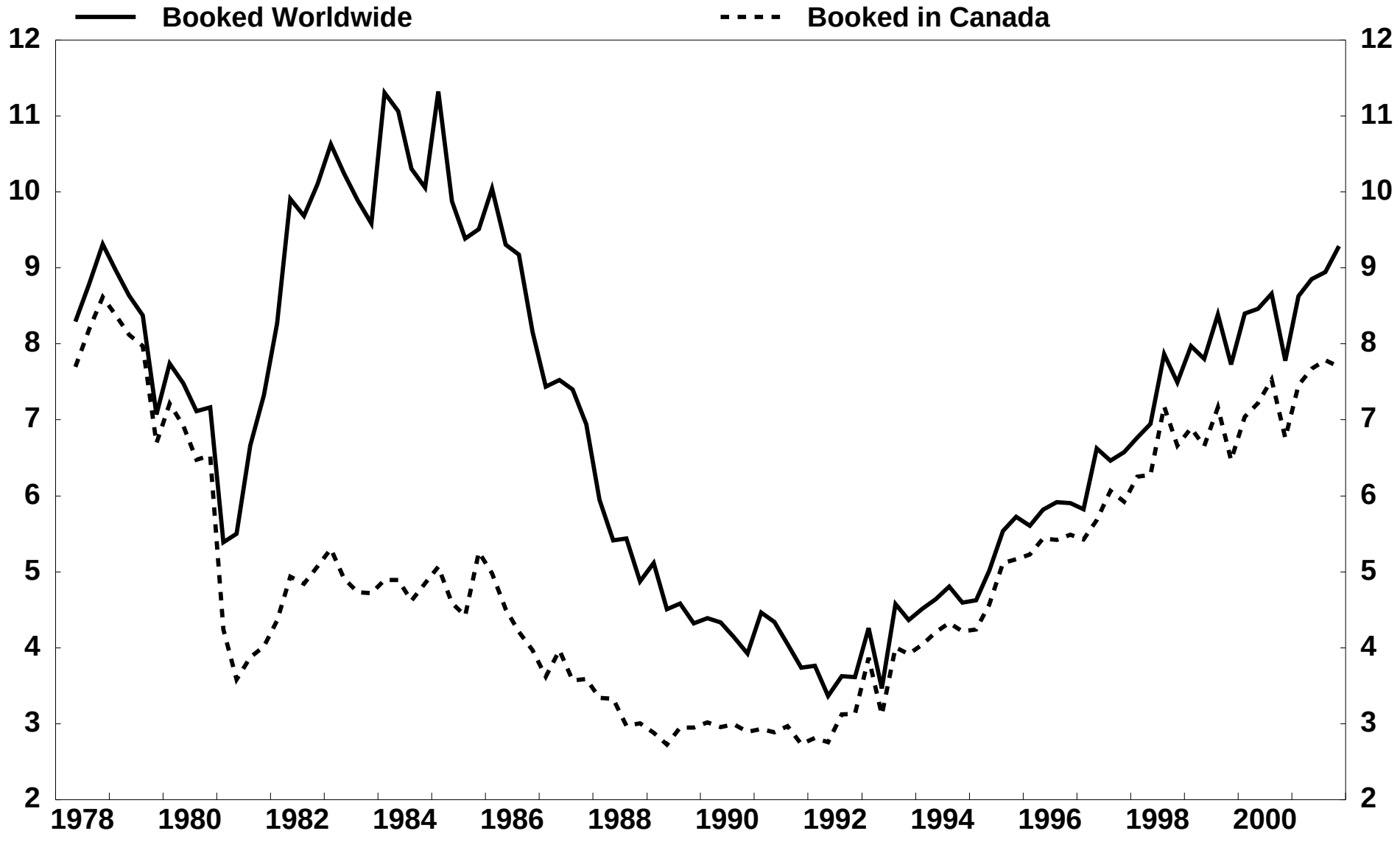
Canada is an open economy where trade represents an important proportion of its GDP,[1] and given that most of its trade is conducted with the United States, most of its import and export transactions are going to be conducted in U.S. dollars. Therefore, I would argue that this 40%–if indeed it is accurate–reflects the high number of international transactions undertaken by Canadians because they live in a very open economy. In order to assess the degree of dollarization in Canada, or in any country, it would seem to be important to get an idea of the extent to which a foreign currency–such as the U.S. dollar–is used by local residents for the purpose of domestic transactions. This is why it is more typical in the literature to use the ratio of foreign–currency denominated deposits held by local residents as a proportion of broad money as a measure of dollarization. The evolution of this ratio in Canada over the past 25 years is shown in the graph below. As shown in this graph, this ratio decreased in the 1980s and then increased in the 1990s and now stands at about 8–9%, roughly the same level as it was in the late 1970s. Although there is evidence of an increase in the 1990s, there is no indication of an upward trend in this ratio over the past two decades.[2] Furthermore, as shown in the table below, similar figures for other countries are much higher. Thus, it is difficult to argue that Canada is a highly–dollarized economy.

