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Mexico versus Canada: Stability Benefits from Making Common Currency with USD?

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Using a de facto classification of exchange-rate regimes, this paper investigates how the volatility of PPP-GDP per person and per hour of work is associated with such regimes in Mexico and in Canada. It finds that, for Mexico unlike Canada, the macroeconomic volatility left is much greater during periods when the nominal exchange rate with USD changes appreciably than when it is quasi-pegged. However, Mexico cannot safely peg to USD except through formal US-dollarization. Hence this finding suggests that the stability benefits of monetary union are greatest for emerging-market countries inside an economically integrating region and non-existent for financially highly advanced countries.

1. Introduction

Even though (1) monetary policy goals and instruments (2) exchange-rate concerns, and (3) trade orientation toward the United States are strikingly similar for Canada and Mexico, this

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paper questions whether the same exchange rate arrangement is appropriate for both. Regarding these similarities:

1. Both Canada and Mexico explicitly target a low inflation rate, 2 percent an average for Canada and 3 percent within a 1 percentage point band on either side for Mexico (for 2005). Neither country uses reserve requirements, and Mexico even announces daily the combined short position (*corto*) intended for the banking and credit institutions participating in its clearance system. Planned changes in this position are used to convey monetary policy impulses.
2. Canada similarly adjusts the Overnight Rate through open-market operations either to effect a change in monetary conditions or to counteract multilateral exchange-rate movements in which the U.S. dollar (USD) has an 86 percent weight. If no change in monetary conditions is intended, a 3 percent depreciation of the Canadian dollar calls for a 1 percentage point increase in the interest rate (commercial paper rate) according to the Bank of Canada's Monetary Conditions Index to keep aggregate demand unchanged as well as incidentally to stabilize its, formally floating, exchange rate. In Mexico, exposure to U.S. interest rate movements and abrupt changes in international capital flows, and hence to disorderly movements of its exchange rate, are a continuous concern in part because inflation targeting within a narrow band cannot succeed there unless exchange rate fluctuations with USD are of low amplitude.
3. Both countries conduct about 80 percent of their trade and much of their foreign finance with or through the United States. Hence the bilateral exchange rates of their currencies with USD and developments affecting the U.S. business outlook and interest rates are of paramount concern to both of them.

In view of these similarities, it is tempting to conclude that the same exchange rate regime of independent floating with USD as with all other currencies should be equally attractive to Canada and Mexico. This paper documents instead a major asymmetry between Canada and Mexico with regard to their monetary and financial credibility and usable policy independence. It finds that factors that move exchange rates so much as to make them appear non-pegged leave heightened macroeconomic volatility in Mexico but not in Canada. For Mexico, liability dollarization, resulting in part from inability to borrow long-term in the domestic currency or to be able to do so only at punishing real interest rates or with high collateral, means that large depreciations pose a threat of bankruptcy for banks and their counterparties and hence to the entire financial intermediation system. Hence some form of monetary union with the United States, even the formal unilateral dollarization of Mexico, could provide major insurance and stability benefits for Mexico.

For a broader perspective, leaving aside the issuers of major international currencies, the United States and the euro area, there are two other groups of countries that have opened up fully to international financial markets:

> (1) One group consists of countries like Canada, Japan, Singapore, Switzerland, and the United Kingdom that have advanced financial systems and are net exporters of financial services even though the network externalities afforded by their own currency to other countries are limited and not truly global.
> (2) The second group of interest contains high-income emerging-market countries that appear unable for the foreseeable future to establish a currency that can credibly promise to maintain its purchasing power over internationally traded goods in the long run. These currency denominations are acceptable for only a limited range of financial transactions even in their

own country, and their domain is threatened by actual or potential currency substitution. Elevation from group (2) to (1) involves a lengthy testing and qualification process which most emerging-market countries have failed repeatedly.

To bring welfare-relevant evidence to bear on the proposition that keeping their own national money may be useful for the first group of countries but not the second, I make use of NAFTA's containing one country from each group, Canada and Mexico, inside an economically integrating region. This allows for interesting contrasts.

1.1. NAFTA Missing an Opportunity from the Start

When Mexico entered NAFTA, it could not plan on credibly fixed exchange rates that end in a common currency with the United States.[1] Despite significant dollarization of business liabilities and the holding of U.S. currency and other dollar-denominated financial assets by Mexican households, formal U.S.-dollarization or co-managed forms of monetary union were not considered. That meant that future cost and competitiveness relations between Mexico and the United States would remain highly variable and uncertain, hampering business-location decisions and long-term planning. Mexico's economic performance has fallen well short of model-based long-term forecasts made just before NAFTA went into effect that stressed the growth benefits of accelerated transfer of embodied technology and growing capital intensity.[2] Insufficient allowance for the heightened exposure to capital-account shocks and financial instability implied by Mexico's maintaining a separate currency after opening its capital markets may be among the reasons for these forecast errors. Perhaps the still quite strong current best estimate, that, *ceteris paribus*, currency union is associated with a doubling of trade between its members (see the meta-analysis by Rose, 2004), is due in part to the avoidance of currency crises and of exchange-rate instability which membership in such a union may bring.

2. Key Insurance Functions of Common Currency

This section seeks to explain why and how monetary union may reduce the variability of living standards in financially backward, but not in advanced countries because this is the maintained hypothesis or conjecture subsequently to be tested. Elaborating on Baur *et al.* (2001, 3-12), the principal insurance benefits of a common currency, particularly for emerging-market countries switching to a world-class money, are:

- *Lower information and transaction costs.* The broadening of the financial market in the common currency encourages standardization of instruments, financial reports and prospectuses, and of market rules and practices. Monetary union thereby lowers both information and transaction costs and facilitates more accurate risk assessment. A reduction in the costs of investing and transacting across borders, in

[1] Unilateral U.S.-dollarization raises several politically uncomfortable issues of foreign control. Formal dollarization makes takeover of a country's financial system by U.S.-based institutions with a technological and funding advantage all but certain. Greater exposure to U.S. regulations, information-harvesting and sharing mandates then follow. The least concern should be with U.S. monetary policy's not suiting other dollarized countries in the region. The reason is that strong growth under dollarization of functional interdependencies in trade and finance would make a policy that is bad for Latin America *less* likely to be good for the United States.

[2] von Furstenberg and Teolis (1993, 137) estimated that Mexico's economic size would rise from 4.4 percent of U.S. GDP in 1990 to 11.0 percent without and 12.2 percent with monetary union by the year 2025. Taking an average of the 2002 and 2003 ratios, each calculated using that year's average peso exchange rate with USD, the ratio of Mexico's GDP to that of the United States had risen to only 5.9 percent. Thus the 7.0 percent ratio that had been forecast in the above source for 2005 with NAFTA but without prospect of monetary union now seems out of reach as conditional convergence has been unexpectedly slow. Kose, Meredith and Towe (2004) sort through the forecasts of NAFTA's effects on Mexico's growth contained in other pre-1994 studies.

turn, will reduce home bias in investment (see Obstfeld and Rogoff, 2000, 363-365) and lead to greater diversification. Canada has already standardized much of its accounting and finance on U.S. or international best-practice models; Mexico has not done so.