[1] For instance, in 2001, Canadian exports accounted for roughly 37% of GDP whereas the corresponding ratio for imports was about 32%.

[2] For a more detailed anlaysis of the extent of dollarization in Canada, see Murray and Powell (2002).

U.S.$ currency deposits of Canadian residents as a percentage of M3

(expressed in Canadian dollars)



Source: Murray and Powell (2002).

Table 1: Extent of Dollarization in Selected Countries, 1995

Country	Ratio of Foreign Currency Deposits to Broad Money (%)
Argentina	43.9
Bolivia	82.3
Greece	21.6
United Kingdom	15.4
Source: Baliño, Bennett and Borensztein (1999).	

I have one final point to make on the topic of dollarization. In the paper, the distinction is made between *private market dollarization* which is usually defined as the increased use of a foreign currency by individuals and firms in the domestic economy, and *policy dollarization* which the authors define as the government officially sanctioning the use of a foreign currency either as a parallel currency or by unilateral dollarization. The authors make the point that private market dollarization does not require any involvement on the part of the government and is driven by the market (p.18). I would qualify this statement to take into account the fact that in many countries private market dollarization is driven by a combination of both government policies and the market. For instance, typically a high degree of private market dollarization is the result of a history of poor macroeconomic policies where domestic agents have lost confidence in the domestic currency and start using a foreign currency for many of their transactions. A country like Bolivia, shown in the table above to have a very high ratio of foreign–currency deposits to broad money, is a good example. Furthermore, dollarization can also be influenced by government regulation on the use of foreign–currency denominated accounts by domestic residents.

4. Methodology

The methodology used in the paper is based on a SVAR with five endogenous variables (output, share of government consumption in GDP, short–term domestic real interest rate, inflation rate and depreciation rate of the nominal exchange rate) and two exogenous variables (commodity price index and real interest rate of target country). The authors also estimate a variant of this model that includes some additional exogenous variables, namely dummy variables that are designed to capture anticipated but unsystematic changes in monetary policy regimes.

One important element lacking in this section is a discussion of the motivation for including the commodity price index and the real interest rate of the target country as exogenous variables. As a result, it is unclear to the reader what motivated their inclusion and what they are intended to capture. Such a discussion seems particularly relevant in this case, given that robustness checks indicate that the results are sensitive to the inclusion of these variables in the model. For instance, in Table 5, the correlations of the various structural shocks are shown for the Canada–U.S. and New Zealand–Australia cases from the models both with and without the commodity price index. As shown, there are important differences in the correlations based on whether or not the commodity price index is included in the model. For instance, in Panel (A), the

correlation of the supply shocks for Canada–U.S. changes from –0.15 to –0.07 when the commodity price index is added as an exogenous variable. This decline in the degree of asymmetry between supply shocks in the two countries could be the result of including a variable that is determined in part by commodity price shocks which are asymmetric in this case.[3]

There is some discussion of the motivation for the inclusion of the other exogenous variables–the dummy variables that are designed to capture anticipated but unsystematic changes in monetary policy regimes. What is not provided in the paper, though, is a list of these dummies with information on which periods are dummied out for each country and the motivation for selecting these periods. I believe that this is vital information for the reader to have, and therefore I would recommend that the authors include this appendix in subsequent versions of the paper.

In addition, it would have been useful for the reader to see the results of the unit root tests for the various series because, as mentioned in the paper, the estimation results are sensitive to the treatment of the variables as either stationary or difference–stationary, and in some cases, this treatment is controversial. The authors mention the case of the real interest rate, and given the controversy over the degree of integration of this variable, they report the results assuming that the variable is both stationary and difference–stationary. However, the degree of integration of inflation is also considered to be controversial although the authors make no mention of this and treat inflation as a stationary process in all their sample countries. For instance, as pointed out by Dupasquier, Lalonde and St–Amant (1997), inflation in Canada is most likely a non–stationary process. Given this, it would be important to show the results of the unit root tests and if inflation is found to be a "borderline" case, then results should also be reported assuming that inflation is difference–stationary.

As mentioned in the paper, the results differ from the literature in that this paper finds a lower degree of shock symmetry for the sample countries compared to previous studies. I believe this is an important point and one which could be elaborated on further in the paper. For instance, the extent to which the inclusion of exogenous variables may explain these differences could be explored further, given that past studies have tended not to use exogenous variables. This ties into my earlier point regarding motivating the use of exogenous variables in the SVAR. Drawing out the main differences between the methodology used in this paper and what has been used in past studies would help to better highlight the main contributions of this study.

5. Concluding Remarks

In closing, I would like to reiterate that I think this is a very interesting paper that addresses an important topic. I particularly like the main message mentioned in the conclusion that good monetary policy is possible under different types of exchange rate regimes, and that the exchange rate regime that a country decides to adopt is not just a function of economic factors but is also influenced by political and institutional elements.

[3] This is because commodities are relatively more important in the Canadian economy. Moreover, this index is likely to be partially driven by oil shocks which are asymmetric in this case given that Canada is a net exporter of oil whereas the United States is a net importer.

References

Baliño, T.J.T, A. Bennett, and E. Borensztein. 1999. "Monetary Policy in Dollarized Economies." IMF Occasional Paper no. 171.

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*, Conference Proceedings, Bank of Canada, October 1996.

Murray, J. and J. Powell. 2002. "Dollarization in Canada." Paper prepared for presentation at the 36th annual meeting of the Canadian Economics Association, Calgary, Canada, May 30–June 2, 2002.

Discussion

Thorvaldur Gylfason

It is a great pleasure for me to participate in this conference at the invitation of the University of Vienna where my father studied economics 65 years ago, in the fateful winter of 1937-38, as well as of two of my favorite central banks, the Österreichische Nationalbank and the Banco Central de Chile – two central banks whose economists are engaged in important research on a wide range of macroeconomic and monetary issues. It was also, indeed, a pleasure to read the massive paper by Eduard Hochreiter, Anton Korinek, and Pierre L. Siklos that I have been asked to discuss here.

My comments will be in three parts. First, briefly, I want to make some general remarks about the paper. Then, without changing the subject, I want to say a few words about politics. Third and last, and this will be my main point, I intend to argue that the crucial question of rigidity versus flexibility in our economic system is not confined to exchange rate regimes. No, I think we need to take a broad view of rigidity and flexibility, a view that incorporates labor market arrangements in particular.

The paper by Hochreiter, Korinek, and Siklos is in two parts, each of which could stand alone as a separate paper. The first part provides an extensive, critical review of analytical issues and recent empirical studies of alternative exchange rate regimes, and is full of interesting information and insights about the various countries under study and the literature on optimal currency areas. The second part then offers a detailed study of the empirical patterns that are discernible in the data. In particular, the authors investigate the correlations of economic shocks across countries and conduct counterfactual experiments in an attempt to sharpen the picture of whether the exchange rate policy stance taken in these countries thus far is appropriate or needs to be changed.