- *Increased insurability and avoidance of unproductive risks.* Monetary union lowers some risks and makes others more insurable in emerging-market countries. Eliminating currency crises for such countries by having them substitute a widely used international currency in the region for their own removes a major, not hitherto insurable, macroeconomic risk. It does so by eliminating currency mismatches due to liability dollarization, a condition that can spread massive economic damage through the financial system in the event of a currency crisis. The welfare gains from greatly reducing the likelihood of falling into this catastrophic region are bound to be large.
- *Risk reduction, external finance and privatization*. Any financial development encouraged by monetary union increases the number of sources and instruments for funding business capital formation. This contribution is especially important in emerging-market countries where dependence on hard-to-get financing from outside the domestic firm is one of the major constraints on its investment (see Rajan and Zingales, 1998). Reducing investment risk and uncertainty about future real exchange rates and future competitiveness among members and having safe access to borrowing in an international currency without precipitating currency mismatches can bring down the discount rate applied to future earnings. Calvo and Mishkin (2003, 101) have pointed to fiscal, financial, and monetary stability as key to macroeconomic success in emerging-market countries, and monetary union tends to promote all three.
- *Risk transfer through capital market development*. The function of insurance and of contingent claims is to transfer risks from principals for whom bearing these risks is costly to parties for whom it is less costly through diversification across *different*, i.e., imperfectly correlated, types of risk and through pooling of individuals' exposure to *given* types of risk. By stimulating financial development, particularly of the insurance sector, and of a deep and internally and externally diversified market for financial instruments including derivatives, monetary union facilitates such risk transfer, particularly for Mexico. As Hausmann *et al.* (2000,155) explain and the Mexican crisis of 1994/95 and Argentine crisis of 2001/02 showed once again, emerging-market countries have no capable internal lender of last resort in a major crisis and could be better off enhancing insurability by joining in monetary union.

In sum, in contrast to financially advanced countries, emerging-market countries can look forward to the reduction in macroeconomic volatility and in the cost of capital through better information, reduction of currency and uninsurable catastrophic risk, and greater insurance of those risks that remain as outstanding contributions of monetary union. Such a spur to financial development will in turn increase economic growth (see Bandiera *et al.*, 2000; Fisman and Love, 2004; Guiso *et al.*, 2004). Having defined some of the insurance benefits expected from monetary union for emerging-market countries, the next question is, of course, whether any evidence can be brought to bear on these matters based on the changing exchange-rate regimes between NAFTA countries.

3. Exchange-Rate Regimes and the Volatility of PPP-GDP per Hour and per Person

For lack of a North American monetary union, the stabilization effects of such a union for Mexico more than Canada can be inferred only partially from episodes of fixed versus floating

exchange rates of their respective currency with USD. Such episodes mimic the one aspects of monetary union that relates to the maintenance of fixed exchange rates (at the rate of 1:1 for the same money). Because monetary union delivers much deeper financial integration than that available from pegged exchange rates between separate currencies alone, any stabilization effects associated with episodes of quasi-fixed exchange rates will be a lower-bound estimate of those expected from monetary union for emerging-market countries.

If a peripheral economy's trade and finance both are highly dependent on that of a dominant country -- or, in Europe, group of countries -- with an international currency, it may gain little benefit from letting its own currency float. In fact, the volatility of its real PPP-GDP[3] per hour and per person may be an increasing function of the extent to which the exchange rate of its currency with that of the dominant partner changes. This claim and the evidence, pro and con, are detailed first. I then analyze the effects on the volatility of living standards of the different *de-facto* exchange-rate arrangements of Canada and Mexico, countries that have a history of switching repeatedly between exchange-rate regimes.

According to interpretations of the evidence for Latin America associated with Fernández-Arias and Hausmann (2000) and Calvo and Reinhart (2002), in such countries floating provides little usable monetary independence, does not effectively discourage dollarization and currency mismatches, and reduces the depth of domestic financial intermediation relative to what it would be under credibly fixed rates, particularly in the nontraded-goods sector.[4] Specifically, Hausmann *et al.* (2000, 141-145) find that Latin American central banks use exchange-rate flexibility very sparingly and interest-rate defenses very heavily to keep exchange rates from falling very far and fast, particularly if they are formally floating. In addition, fixed-exchange-rate regimes lead on average to lower real interest rates so that peso problems associated with fixed rates raise interest rates less than the risk premiums that are attributable to even greater uncertainty about future levels of exchange rates under floating.

Furthermore, Hausmann *et al.* continue, letting the exchange rate fluctuate with the terms of trade strengthens the positive covariance that agents experience between shocks to their income and accumulated wealth. The result is a "double whammy" to their living standards when the terms of trade decline and the exchange value of the currency plunges unless they hold their wealth in credible assets denominated in hard foreign currency. Falling exchange rates also expose currency mismatches of financial institutions and their counterparties to the extent parts of their domestic loans and deposits are denominated in the dominant international currency of their region. Letting the exchange rate go then leads to an increase in interest rates, has a large inflationary impact, and causes a major decline in output (Hausmann *et al.*, 2000, 138). The latter occurs because a large and sudden depreciation is both cause and effect of the disruption of a country's foreign and domestic intermediation and financing systems. Floating thus heightens real exchange-rate volatility,[5] currency risk, and the risk of financial crisis according to this interpretation, thereby justifying a fear of floating -- in Latin America usually sinking -- exchange

[3] PPP refers to conversion at Purchasing Power Parity to international dollars as further explained later in this section. International-dollar aggregates reflect relative prices that are more representative globally than those prevailing just in the United States.

[4] The exchange-rate disagreements precipitated by some of the parties' to a free-trade agreement choosing to float are explained and analyzed by Fernández-Arias, Panizza, and Stein (2004). Tornell, Westermann, and Martinez (2004) attribute NAFTA and Mexico's undistinguished economic performance since 1995 to a protracted credit crunch that has hit the nontradable-goods sector especially severely for lack of dollar-receivables and access to foreign financing. They do not call attention to Mexico's transition to floating having contributed to the low level of financial services being delivered to peso-loan-dependent sectors of the economy, but such an inference may well be drawn.

[5] Teolis and von Furstenberg (1993) found that over largely quasi-pegged periods, such as 1957:02-1976:08 and 1988:04-1992:06, the monthly variability of the real exchange rate between the Mexican peso and USD was between 1 and 3 times as great as that within the United States between Chicago and Los Angeles, which are among the metropolitan areas for which CPIs are reported. During the largely non-pegged or freely falling period for the peso in between, 1976:10-1988:02, it was 41 to 58 times as great.

rates. Edwards (2002, 246-248) has attempted to show, however, that not all policy reactions to exchange rate movements are sub-optimal, or deserve to be labeled as "fear of floating" even though the optimal amount of floatation in small and open economies generally may be small.

An alternative claim regularly emphasized in publications of the Canadian and Chilean central banks[6] is that floating, for these countries at least, has been a welfare-enhancing shock absorber facilitating and smoothing adjustment to the equilibrium level of real exchange rates and both terms-of-trade and capital-account shocks. Since Chile is highly dependent on the United States only in finance and Canada only in trade, their conditions are not comparable to those of Mexico because Mexico is highly dependent on the United States in both trade and finance. It is for countries with this double dependency for which the assertion made at the beginning of this section, about floating their currency being of little benefit, is most likely to be apt. In addition, Calvo and Mishkin's (2003, p. 107) judgment, that "for a central bank without inflation-fighting credibility, an expansionary monetary policy will only lead to an immediate jump in interest rates and/or the price level" applies to Argentina and, at least until recent years, to Mexico, but certainly not to Canada as they note. Rather, in Canada an easing (decrease) of its Monetary Conditions Index involves a decline in the level of interest rates relative to their U.S. level and a consequent depreciation of the CAD/USD exchange rate without an immediate rise in the inflation rate.