The authors' broad conclusion is that the symmetry of shocks across countries, both as a precondition of monetary union and as a statement of fact, has tended to be exaggerated and that it is impossible to choose an exchange rate regime once and for all. This broad conclusion is absolutely correct in my view. As the authors point out, different countries have adopted different exchange rate arrangements despite seemingly similar economic circumstances. For example, Austria belongs to a monetary union while Switzerland, next door, allows its currency to float.

Is this puzzling? My answer is No, not really, because the political circumstances are different. The authors share this view but they do not pursue the political issues involved very far. What they do is embark on an ambitious effort at economic benefit-cost analysis of different exchange rate options. Knowing the benefits and costs is, of course, always useful. And the authors offer us some surprises: Austria, the great fixer, might actually have been better off with inflation targeting, they find, and New Zealand might perhaps have been better off in a monetary union with Australia.

The authors' main conclusion, however, comes as no surprise: There *are* costs and benefits associated with any type of exchange rate regime and there is no way to tell once and for all which is better, to float or not to float, for the right thing to do varies from case to case and place to place. Frankel (1999), Williamson (2000), and Corden (2002) come to the same conclusion, as have others. Hochreiter, Korinek, and Siklos's paper demonstrates this general proposition in greater empirical detail than most. In my eyes, this is the main virtue of the paper.

Which brings me to politics. As far as EMU membership goes, economic analysis is not enough. When Iceland and Norway became founding members of NATO in 1949, we did not sit down to weigh the benefits and costs. We did not need to apply any fuzzy clustering analysis. No, we said "Yes, thank you, this is a club where we belong." There was, naturally, some political opposition to NATO membership in both countries, based mostly on nationalistic sentiments but also, in some cases, on sympathy with the Soviet Union and its

satellites, but even so, a large majority of the population of both Norway and Iceland wanted to join. And this is what we did, without delay.

To me, the current question of whether Iceland and Norway should join the EU and the EMU is to some extent comparable. It involves politics as well as economics for the simple reason that European integration is a political project as much as an economic one. The political dimension concerns peace. Further European integration is intended to continue to affirm and foster harmonious coexistence and cooperation especially between Germany and her neighbors. The sharing of sovereignty among NATO members is comparable with that among EU members: after all, an external attack on one NATO member is an attack on them all. I realize that others may disagree with the parallel I have drawn between NATO and the EU: clearly, Austria, Finland, Ireland, and Sweden did not join NATO, for different political reasons. Austria had Russians to worry about at the time, within Austria. Finland also had Russians to worry about across its long eastern border. Perhaps Ireland found it difficult to share her national defenses so explicitly with the United Kingdom, and therefore decided to stay out. Sweden had none of these problems, but decided not to join NATO anyway.

The worries of those nations that have not yet joined the EU or EMU may be exaggerated because the differences that are held out as arguments against or impediments to entry may fade away once membership is a fact. A nation that thinks it cannot join because it is in some ways too different from the existing members may find that membership tends to reduce such differences. Indeed, a candidate country may want to join a monetary union for political reasons, hoping that the cross-country differences and other impediments that made it hesitate will fade away. One such difference concerns the structure and functioning of labor markets.

The lingering doubts in the United Kingdom, Denmark, and Sweden about the wisdom of adopting the euro rest on their fears that EMU membership might restrain their ability to maintain full employment at home. These countries have a history – a pretty successful record, some would say, albeit not

consistently so – of devaluing or floating their currencies to keep domestic unemployment under control. Austria thought differently, even if its labor market arrangements have long been similar to those in Sweden. Austria entered the EU with Sweden and Finland in 1995 and then – like Finland, but unlike Sweden – decided to adopt the euro from the outset in the hope, after the fact if not up front, that the strict discipline thus imposed from outside would gradually loosen up the Austrian labor market and make wage formation more market-friendly and flexible (Hochreiter and Winckler, 1995). Put differently, Austria gambled that her labor unions would react to the new rules of the game by exercising moderation in wage demands. Similarly, Grubel (2000) has argued that labor market flexibility is endogenous to the exchange rate regime and that monetary union between the United States and Canada would eventually induce labor market organizations to mend their ways by adapting their work and wage settlements to the need for absorbing exogenous economic change and instability more efficiently than before – that is, with less unemployment as a result. The key word here is "eventually."