Although about half the value of bonds outstanding of Canadian corporations is in USD, the share of variable-rate credit market instruments whose interest rates are set as USD-LIBOR+ is comparatively small because Canadian firms borrow principally in the U.S., and not the euro-dollar market (Murray and Powell, 2003, 164). In Mexico, many large businesses are predominantly USD-financed, particularly at the long end, with the IMF (2004a, 51-61) providing useful data on the development of other aspects of Mexico's dollarization. The elasticity of Canada's overnight borrowing rate with respect to movements in the U.S. effective federal funds rate so far this decade has been only about 0.6. Perhaps because of "fear of sinking" engendered by widespread liability dollarization, the elasticity of Mexico's interbank rate (28-day TIIE) with respect to the U.S. federal funds rate has been 1.9, three times as high as the comparable elasticity in Canada.[7] Hence the consequences of having chosen a particular exchange-rate regime, if indeed there was a choice, are likely to be quite different for Canada and Mexico as Hausmann *et al.* (2000, 138) have emphasized. They argued that floating confers very little monetary

[6] From the Bank of Canada see, for instance, Murray (1999), Laidler (1999) and Schembri (2001). From the Banco Central de Chile see Morandé and Schmidt-Hebbel (2000) and Edwards and Magendzo (2002). For Mexico, exchange-rate movements that show a tendency to bring the exchange rate back to fundamental equilibrium identified by a variety of models have been difficult to document. One careful recent study (Fullerton, Hattori, and Calderón , 2001), for instance, concludes that "in no case ... do any of the error correction models generate forecasts [of the MXP/USD exchange rate] that produce superior rates of accuracy than those associated with a simple random walk." Buiter (1999, 49) criticizes the "fine tuning fallacy" according to which monetary policy can be used systematically and effectively at least in advanced countries to dampen the effect on the real economy of external and/or internal shocks.

[7] To derive these results I took the logarithm of the respective gross interest rates (1+r, where r is the interest rate expressed as a fraction) reported by the respective central banks and regressed the Canadian and Mexican rates so derived with intercept and AR1 correction on those of the United States, using monthly data from January 2000 through October 2004. With t-values in parentheses, for Canada, the intercept was 0.015(4.77), the final value of rho estimated with the Prais and Winsten algorithm was 0.918(17.52), and the elasticity with respect to the U.S. rate was 0.643(8.46) with an adjusted R-square of 0.96. For Mexico the intercept was 0.046(7.18), rho was 0.705(7.51), and the elasticity with respect to the U.S. rate was 1.904(10.62) with adjusted R-square of 0.93. The nominal interest rates in the 4-3/4 years long sample averaged 2.82% with 2.42% inflation for a real interest rate of 0.39% in the United States, 3.41% with 2.36% inflation (almost the same average inflation rate as for the United States) for a real rate of 1.03% in Canada, and 9.86% in Mexico with 5.33% inflation for a real rate of 4.30%, almost 4 percentage points higher than in the United States.

independence, on Mexico.[8] Indeed it leaves Mexico with disproportionately large interest-rate dependence on the United States.

Mexican-peso interest rates not only move strongly with dollar interest rates in the United States but, as documented in a previous note, there is also a 4-percentage-point real excess return required on even the shortest top-quality loans of ready funds in Mexico compared with the United States while the equivalent excess for Canada (of 0.6 percentage point) is insubstantial by comparison. There were no credible indications that the peso was overvalued relative to USD in October 2004. Hence it is unlikely that Mexican and foreign investors needed to be compensated in advance for any real depreciation leading toward equilibrium that they saw lurking past the January 2000-October 2004 data frame. It is also implausible to argue that interbank domestic-currency obligations were subject to appreciable fulfillment risk in Mexico during this period so that a default premium might have crept in. Hence the 4-percentage-point excess over the U.S. real federal funds rate must be viewed as a pure risk premium and as the type of surcharge on the international cost of capital that emerging-market countries with limited credibility just do not seem to be able to escape as long as they keep their own currency and the policy risks that go with it.

3.1. The Welfare Significance of the Volatility of PPP Measures of GDP per Hour and Head

Particularly in countries like Mexico, in which consumer borrowing is still in its infancy, the adverse effect on welfare of greater *volatility* of real GDP per person, even at unchanged expected levels of this variable, is an obvious consequence of convex utility. For liquidity-constrained consumers, rates of change in personal consumption are highly correlated with those in real income, so that income variability can be used in lieu of consumption variability, which is commonly taken as a welfare criterion (*e.g.*, in Engel, 2001, who presents evidence for Mexico). For those remaining employed under somewhat flexible work arrangements, increased volatility of real GDP per hour worked lowers expected utility in part also from the supply side: Diminishing marginal utility of leisure is encountered as work effort is shifted temporarily in response to fluctuating compensation rates.

The merits of basing welfare inferences about consumption volatility on *PPP*-dollar measures require more justification. If our focus were mainly on comparing living standards in two countries, choosing dollar-converted PPP measures clearly would be preferable to using measures converted to the same currency with actual (annual) average exchange rates.[9] The reason is that the latter fail to reflect the true quantity *levels* of goods and services embodied in the aggregates being compared in a given year and also the true *movements* in relative volumes of these goods and services over time to the extent exchange rates do not reflect absolute or even relative PPP (Ahmad, no date, p. 2). The exact measurement of the PPP measures to be compared could be important also for international welfare comparisons of the *volatility* rather than *levels* of GDP per hour or per head. For instance, income variability may be more costly in relation to the utility of the expected value of the chosen PPP measure of real income, the closer that value for parts of the population comes to an assumed absolute subsistence minimum (that could trigger the Inada condition). Welfare-relevant logarithmic volatility measures then depend on the precise

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[8] Hausmann *et al.* (2000, 149) estimated that a 1-percentage point hike in the U.S. rate caused a 5.93 percentage point increase in the rate for Mexico during the period September 1997 - February 1999 containing the East-Asian and then the Russian default crises of 1997 and 1998 and the Brazilian crisis of 1998/99. My estimate reported in the previous note for the quieter period that followed is less than one-third as large but still far, and highly significantly, above 1 while the Canadian response elasticity is statistically significantly below 1.

[9] The difference PPP conversion makes tends to be large for developing countries but not for advanced countries similar to the United States. In 1993, for instance, the PPP exchange rates for CAD and MXP relative to USD were 1.281 and 2.102 respectively (Ahmad, no date, p. 27). The corresponding average annual market rates were 1.290 and 3.116, implying essentially no difference for Canada but a large percentage deviation in PPP from the market exchange rate for Mexico.

level of welfare because the utility function from which they are derived displays decreasing, rather than constant, relative risk aversion. Even setting such scale-dependence aside, using long time series for different countries that are all constructed by the same welfare-consistent statistical method applied in the World Bank's International Comparison Project (ICP) may be preferable to using a variety of national measures that are deflated in different ways.

3.2. Differences in the Expected Volatility of PPP Measures of GDP per Hour and per Head

Having illustrated the use, and argued for the usefulness, of PPP measures of real GDP, it is now time to show how PPP-GDP per Person (GDPP) and per Hour (GDPH), and hence their volatilities, are related. For this comparison it is useful to consider the identity:

$$GDPP = GDPH(H/EMPL)(EMPL/LF)(LF/PWA)(PWA/POP) \qquad (1)$$

Here H/EMPL is annual hours of work per employee, EMPL/LF is the complement of the unemployment rate, LF/PWA is the labor force (LF) participation rate with PWA denoting the population of working age, and PWA/POP is the complement of the dependency ratio, where POP is total population.

Now because hours per employee, H/EMPL, the employment rate, EMPL/LF, and the labor force participation rate, LF/PWA, are all decidedly pro-cyclical, GDPP must be more cyclical than GDPH. Indeed, in exceptional cases such as those associated with the Thatcher "revolution" in the UK after 1979, GDPH could even be countercyclical if a recession and changes in labor laws induce not labor hoarding but massive labor shedding and plant closings so that only the more efficient operations survive. Hence GDPP will reflect demand-side disturbances to a greater extent than GDPH. GDPH will be relatively more exposed to supply-side disturbances, including shocks resulting from changes in the terms of trade. Empirically, the standard deviation of the sample standard deviations estimated in the succession of moving three-year windows is uniformly greater for the volatility of GDPP than for the volatility of GDPH for Canada and the United States but not for Mexico; both standard deviations are highest for Mexico.

There was little difference in the mean volatility of rates of change in Mexico's GDPP and GDPH. A series of bold entries in Table I shows that the correlation between the annual rates of change in GDPP and GDPH is 0.90 for Mexico, but only half as large, 0.45, for Canada. Results obtained with the volatility of each of the two measures thus are likely to differ more for Canada than for Mexico which is our main focus. Even so testing for the consistency of the results obtained with the two measures appears worthwhile. The 0.59 (0.78) correlation between Canadian and US annual rates of change of GDPH (GDPP) suggests that there is much synchronous volatility spillover from the United States to Canada, particularly in the more cyclical of the two measures. The much lower correlations between matching Mexican and US rates of change of 0.22 (0.17), make a finding of statistically significant volatility spillover from the United States to Mexico less likely.

We are now ready to investigate empirically the way the volatility of either measure relates to the exchange-rate regimes that have prevailed in Canada and Mexico from 1950 (GDPP) or 1960 (GDPH) to 2003, using data available from the Groningen Growth and Development Centre (2004) for these concepts and periods.[10] Volatility measures are constructed

[10] I am grateful to Gary Martin of the Bureau of Labor Statistics – Foreign Labor Statistics, for directing me to this source. It provides data at http://www.ggdc.net/homeggdc.htm on GDP per hour in 1999 USD converted only at EKS PPPs and on GDP per person in 1999 USD converted only at GK PPPs. The EKS (Elteto-Koves-Szulc) and GK (Geary-Khamis) methods of computing PPPs are described in Ahmad (no date, 7-10). He notes, "The advantage of the EKS method is that it is built up from Fisher type index numbers and has properties that are desirable from the standpoint of consumer choice theory. The major drawback of EKS [compared with GK] is that it is not additive, i.e., the sum of the components of national accounts would not equal the total."

as centered rolling standard deviations of three adjoining annual rates of change in the respective measures. For instance, if the first "level" datum available is for 1950, the first rate of change is constructed for 1951 from 1950, and the first volatility measure, centered at 1952, is simply the standard deviation of the rates of change calculated for 1951, 1952, and 1953. All volatility measures are constructed for Canada, Mexico, and the United States, where the respective U.S. measure may serve as one of the explanatory variables for the volatility of GDPP or GDPH in Canada and Mexico.

3.3. Characterizing the de Facto Exchange-Rate Regimes in Canada and Mexico

The exchange-rate regime is characterized analogously as a rolling window of three-year centered averages. The first value used in the above series, for instance, is the average of the dummy variable levels used to characterize the exchange-rate regime in 1951, 1952, and 1953 centered on 1952 just as the last value is the average of the levels for 2001, 2002, and 2003, centered on 2002. This procedure allocates the exchange regime in any year in equal parts to what was laid in store in the previous year, what happened in the current year, and what ensued in the following year. For instance, if a peg is abandoned in a year of crisis, the coding for the *de facto* exchange-rate behavior during the crisis spills over in both directions, backward and forward. Looked at differently, it takes a sequence of three years of the same regime to attribute the middle year of that sequence fully, and reasonably securely, to that regime. Of course some small unobserved probability of transition applies in any year in progress even when no transition occurred in surrounding years.

Because Reinhart and Rogoff (2003) have succeeded in driving home the point that the formally-declared and actual exchange-rate regimes often differ, we simply classify exchange-rate regimes in Canada and Mexico by the extent of within-year (yearend-to-yearend) changes in the nominal exchange rate: less than 5 percent up or down (dummy value of 0 for "pegged" or "quasi-pegged"),[11] or changes of 5 percent or more (dummy value of 1 for "non-pegged"). The latter episodes are subdivided into those where the nominal exchange rate changed by at least 5 percent but less than 40 percent *per annum* (dummy value 1 as before) and years in which it changed (in actuality, depreciated) by 40 percent or more (dummy value 2 for "non-pegged freely-falling"). This extreme non-pegged class, which is empty in Canada, is similar to Reinhart and Rogoff"s "freely falling" category for cases with 12-month inflation over 40 percent *per annum*. The largest annual rate of change in Canada was an 18-percent nominal appreciation in 2003.[12]

The coding used for the entire period, 1950-2003, is indicated in Table II. As this table shows, the exchange rate of the CAD with the USD acted as if it were effectively pegged every year from 1950 through 1976 with the exception of just one year, 1970. Yet as Schembri (2001, 31) reports, Canada had what it officially classified as a floating rate in 43 out of the past 51 years, 1950-2000. By contrast, Table II shows *de facto pegging* in 40 of these same 51 years, and non-pegging in only 11. Mexico turned in the same record of pegging to the US dollar as Canada in the early part of the time series, from 1950 through 1975, with the exception of again just one year, 1954. Hence the longer data period for GDPP, effectively starting with values centered on 1952, has considerably more observations generated under pegged or quasi-pegged exchange-rate arrangements than the shorter period for GDPH starting with values centered on 1962.

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[11] Article 4 of the Smithsonian Agreement of December 1971 made provision for 2.25 percentage point margins of exchange rate fluctuations above and below a central rate. The exchange rate with the dollar of countries availing themselves of these margins (that were wider than the 1 percentage point on either side stipulated in Section 3 of Article IV of the original (1944) *Articles of Agreement of the International Monetary Fund*) thus could fluctuate by at most 4.5 percent inside this band. However, Mexico in 1971 chose not to change either its central rate (12.5 old peso per dollar) or its margins, and Canada continued to proceed without a central rate or par value.

[12] Given that the level of interest rates was already very low in Canada in 2003, a 6 percentage point reduction to keep the Monetary Conditions Index unchanged would not have been feasible, making the potential adjustment of interest rates to exchange rate movements in Canada somewhat asymmetric.

3.4. Regression Estimates for the Volatility of Rates of Change in GDPP and GDPH

Construction of the dependent variables, and the like explanatory variable from the United States, starts with taking the respective levels of GDPP or GDPH reported in the source already identified for each year *t* 1950-2003 for the former and 1960-2003 for the latter for Canada and Mexico. The operation used to derive rates of change (in percentage points) from these variables, generically called y, is $100dln(y_{t+1}) = 100ln(y_{t+1}/y_t)$, so that annual rates are calculated for 1951 to 2003 from the preceding year for y=GDPP and for 1961 through 2003 for GDPH. The centered rolling-window volatility measures then are the standard deviation (STDEV) constructed from 3 rates of change such that $Volatility_{t+2} = STDEV[100dln(y_{t+1}), 100dln(y_{t+2}), 100dln(y_{t+3})]$. Hence the first volatility measure that can be constructed is for 1952 and the last for 2002 if y=GDPP, for a total of 51 observations. The range is from 1962 to 2002 for GDPH, for a total of 41 observations.

The regression results in Table III show highly significant volatility spillover of 50 percent from the United States to Canada for (rates of change of) GDPP. The spillover for GDPH is one-fifth but not statistically significant at the 5 percent level. For Mexico, this spillover is either positive (GDPP) or negative (GDPH) and insignificant. This is the type of result for Mexico that has often been misused to argue against credibly-fixed exchange rate arrangements, such as dollarization or other forms of monetary union, with the United States on the ground of an alleged lack of symmetry of shock exposure. In fact, the highly significant coefficient on the exchange-rate regime index for Mexico shows that volatility is systematically greater when the exchange rate is moving around than when it stays quasi-pegged to USD. Specifically, solved at the mean level of volatility for the corresponding measure in the United States, the predicted volatility of the annual rates of change of GDPP is 1.59 percentage point under quasi-pegging, but that figure more than doubles to 3.21 percentage points when there are three years in a row that have the nominal peso-dollar exchange rate move by 5 percent or more but by less than 40 percent from beginning to end of each year (so that the centered average dummy value is 1). The predicted increase is from 1.59 to 2.67 when the three-year rolling average exchange-rate regime index has just two such years in it and one that is quasi-pegged (so that the average dummy value is 2/3). The difference made by the exchange regime is smaller for GDPH than for GDPP. For instance, raising the value of the dummy variable from 0 to 1 produces a 76-percent, rather than 102-percent, increase in the volatility of the respective measure, using the mean of U.S. volatility in solving the last two equations in Table III for Forex-Regime dummy value 1 versus 0.