The difference of opinions in this case thus centers on the question of which should come first: labor market liberalization or monetary union. The Swedes are not, at least not yet, confident that the structure and functioning of the Swedish economy, and of the Swedish labor market in particular, is flexible enough to adapt to the adoption of the euro. Yet, the high-technology revolution seems to have done rather a lot of late to loosen up the Swedish labor market: new high-tech companies come and go and, accordingly, they have brought with them a new work culture, with more flexible employment and pay schemes that make it easier for firms to hire and fire and such. This development may help explain the considerable drop in unemployment in the wake of the high-tech revolution in Sweden in the past few years even if Swedish labor market legislation has not changed much. And this may also help explain why Finland has managed to cut its unemployment rate in half since joining the EU. If so, this may make it easier for Swedes to overcome their fear of joining the EMU. The Austrians, on the other hand, believed that their

economy, including the behavior of labor unions and employers' associations, was flexible enough to adjust as needed. The Finns did not dwell on this issue for they were determined to join for political reasons, no matter what.

How about those countries that do by now have reasonably flexible labor markets and, therefore, do have a choice as to whether to keep their currencies afloat or to join a monetary union? This question brings us back into the political arena. The United Kingdom and perhaps even Switzerland have clear political motives to join the EMU, but Australia and New Zealand do not: for them, there is no particular need to merge their dollars or to dump them in favor of the US dollar. For the antipodes, this is an economic issue, pure and simple. And this actually makes the choice more difficult, not less.

In conclusion, one of the main advantages of labor market flexibility is that it makes a nation free to choose between fixed and flexible exchange rates. Rigid labor markets tie the hands of nations: with rigid wages, fixed exchange rates can lead to persistent, even permanent unemployment and economic stagnation of the type that the United Kingdom experienced under the gold standard between the two world wars. Flexible labor markets untie this knot by giving nations a choice. To be efficient, and thus to be able to grow rapidly, an economic system must have either flexible labor markets or a flexible exchange rate regime, or both. The implication for EMU members is clear: they must loosen up their labor markets in order to reduce unemployment and thus encourage economic efficiency and growth.

But the choice of an exchange rate regime cannot be made for all time. Never say never. Sometimes it is better to be flexible; sometimes it is better to be firm. And nations do not necessarily have to pick a corner solution: the center of the exchange rate spectrum need not be empty. After all, the real exchange rate always floats, even within a monetary union.

References

Corden, W. Max (2002), *Too Sensational: On the Choice of Exchange Rate Regimes*, MIT Press, Cambridge, Massachusetts.

Frankel, Jeffrey A. (1999), *No Single Currency Regime Is Right for All Countries or at All Times*, Essays in International Finance No. 215, August, Princeton University Press.

Grubel, Herbert G. (2001), "The Merit of a Canada-US Monetary Union," *North American Journal of Economics and Finance,* 11, January, 19-40.

Hochreiter, Eduard, and Georg Winckler (1995), "The Advantage of Tying Austria's Hands: The Success of the Hard Currency Strategy," *European Journal of Political Economy,* 11, 83-111.

Williamson, John (2000), *Exchange Rate Regimes for Emerging Markets: Reviving the Intermediate Option*, Institute for International Economics, Washington, D.C.