While acting non-pegged thus is associated with much greater remaining volatility for Mexico, Table III also shows that the size of exchange rate movements is unrelated to the stability that is left to be observed in Canada with these movements. Hence it appears that Canada (and international financial markets) handled matters well by keeping the exchange rate with USD quasi-pegged most of the time, but sometimes letting it move by 5 percent or more to maintain a given degree of economic stability. If the quality of exchange-rate management and functioning in Canada's free capital market are uniformly high, but the stance that is optimal changes with shocks, one might expect the exchange-rate regime not to be a significant explanatory factor in the volatility of rates of growth of PPP-GDP per person or per hour that remains to be observed: The exchange regime has already done its best to reduce that volatility.

Yet there is no support for the suggestion, sometimes entertained by staff of the Bank of Canada (see, for instance, Schembri, 2001), that what is appropriate for a financially highly developed and credible country like Canada is appropriate also for Brazil and Mexico which lack these attributes. "Small" countries like Canada that are net exporters of financial services and leaders in global financial management and innovation may very well keep their own money for the time being without incurring any net cost. Others would clearly be better off to adopt a money of international standing, which they themselves can not bring forth, to obtain access to high-quality monetary and financial services. Hausmann *et al.* (2000, 135-138) carefully distinguish

the constructive exchange-rate experience of Canada, and of major European countries during the ERM crisis (1992-1993), from the experience of Latin American countries with their own currencies in this regard.

3.5 Further Sensitivity and Validation Tests

Having already relied on the combined evidence obtained from two welfare-relevant measures of PPP-GDP rather than just one, further sensitivity tests are in order. These relate to (a) possible breaks in the time-series relations, (b) the special role of commitment to the narrow "Bretton Woods" fluctuations of 1 percent on either side of the declared parity with USD inside the quasi-pegged category, and (c) the use of a continuous variable, instead of a discontinuous or dummy variable, to characterize regimes by the degree of exchange-rate fluctuations.

(a) The FTA between Canada and the United States concluded in January 1989 and the financial liberalization in Mexico which Obstfeld and Taylor (2004, 252) date from the same month suggest checking whether the coefficients shown in Table III might be different for the sub-period starting in 1989 from those applying earlier. Volatility spillover from the United States to both Canada and Mexico could well have become more intense since 1989 and capital flows to Mexico much larger and less stable. However, adding the respective explanatory variables once more but now multiplied by a dummy that was set to 0 before 1989 and to 1 from 1989 on to allow for coefficient change for the latter period never yielded statistically significant results on the subdivision.[13] Hence there is no statistical evidence of a break in the time-series relations for either Mexico or Canada around 1989.

(b) It is reasonable to hypothesize that exchange-rate expectations and "anchoring" effects relevant for economic stability are different for countries committed to the Bretton Woods system and for countries whose exchange rate with USD just happened to change little over a period of time without the support of such a formal commitment. Canada was a reliable member of the Bretton Woods system for only 7 full calendar years, 1963-1969. Mexico kept its exchange rate fixed within the narrow Bretton-Woods margins (rather than the wider "Smithsonian" margins of +/- 2.25 percent of par authorized in 1971) from after a major devaluation in 1954 to 1976. Its period of firm commitment to the Bretton Woods system was dated 1956-1970, but choosing a terminal date as early as 1969 and as late as 1975 made little quantitative and no qualitative difference to the results reported below. Hence a Bretton-Woods dummy that was set to 1 for Canada for each year from 1963 through 1969, and for Mexico from 1956 through 1970, was added to the specifications shown in Table III. The result for the GDPH measure, that started in 1962, was that the coefficient on the Bretton Woods dummy was negative insignificant (-0.52 (with t-value of -0.72)) for Mexico and positive insignificant (0.45(1.94)) for Canada with little else changed. If one were to make anything of these statistically insignificant coefficients it would be that Mexico gained stability from the firmer commitment while Canada sacrificed stability for it, as if tying its hands needlessly. However, this interpretation does not fit the results obtained with the GDPP data starting in 1952 because the sign pattern is reversed for the two countries, though with absolute t-values much smaller still. Hence characterizing centered average exchange rates that change by less than 5 percent during a year as belonging to a single regime called "quasi-pegged" is not to be faulted for failing to allow separately for Bretton-Woods effects within this category.

(c) There may be regime-specific stability effects that have to do with the perceived membership in a particular regime and not so much with the exact amount of exchange-rate change supporting that perception. Yet the breakpoints set between regimes, at 5 percent and 40 percent exchange-rate change, are to some extent arbitrary. A way of proceeding with less prior imposition is to calculate the three-year centered moving average of the absolute values of

[13] This lack of significant or consistently growing volatility spillover from the United States to Mexico is somewhat surprising in view of Torres and Vela's (2003) finding of recent increases in cyclical interdependence.

(logarithmic) exchange-rate changes between successive yearends so as to create a continuous variable characterizing the absolute size of exchange-rate change. This variable is called ForexContinuChange in Table IV. Except for the inevitable difference in the size of the regression coefficients due to the dimensional change,[14] the results obtained with ForexContinuChange are very nearly the same as those reported with ForexRegimeDummy in Table III. In particular, the significance levels of all matching FOREX coefficients are similar and the standard errors of the final estimate, in the last row of regression results in Tables III and IV, are almost the same. Hence the results appear robust with regard to the construction of the critical variable characterizing exchange-rate behavior and regime in this paper.

4. Interpretation of Results

There is now a considerable literature relating to the question of which exchange-rate regime, combined with a monetary-policy rule such as inflation-targeting when floating, is best for economic growth and stability. Even when such literature rests on *de facto*, rather than *de jure*, classifications of exchange-rate regimes, as seems eminently desirable, it does not proceed from the assumption that exchange-rate behavior is completely endogenous or model-determined. Rather, exchange-rate behavior shares some of the unpredictability of asset prices in inexplicable, and at times disturbing or crisis-aggravating, ways. Thus nominal exchange-rate flexibility can be a major source of extraneous shocks (Buiter, 1999, 34).

If, on the other hand, nominal exchange-rate movements were attributable largely to "fundamentals" that caused the equilibrium level of the real exchange rate to wander about, in theory, nominal exchange-rate flexibility could raise the speed and reduce the cost of adjusting the real exchange rate when nominal wage and price rigidity stand in the way.[15] Then if there were fundamental reasons for nominal exchange rates to change appreciably (5 percent or more according to our classification) in only some of the years, sample-selection bias would still make periods with appreciable exchange-rate movement appear more volatile than those in which exchange rates held steady simply because "nothing happened." Although such bias can not be ruled out entirely, pegged rates have been so common that it is difficult to dismiss them as a fair-weather phenomenon that can persist only as long as it is not challenged by fundamentals.

Part of the reason is that the implications of any shock for the equilibrium level of the real exchange rate are rarely clear, even directionally. For instance, it is not clear in general whether positive productivity shocks should lead to an appreciation or depreciation of the equilibrium real exchange rate. Melvin (2003, 187) casually assumes the latter while the empirical evidence for a number of countries including Canada (Gauthier and Tessier, 2002) and Chile (Navarro and Soto, 2001; Soto 2003) points the other way. Positive productivity shocks affecting much of a country's export sector may either depreciate or appreciate the real exchange rate depending on the extent to which the country is a major international supplier facing limited elasticity of demand for its chief exports. The higher that elasticity -- in the derivation of the Balassa-Samuelson theorem it is assumed to be infinite -- the more likely it is that a real appreciation is the equilibrium outcome. In that case the increase in the relative price of nontraded goods swamps any slight reduction in the terms of trade brought on by a positive supply shock in the traded-goods sector. It is also

[14] The mean of ForexRegimeDummy for Mexico is 0.490, SD: 0.583, for 1952-2002 (0.561, SD: 0.612, for 1962-2002) and that of ForexContinuChange is 0.1420, SD: 0.210 (0.168, SD: 0.225). The same data for Canada in the same order are 0.242, SD: 0.276 (0.301, SD: 0.277) and 0.031, SD 0.019 (0.032, SD: 0.021). Hence, if the alternative explanatory variables convey essentially the same information, the regression coefficient on the latter would be expected to be about three times as large as on the former for Mexico and about 14 times as large for Canada if the distribution of both variables were normal. Although the distribution of the three-state dummy variable for the ForexRegime shown in Table 2 obviously is not normal, the coefficients on ForexContinuChange in Table 4 increase much more for Canada than for Mexico relative to those on their respective ForexRegimeDummy in Table 3.

[15] Research published by the Bank of Canada regularly reports findings indicating that "most of the variation in the real exchange rate ... is explained by real demand shocks and supply shocks" while "monetary shocks are unimportant" (Schembri, 2001, 33). See also Laidler (1999).

possible that such a shock calls for no appreciable response of the nominal exchange rate at all. In fact, as reviewed and analyzed in Hausmann *et al.* (2000, 141-144), few countries have found it useful to have high volatility in their terms of trade spill over to their key exchange rate. The reason appears to be that such countries obtain what they most need from pegging: deeper financial markets on which they can depend to tide themselves over and to help adjust to high degrees of variability in their terms of trade.

Edwards and Magendzo (2002) conclude that macroeconomic volatility is found not to differ significantly across dollarized and non-dollarized economies if a matching-estimator technique is employed. This paper has not dealt with comparable economies that made different choices but with different economies that ultimately have made the same formal choice of exchange-rate regime. Yet judging by the volatility behavior of the rates of change in GDPP and GDPH, in Mexico, the macroeconomic volatility remaining turned out to be about twice as high in periods with significant exchange-rate changes as in periods in which the exchange rate remained quasi-pegged. Hence if the composition, size, and frequency of shocks to fundamentals did not differ systematically over time, the effects of shocks appeared easier to cushion during quasi-pegged periods in Mexico than during periods when there was much more net movement in the key exchange rate with USD. Edwards and Magendzo's finding, using alternative control groups, was instead that the volatility of growth never differed significantly for dollarized and non-dollarized countries. Comparability is limited since time-series findings for countries that have experienced a number of *de facto* exchange-rate regime changes, and results for cross-sections of countries differing by regime, are known frequently to be different for reasons given, for instance, in Rose (2004, 102). Indeed, far from finding fixed exchange rates to be a fair-weather standard, Edwards and Levy-Yeyati (2003) suggest that terms-of-trade shocks get amplified in countries that have more-rigid exchange-rate regimes. Hence it is all the more surprising in relation to their findings, but not those of Hausmann (2000, 134, 147), that I found a strong *positive* relationship between macroeconomic volatility and exchange-rate movements between yearends.

For Mexico, in particular after its 1994 entry into NAFTA, it is also useful to recall McKinnon's (1973, 85-86) long-standing judgment that "independent national policies are neither necessary nor desirable if exchange rate changes can upset carefully negotiated tariff, tax, and pricing policies." Fernández-Arias, Panizza and Stein (2004) documented the disastrous effects of exchange-rate misalignments among countries that are parties to a regional economic-integration agreement. Whether such misalignments are precipitated by unilateral changes in the exchange-rate regime of a country vis-à-vis its partners (Brazil vs. Mercosur partners, 1999) or by capital shocks and socioeconomic pathologies or political traumata affecting just one country, exchange-rate responses that are driven by bad policies and politics spread the costs of a country's governance failures to its closest partners in trade and finance. Susceptibility to large and sudden exchange-rate-induced changes in competitiveness among the parties to regional trade agreements is not conducive to deep and low-risk economic and financial integration among them.

The question whether quasi-pegging is a standard that has delivered economic results under all kinds of weather, on a par with the other standards of exchange-rate behavior, relates also to the factors causing exchange-rate regimes to change. There are a few countries, such as Chile, that made a smooth and unforced transition from crawling pegs in a widening band to genuine floating, a transition completed in September 1999. Mexico repegged soon after every major postwar currency crisis except the crisis of 1994/95. The Mexican Central Bank's conviction, echoed by the IMF (2004b, 73) that "Mexico's flexible exchange rate regime has been effective in cushioning the economy from external shocks" since that time begs the question of how much more stable and prosperous that economy might have been without its own money.[16]

[16] IMF (2004a, 82) shows that Mexico's real effective exchange rate (REER) has been highly variable from 1995 to 2004 compared with that of China which had maintained a tight dollar peg over this period. The latter publication also contains statements inconsistent with the staff's conclusion about the "effective economic cushioning" of

Berg et al. (2002, 232), for instance, have previously concluded on trade grounds that Mexico's would enhance its stability by giving up its own currency.

There is other evidence that letting the exchange rate go, forced or freely, is not confidence-inspiring in Mexico. A recent paper (von Furstenberg and Tabora, 2004) found that, while depreciations normally are expected to raise total local (currency) returns in countries whose major listings are highly export-oriented, but not by enough to keep international (currency) holding-period returns from falling, in Mexico, a depreciation of the peso strongly and significantly depresses local returns and hence international returns twice as strongly. This finding was based on data for 1996-2002 not containing any currency crisis.

5. Conclusions

Canada and Mexico now use inflation targeting to achieve low rates of inflation with similar instruments. Both allow their currency to float independently against each of their NAFTA partners but both tend to resist large movements in their exchange rate with the United States. In addition, NAFTA partners Canada and Mexico are equally dependent on trade with the United States. In spite of these similarities, the effects of non-pegged exchange rates on the stability of their living standards appear to be quite different. This paper has demonstrated that macroeconomic instability is more likely to have been abetted than allayed by exchange-rate changes in Mexico. For instance, a period in which exchange rates change by at least 5 percent but less than 40 percent in each of three consecutive years is associated with macroeconomic volatility that is higher than in a period of steadier exchange rates by between 76 and 102 percent depending on whether the measure of PPP-GDP per hour or per person is chosen. Stability benefits from moving from non-pegged not just to a quasi-fixed exchange rate, but to a full-fledged monetary union likely would be even greater.

By contrast, the exchange-rate variations that have occurred in Canada do not appear to have been volatility-increasing or systematically disturbing to real economic activity. Canada does not suffer from "original sin," an inability to borrow long-term in its own currency in international financial markets. The partial US-dollarization of business and financing that exists in export-oriented Canadian corporations does not pose a major risk of currency mismatches. For the economy as a whole, exchange-rate pass-through to domestic wages and prices is slow and fractional. Hence, as Dean (2001) has emphasized, "fear of floating" would be unfounded. Country and currency risk premiums against the United States and the USD have become insubstantial for CAD compared with MXP. Canada's fiscal stance is very sound, its governance is rated clean and efficient, its federal and provincial institutions are credible, and its currency and financial expertise are world-class. Since none of these quality attributes applies to countries south of the US border, the Canadian experience does not apply to them. Indeed differences between Canada and Mexico were shown to be stark, with Canada not troubled by a destabilizing relation between the size of exchange rate movements and the macroeconomic volatility captured in the PPP-GDP data.