Index of Working Papers:

August 28, 1990	Pauer Franz	1[1)]	Hat Böhm-Bawerk Recht gehabt? Zum Zusammenhang zwischen Handelsbilanzpassivum und Budgetdefizit in den USA[2)]
March 20, 1991	Backé Peter	2[1)]	Ost- und Mitteleuropa auf dem Weg zur Marktwirtschaft - Anpassungskrise 1990
March 14, 1991	Pauer Franz	3[1)]	Die Wirtschaft Österreichs im Vergleich zu den EG-Staaten - eine makroökonomische Analyse für die 80er Jahre
May 28, 1991	Mauler Kurt	4[1)]	The Soviet Banking Reform
July 16, 1991	Pauer Franz	5[1)]	Die Auswirkungen der Finanzmarkt- und Kapitalverkehrsliberalisierung auf die Wirtschaftsentwicklung und Wirtschaftspolitik in Norwegen, Schweden, Finnland und Großbritannien - mögliche Konsequenzen für Österreich[3)]
August 1, 1991	Backé Peter	6[1)]	Zwei Jahre G-24-Prozess: Bestandsaufnahme und Perspektiven unter besonderer Berücksichtigung makroökonomischer Unterstützungsleistungen[4)]
August 8, 1991	Holzmann Robert	7[1)]	Die Finanzoperationen der öffentlichen Haushalte der Reformländer CSFR, Polen und Ungarn: Eine erste quantitative Analyse
January 27, 1992	Pauer Franz	8[1)]	Erfüllung der Konvergenzkriterien durch die EG-Staaten und die EG-Mitgliedswerber Schweden und Österreich[5)]
October 12, 1992	Hochreiter Eduard (Editor)	9[1)]	Alternative Strategies For Overcoming the Current Output Decline of Economies in Transition
November 10, 1992	Hochreiter Eduard and Winckler Georg	10[1)]	Signaling a Hard Currency Strategy: The Case of Austria

1) vergriffen (out of print)
2) In abgeänderter Form erschienen in Berichte und Studien Nr. 4/1990, S 74 ff
3) In abgeänderter Form erschienen in Berichte und Studien Nr. 4/1991, S 44 ff
4) In abgeänderter Form erschienen in Berichte und Studien Nr. 3/1991, S 39 ff
5) In abgeänderter Form erschienen in Berichte und Studien Nr. 1/1992, S 54 ff

March 12, 1993	Hochreiter Eduard (Editor)	11	The Impact of the Opening-up of the East on the Austrian Economy - A First Quantitative Assessment
June 8, 1993	Anulova Guzel	12	The Scope for Regional Autonomy in Russia
July 14, 1993	Mundell Robert	13	EMU and the International Monetary System: A Transatlantic Perspective
November 29, 1993	Hochreiter Eduard	14	Austria's Role as a Bridgehead Between East and West
March 8, 1994	Hochreiter Eduard (Editor)	15	Prospects for Growth in Eastern Europe
June 8, 1994	Mader Richard	16	A Survey of the Austrian Capital Market
September 1, 1994	Andersen Palle and Dittus Peter	17	Trade and Employment: Can We Afford Better Market Access for Eastern Europe?
November 21, 1994	Rautava Jouko	18[1)]	Interdependence of Politics and Economic Development: Financial Stabilization in Russia
January 30, 1995	Hochreiter Eduard (Editor)	19	Austrian Exchange Rate Policy and European Monetary Integration - Selected Issues
October 3, 1995	Groeneveld Hans	20	Monetary Spill-over Effects in the ERM: The Case of Austria, a Former Shadow Member
December 6, 1995	Frydman Roman et al	21	Investing in Insider-dominated Firms: A Study of Voucher Privatization Funds in Russia
March 5, 1996	Wissels Rutger	22	Recovery in Eastern Europe: Pessimism Confounded ?
June 25, 1996	Pauer Franz	23	Will Asymmetric Shocks Pose a Serious Problem in EMU?
September 19, 1997	Koch Elmar B.	24	Exchange Rates and Monetary Policy in Central Europe - a Survey of Some Issues
April 15, 1998	Weber Axel A.	25	Sources of Currency Crises: An Empirical Analysis

May 28,1998	Brandner Peter, Diebalek Leopold and Schuberth Helene	26	Structural Budget Deficits and Sustainability of Fiscal Positions in the European Union
June 15, 1998	Canzeroni Matthew, Cumby Robert, Diba Behzad and Eudey Gwen	27	Trends in European Productivity: Implications for Real Exchange Rates, Real Interest Rates and Inflation Differentials
June 20, 1998	MacDonald Ronald	28	What Do We Really Know About Real Exchange Rates?
June 30, 1998	Campa José and Wolf Holger	29	Goods Arbitrage and Real Exchange Rate Stationarity
July 3,1998	Papell David H.	30	The Great Appreciation, the Great Depreciation, and the Purchasing Power Parity Hypothesis
July 20,1998	Chinn Menzie David	31	The Usual Suspects? Productivity and Demand Shocks and Asia-Pacific Real Exchange Rates
July 30,1998	Cecchetti Stephen G., Mark Nelson C., Sonora Robert	32	Price Level Convergence Among United States Cities: Lessons for the European Central Bank
September 30, 1998	Christine Gartner, Gert Wehinger	33	Core Inflation in Selected European Union Countries
November 5, 1998	José Viñals and Juan F. Jimeno	34	The Impact of EMU on European Unemployment
December 11, 1998	Helene Schuberth and Gert Wehinger	35	Room for Manoeuvre of Economic Policy in the EU Countries – Are there Costs of Joining EMU?
December 21, 1998	Dennis C. Mueller and Burkhard Raunig	36	Heterogeneities within Industries and Structure-Performance Models
May 21, 1999	Alois Geyer and Richard Mader	37	Estimation of the Term Structure of Interest Rates – A Parametric Approach
July 29, 1999	José Viñals and Javier Vallés	38	On the Real Effects of Monetary Policy: A Central Banker´s View
December 20, 1999	John R. Freeman, Jude C. Hays and Helmut Stix	39	Democracy and Markets: The Case of Exchange Rates

March 01, 2000	Eduard Hochreiter and Tadeusz Kowalski	40	Central Banks in European Emerging Market Economies in the 1990s
March 20, 2000	Katrin Wesche	41	Is there a Credit Channel in Austria? The Impact of Monetary Policy on Firms' Investment Decisions
June 20, 2000	Jarko Fidrmuc and Jan Fidrmuc	42	Integration, Disintegration and Trade in Europe: Evolution of Trade Relations During the 1990s
March 06, 2001	Marc Flandreau	43	The Bank, the States, and the Market, A Austro-Hungarian Tale for Euroland, 1867-1914
May 01, 2001	Otmar Issing	44	The Euro Area and the Single Monetary Policy
May 18, 2001	Sylvia Kaufmann	45	Is there an asymmetric effect of monetary policy over time? A Bayesian analysis using Austrian data.
May 31, 2001	Paul De Grauwe and Marianna Grimaldi	46	Exchange Rates, Prices and Money. A Long Run Perspective
June 25, 2001	Vítor Gaspar, Gabriel Perez-Quiros and Jorge Sicilia	47	The ECB Monetary Strategy and the Money Market
July 27, 2001	David T. Llewellyn	48	A *Regulatory Regime* For Financial Stability
August 24, 2001	Helmut Elsinger and Martin Summer	49	Arbitrage Arbitrage and Optimal Portfolio Choice with Financial Constraints
September 1, 2001	Michael D. Goldberg and Roman Frydman	50	Macroeconomic Fundamentals and the DM/$ Exchange Rate: Temporal Instability and the Monetary Model
September 8, 2001	Vittorio Corbo, Oscar Landerretche and Klaus Schmidt-Hebbel	51	Assessing Inflation Targeting after a Decade of World Experience
September 25, 2001	Kenneth N. Kuttner and Adam S. Posen	52	Beyond Bipolar: A Three-Dimensional Assessment of Monetary Frameworks