There is one other interesting difference between Canada and Mexico that relates to their monetary independence from the United States in view of the volatility spillovers received from that country. For Mexico, these spillovers are small and statistically insignificant as Mexico appears quite capable of making much of its own "noise." But instead of this lack of appreciable symmetry in the cross-country pattern of observed PPP-GDP volatilities leading to a high degree of monetary independence from the United States, Mexico's average monthly interbank rate predictably moved by an amount 1.9 times of and with any change in the average monthly U.S. federal funds rate. This result was obtained with monthly data from January 2000 through

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Mexico's flexible exchange rate that was endorsed October 18, 2004 by the IMF Executive Board. Among these statements by IMF staff and authorities, respectively, are that Mexico still needs to look to "provide room for policy actions to buffer shocks" (p. 30), hinting at *fear of floating*, and that "the peso depreciation since February [2004] was not based on fundamentals" (p. 25).

October 2004. Although the volatility spillover from the United States to Canada was much larger and statistically significant, the overnight borrowing rate in Canada responded with a coefficient significantly below 1 to any change in the U.S. federal funds rate. Because of greater symmetry of the observed PPP-GDP volatilities, Canada had more reason to shadow U.S. interest rates than Mexico. However, it did so only one-third as much, with a coefficient of 0.6 rather than 1.9, thereby availing itself of a useful degree of monetary independence.

REFERENCES

Ahmad, Sultan. No Date. Purchasing Power Parity (PPP) for International Comparison of Poverty: Sources and Methods. World Bank. http://siteresources.worldbank.org/ICPINT/Resources/poverty_PPP_Data_rev2.doc .

Alexander, Volbert; Mélitz, Jacques, and von Furstenberg, George M., eds. 2004. *Monetary Unions and Hard Pegs: Effects on Trade, Financial Development, and Stability.* Oxford: Oxford University Press.

Banco de México. 1999. *The Mexican Economy 1999: Economic and Financial Developments in 1998 and Policies for 1999*. Banco de México, July.

Banco de México. 2004. Follow http://www.banxico.org.mx , English, Economic and Financial Indicators, Labor Market/Employment and Unemployment, Summary Tables, Wages and Productivity.

Bandiera, O; Caprio, P; Honohan, P, and Schiantarelli, F. (cited as Bandiera *et al*.) 2000. "Financial Development and Economic Growth," *Review of Economics and Statistics* 82(2), May: 239-263.

Baur, Esther; Birkmaier, Ulrike, and Rüstmann, Marco. 2001. *The Economic Impact of Insurance in Central and Eastern Europe and the Impact of Globalisation and e-Business.* Distributed by United Nations, Economic and Social Council, Economic Commission for Europe, as TRADE/2001/15, May 1.

Berg Andrew; Borensztein, Eduardo, and Mauro, Paolo. 2002. "An Evaluation of Monetary Regime Options for Latin America," *North American Journal of Economics and Finance* 13(3), December: 213-235.

Buiter, Willem. 1999. "Optimal Currency Areas: Why Does the Exchange Rate Regime Matter?" Sixth Royal Bank of Scotland/Scottish Economic Society Annual Lecture.

Calvo, Guillermo A., and Reinhart, Carmen. 2002. "Fear of Floating," *Quarterly Journal of Economics* 117(2), May: 379-408.

Calvo, Guillermo A., and Mishkin, Frederic S. 2003. "The Mirage of Exchange Rate Regimes for Emerging Market Countries," *Economic Perspectives* 17(4), Fall: 99-118.

Dean, James W. 2001. "Should Latin America's Common Law Marriage to the U.S. Dollar be Legalized? Should Canada's?" *Journal of Policy Modeling* 23(3), April: 291-300.

Edwards, Sebastian. 2002. "The Great Exchange Rate Debate After Argentina," *North American Journal of Economics and Finance*, 13(3), December: 237-252.

Edwards, Sebastian, and Magendzo, I. Igal. 2002. Dollarization and Economic Performance: What Do We Really Know? *Banco Central de Chile Working Paper 175*, August.

Edwards, Sebastian, and Levy-Yeyati, Eduardo. 2003. Flexible Exchange Rates as Shock Absorbers. *NBER Working Paper No. 9867*, July.

Engel, Charles. 2001. "Optimal Exchange Rate Policy: The Influence of Price Setting and Asset Markets," *Journal of Money, Credit and Banking* 33(2, Part 2), May: 518-541.

Ethier, Wilfred J. 2001. "The New Regionalism in the Americas: A Theoretical Framework," *North American Journal of Economics and Finance* 12(2), July: 159-172.

Fernández-Arias, Eduardo, and Hausmann, Ricardo, eds. 2000. *Wanted: World Financial Stability.* Washington, D.C.: Inter-American Development Bank.

Fernández-Arias, Eduardo; Panizza, Ugo, and Stein, Ernesto. 2004. "Trade Agreements, Exchange Rate Disagreements." In Alexander, Mélitz and von Furstenberg, 135-150.

Fisman, Raymond, and Love, Inessa. 2004. Financial Development and Growth in the Short and Long Run. *NBER Working Paper 10236*, January.

Fullerton, Thomas M.; Hattori, M., and Calderón, Cuauhtémoc. 2001. "Error Correction Exchange-Rate Modeling: Evidence for Mexico," *Journal of Economics & Finance* 25(3), Fall: 358-368.

Gauthier, Céline, and Tessier, David. 2002. Supply Shocks and Real Exchange Rate Dynamics: Canadian Evidence. *Bank of Canada Working Paper 2002-31*, November.

Groningen Growth and Development Centre. 2004. Total Economy Database, August. University of Groningen: The Netherlands. http://www.ggdc.net.

Guiso, Luigi; Jappelli, Tullio; Padula, Mario and Pagano, Marco (cited as Guiso *et al.*). 2004. "Financial Market Integration and Economic Growth in the EU," *Economic Policy* (40), October: 525-560.

Hausmann, Ricardo; Gavin, Michael; Pagés-Serra, Carmen, and Stein, Ernesto (cited as Hausmann *et al*.). 2000. "Financial Turmoil and the Choice of Exchange Rate Regime." In Fernández-Arias and Hausmann, 131-164.

International Monetary Fund (cited as IMF). 2004a. Mexico: Selected Issues," *IMF Country Report*, No. 04/250, August.

IMF. 2004b. "Mexico: 2004 Article IV Consultation – Staff Report ..." *IMF Country Report*, No. 04/419, December.

Kose, M. Ayhan; Meredith, Guy M., and Towe, Christopher M. 2004. "How Has NAFTA Affected the Mexican Economy? Review and Evidence," *IMF WP/04/59*. April.

Laidler, David. 1999. The Exchange Rate Regime and Canada's Monetary Order. *Bank of Canada Working Paper 99-7*, March.

McKinnon, Ronald I. 1973. "The Dual Currency Regime Revisited." In Harry G. Johnson and Alexander K. Swoboda, eds. *The Economics of Common Currencies*. Cambridge, MA: Harvard University Press, 85-90.

Melvin, Michael. 2003. *International Money & Finance*. 7th Ed., Boston: Pearson Addison-Wesley.

Morandé, Felipe, and Schmidt-Hebbel, Klaus. 2000. Chile's Peso: Better Than (Just) Living with the Dollar? *Banco Central de Chile Working Paper 068*, March.

Mulder, Nanno; Montout, Sylvia, and Lopes, Luis Peres. 2002. Brazil and Mexico's Manufacturing Performance in International Perspective, 1970-1998. Research Memorandum GD-52. Groningen Growth and Development Center, January.