October 1, 2001	Luca Dedola and Sylvain Leduc	53	Why Is the Business-Cycle Behavior of Fundamentals Alike Across Exchange-Rate Regimes?
October 10, 2001	Tommaso Monacelli	54	New International Monetary Arrangements and the Exchange Rate
December 3, 2001	Peter Brandner, Harald Grech and Helmut Stix	55	The Effectiveness of Central Bank Intervention in the EMS: The Post 1993 Experience
January 2, 2002	Sylvia Kaufmann	56	Asymmetries in Bank Lending Behaviour. Austria During the 1990s
January 7, 2002	Martin Summer	57	Banking Regulation and Systemic Risk
January 28, 2002	Maria Valderrama	58	Credit Channel and Investment Behavior in Austria: A Micro-Econometric Approach
February 18, 2002	Gabriela de Raaij and Burkhard Raunig	59	Evaluating Density Forecasts with an Application to Stock Market Returns
February 25, 2002	Ben R. Craig and Joachim G. Keller	60	The Empirical Performance of Option Based Densities of Foreign Exchange
February 28, 2002	Peter Backé, Jarko Fidrmuc, Thomas Reininger and Franz Schardax	61	Price Dynamics in Central and Eastern European EU Accession Countries
April 8, 2002	Jesús Crespo-Cuaresma, Maria Antoinette Dimitz and Doris Ritzberger-Grünwald	62	Growth, Convergence and EU Membership
May 29, 2002	Markus Knell	63	Wage Formation in Open Economies and the Role of Monetary and Wage-Setting Institutions
June 19, 2002	Sylvester C.W. Eijffinger (comments by: José Luis Malo de Molina and by Franz Seitz)	64	The Federal Design of a Central Bank in a Monetary Union: The Case of the European System of Central Banks

July 1, 2002	Sebastian Edwards and I. Igal Magendzo (comments by Luis Adalberto Aquino Cardona and by Hans Genberg)	65	Dollarization and Economic Performance: What Do We Really Know?
July 10, 2002	David Begg (comment by Peter Bofinger)	66	Growth, Integration, and Macroeconomic Policy Design: Some Lessons for Latin America
July 15, 2002	Andrew Berg, Eduardo Borensztein, and Paolo Mauro (comment by Sven Arndt)	67	An Evaluation of Monetary Regime Options for Latin America
July 22, 2002	Eduard Hochreiter, Klaus Schmidt-Hebbel and Georg Winckler (comments by Lars Jonung and George Tavlas)	68	Monetary Union: European Lessons, Latin American Prospects
July 29, 2002	Michael J. Artis (comment by David Archer)	69	Reflections on the Optimal Currency Area (OCA) criteria in the light of EMU
August 5, 2002	Jürgen von Hagen, Susanne Mundschenk (comments by Thorsten Polleit, Gernot Doppelhofer and Roland Vaubel)	70	Fiscal and Monetary Policy Coordination in EMU
August 12, 2002	Dimitri Boreiko (comment by Ryszard Kokoszczyński)	71	EMU and Accession Countries: Fuzzy Cluster Analysis of Membership
August 19, 2002	Ansgar Belke and Daniel Gros (comments by Luís de Campos e Cunha, Nuno Alves and Eduardo Levy-Yeyati)	72	Monetary Integration in the Southern Cone: Mercosur Is Not Like the EU?
August 26, 2002	Friedrich Fritzer, Gabriel Moser and Johann Scharler	73	Forecasting Austrian HICP and its Components using VAR and ARIMA Models

September 30, 2002	Sebastian Edwards	74	The Great Exchange Rate Debate after Argentina
October 3, 2002	George Kopits (comments by Zsolt Darvas and Gerhard Illing)	75	Central European EU Accession and Latin American Integration: Mutual Lessons in Macroeconomic Policy Design
October 10, 2002	Eduard Hochreiter, Anton Korinek and Pierre L. Siklos (comments by Jeannine Bailliu and Thorvaldur Gylfason)	76	The Potential Consequences of Alternative Exchange Rate Regimes: A Study of Three Candidate Regions