Murray, John. 1999. Why Canada Needs a Flexible Exchange Rate. *Bank of Canada Working Paper 99-12*, July.

Murray, John, and Powell, James. 2003. "Dollarization in Canada: Where Does the Buck Stop?" *North American Journal of Economics and Finance* 14(2), August: 145-172.

Navarro, Lucas, and Soto, Raimundo. 2001. Procyclical Productivity: Evidence from an Emerging Economy. *Banco Central de Chile Working Paper 109*, October.

Obstfeld, Maurice, and Rogoff, Kenneth. 2000. "The Six Major Puzzles in International Macroeconomics: Is there a Common Cause?" In Ben S. Bernanke and Kenneth Rogoff, eds., *NBER Macroeconomics Annual* 15: 339-390.

Obstfeld, Maurice, and Taylor, Alan M. 2004. *Global Capital Markets: Integration, Crisis, and Growth*. Cambridge: Cambridge University Press.

Rajan, Raghuram G., and Zingales, Luigi. 1998. "Financial Dependence and Growth," *American Economic Review* 88(3), June: 559-586.

Reinhart, Carmen M., and Rogoff, Kenneth S. 2003. The Modern History of Exchange Rate Arrangements: A Reinterpretation. International Monetary Fund, March 3 draft.

Rose, Andrew K. 2004. "The Effect of Common Currencies on International Trade: A Meta-Analysis." In Alexander, Mélitz, and von Furstenberg, 101-111.

Schembri, Lawrence. 2001. "Conference Summary: Revisiting the Case for Flexible Exchange Rates," *Bank of Canada Review*, Autumn: 31-37.

Soto, Claudio. 2003. The Effects of Nominal and Real Shocks on the Chilean Real Exchange Rate During the Nineties. *Banco Central de Chile Working Paper 220*, August.

Teolis, David P., and von Furstenberg, George M. 1993. "Reducing Real Exchange Rate Variability and Drift: Mexico on the Way to North American Monetary Union?" *North American Journal of Economics and Finance* 4(2), Fall: 253-269.

Tornell, Aaron; Westermann, Frank, and Martinez, Lorenza. 2004. NAFTA and Mexico's Less-than-Stellar Performance. *NBER Working Paper 10289*, February.

Torres, Alberto, and Vela, Oscar. 2003. "Trade Integration and Synchronization of Business Cycles of Mexico and the United States," *North American Journal of Economics and Finance* 14(3), December: 319-342.

von Furstenberg, George M., and Teolis, David P. 1993. "Growth and Income Distribution Benefits of North American Monetary Union with Mexico," *North American Journal of Economics and Finance* 4(1), Spring: 127-143.

von Furstenberg, George M., and Tabora, Carlos B. 2004. "Bolsa and NYSE: Price Discovery for Mexican Shares," *Journal of International Financial Markets, Institutions & Money* 14(4), October: 295-311.

Table I
Correlation Matrix of Rates of Change in GDPH and GDPP for the United States, Canada, and Mexico, 1961-2003

	GDPH US	GDPH CA	GDPH MX	GDPP US	GDPP CA	GDPP MX
US-GDPH	1					
CA-GDPH	***0.590***	1				
MX-GDPH	*0.222*	0.283	1			
US-GDPP	**0.601**	0.338	0.163	1		
CA-GDPP	0.456	***0.449***	0.309	***0.778***	1	
MX-GDPP	0.180	0.141	***0.900***	*0.165*	0.273	1

Notes: Bold type indicates coefficients that are statistically significant at the 5 percent level. Italicized values are mentioned in the text.

Table II
De Facto Classification of Exchange-Rate Regimes in Canada and Mexico, 1950-2003

Canada	Canada	Mexico	Mexico	Mexico
Quasi-Pegged	Non-Pegged	Quasi-Pegged	Non-Pegged	Freely Falling
Dummy Value 0	Dummy Value 1	Dummy Value 0	Dummy Value 1	Dummy Value 2
1950 - 1969	1970	1950 - 1953	1977	1954
1971 - 1976	1977 - 1978	1955 - 1975	1981	1976
1979 - 1983	1984 - 1985	1978 - 1980	1984	1982 - 1983
1986	1987 - 1988	1988	1989 - 1990	1985 - 1987
1989 - 1991	1992	1991 - 1993	1998	1994 - 1995
1993	1994	1996 - 1997	2002 - 2003	
1995 - 1997	1998 - 1999	1999 - 2001		
2000	2001			
2002	2003			

Notes: Exchange rates are classified as quasi-pegged in any year if they changed by less than 5 percent during that year from the preceding to the current yearend. They are classified as non-pegged (N-P) otherwise. In Mexico, two types of N-P regimes are encountered. One, simply described as N-P, applies to exchange rate changes of 5 percent or more but less than 40 percent in any year. The second, non-pegged freely-falling, applies to nominal exchange-rate changes (all depreciations) of 40 percent or more. That category is empty in Canada and thus not shown.

Table III
Regression Results for Volatility Measures of GDPH and GDPP
With Exchange-Rate Regime Dummy

	Canada	Canada	Mexico	Mexico
Volatility Measure for:	GDPP	GDPH	GDPP	GDPH
Intercept	0.958	0.848	1.533	2.239
[t-value]	[2.42]	[3.22]	[2.70]	[3.00]
Correspond. Volatility	**0.484**	0.173	0.028	-0.408
Measure for the US	**[3.82]**	[0.89]	[0.13]	[-0.82]
ForexRegimeDummy	-0.234	0.081	**1.619**	**1.418**
[t-value]	[-0.39]	[0.22]	**[3.41]**	**[2.50]**
RHO [on e(t-1)]	**0.545**	**0.403**	**0.398**	**0.582**
[t-value]	**[4.59]**	**[2.79]**	**[3.07]**	**[4.53]**
Durbin-Watson -- e(t)	0.911	1.193	1.204	0.836
Durbin-Watson -- u(t)	1.811	1.668	1.962	1.988
Standard Error -- e(t)	0.948	0.546	1.502	1.638
Standard Error -- u(t)	0.795	0.499	1.378	1.332

Note: Bold type indicates coefficients that are statistically significant.

Memo:					
Mean of Volatility	1.86	1.01		2.38	2.67
SD of Volatility	1.13	0.53		1.76	1.86
Corresponding US Volatility Measure used as Explanatory Variable:					
US-Mean:	1.90 (GDPP)	0.92 (GDPH)	US-SD:	1.13 (GDPP)	0.47 (GDPH)

Table IV
Regression Results for Volatility Measures of GDPH and GDPP
With Continuous Rate of Exchange-Rate Change

	Canada	Canada	Mexico	Mexico
Volatility Measure for:	GDPP	GDPH	GDPP	GDPH
Intercept	0.872	0.761	1.797	3.049
[t-value]	[1.91]	[2.68]	[3.23]	[4.66]
Correspond. Volatility	**0.498**	0.184	-0.021	-0.753
Measure for the US	**[4.00]**	[0.96]	[-0.10]	[-1.51]
ForexContinuChange	0.773	3.131	**4.414**	**1.756**
[t-value]	[0.01]	[0.65]	**[3.19]**	**[3.53]**
RHO [on e(t-1)]	**0.544**	**0.403**	**0.426**	**0.619**
[t-value]	**[4.58]**	**[2.79]**	**[3.33]**	**[5.05]**
Durbin-Watson -- e(t)	0.912	1.157	1.148	0.762
Durbin-Watson -- u(t)	1.803	1.683	1.938	1.879
Standard Error -- e(t)	0.949	0.543	1.534	1.718
Standard Error -- u(t)	0.797	0.497	1.388	1.350

Note: Bold type indicates coefficients that are statistically significant.