

One Region, One Money: The Potential Contribution of Currency Consolidation to Financial Stability in the Developing World

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Abstract: The lecture explores causes and consequences of the declining usefulness of the separate currency denominations maintained by that large number of *small* open economies whose currencies play little or no role in international finance. So far official multinational entities capable of taking up new threats to international financial stability, like the Group of Seven (G7), the G10 Finance Ministers and Central Bank Governors, the International Monetary and Financial Committee (IMFC) comprising 24 IMF Governors, and the Financial Stability Forum (FSF), have given little visible attention to these market-driven tendencies toward currency consolidation. As a result, there is scant official guidance on what to do about these tendencies so as to contribute to greater international financial stability in a multilateral framework. More such attention is overdue because intermediate stages of currency competition in an emerging-market country in which there is more than one monetary standard in domestic use carry high risks to the stability of that country and its financial sector.

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1. INTRODUCTION

Pressures for currency consolidation arise from several sources related to political liberalization, economic globalization, and the ICT revolution. Freer cross-border provision of financial services and a changed official attitude to foreign establishment and takeovers have encouraged foreign entry. Many regional and global electronic spot markets and electronic trading platforms price in U.S. dollars or, prospectively, in euro.

MNEs consolidate accounts in either or both of these currencies, depending on the principal habitat of major divisions, and expect those who participate in their global or regional supply chains to do the same. Cross-border e-banking, e-investing, and e-commerce of all kinds may compete not only with domestic financial and business establishments but also with local currencies that provide inferior consumption insurance at currency-crisis cycle frequencies, and inadequate intertemporal predictability of purchasing power and other "real" terms of contract at longer frequencies.

This paper argues, and in small part substantiates, that e-commerce, regional economic integration, and global liberalization have eroded the monopoly of small currencies in their home market. These developments now threaten the continued viability of a number of them over the medium run. If technological and market-driven pressures lead to growing use of the internationally dominant currency denomination of the region in a lengthening list of financial, e-commerce, and other activities in a liberalizing world, the question for government policy becomes how to respond to these pressures. What kind of institutional arrangements and international architecture for trade in financial services are most suitable for the prospective environment of a greatly reduced multiplicity of currencies? Even partial currency consolidations, such as those afforded by currency boards, are likely to prove unsustainable in the new environment characterized by momentum toward regional currency and monetary unions.

The evolution leading from the original European Economic Community of six countries that went into effect in 1958 to the consummation of European Monetary Union (EMU) among 12 countries took 44 years. The leisurely pace was due to only gradually growing appreciation of the monetary requirements of deep economic integration as long

as the Bretton Woods system provided reasonably fixed exchange rates between the major currencies. Even after the demise of that system in 1973, it still took one or two decades for freedom of capital movement fully to be reestablished in most parts of the world. With the phasing out of exchange controls and dual exchange rates in ever more developing countries, the gradual achievement of unrestricted capital-account convertibility made fixed but adjustable exchange rates much more vulnerable to being dislodged until they could not credibly be fixed any more.

There now is widespread agreement that as between U.S. dollar, euro, and yen, “realistically, there is no alternative to floating exchange rates among the three major currencies” (Köhler quoted in *IMF Survey*, January 22, 2001, p. 23). However, pressures to take new steps to assure irrevocably fixed exchange rates inside economic unions have grown. There are those, like Mundell (see the report in *IMF Survey*, March 5, 2001, p. 75 and Friedman and Mundell 2001), who would like gradually to change this reality, viewing a single world currency as a desirable endpoint in the long run, while others find that “from an economic point of view, it would be preferable to retain at least, say, three or four currencies” (Rogoff, 2001, p. 246).

For the smaller countries in each region, the questions raised by financial liberalization are quite different. For them, maintaining separate currencies, and hence exchange rates, became less desirable when exchange rates, instead of being serviceable shock absorbers, became a growing source of shocks to the economy and its finances. “Really I do believe that you cannot have a common market when you have fluctuating exchange rates in an area” Mundell (2000, p. 164) has said. Abrupt changes in nominal and real exchange rates that reverse themselves only slowly after a currency crisis can

drastically change competitive conditions between the members of an economic union and hence of each member with outsiders. Such changes are liable to disturb, rather than to equilibrate, trade relations. The desire to avoid such upsets by using a single money inside economically integrated regions may have contributed to a mutual insurance interest in EMU. Nevertheless, its adoption owed more to the political logic of shared governance and a common anti-inflationary resolve than to overwhelming pressures in financial markets.

Since about the time of the Maastricht Treaty, 1991, the regulatory protections that had allowed many small currencies and fragmented financial markets to continue have been emasculated. International competition in financial services has been facilitated by the spreading application of the principles of mutual recognition and national treatment. Mutual recognition led to the concept of European “passports” allowing unchallenged provision of financial services across the European Union’s internal borders, while the widespread adoption of the principle of national treatment gives substance to global access which includes the option of foreign establishment anywhere. Invariably, the strongest competitors in financial services operate from and in the leading international currencies and crowd out financial business in lesser currencies and the local institutions that provide it.

Hence, in the future, there will be greater urgency to decide whether to hang on to a financially small and purely domestic currency in which less and less business can be conducted cost-effectively. The alternative is to try merging it into some form of regional monetary union while there still is a choice. Even in the Western Hemisphere, where free trade areas, such as NAFTA, have been formed between countries whose currencies float

against each other, the question of monetary unification may not be put aside much longer. Mercosur's common market arrangement has been all but destroyed in the three years since the Brazilian real was left to float against the Argentine peso in January 1999.

These internal tensions indicate that under present circumstances, Mundell's dictum is proving true: Large exchange-rate movements between the partners in an economically integrated region almost inevitably threaten stability and hence the reliability of integration between them. Politically, the resulting changes in trade advantage are liable to be viewed as disruptive and unfair. Monetary union, whether unilateral like dollarization or multilateral like EMU, now may be the only reliable way to preclude such disruptions. Indeed, lack of monetary union may detract from economic union because exchange rate movements give a divisive edge to national borders and national trade interests when currency boundaries are maintained. Monetary union is becoming a less and less optional companion of economic union which gives political definition to an economic region.

Apart from the pressures for currency consolidation just noted that arise from the trade side in economically integrated regions, there are also pressures everywhere that arise simply from currency competition in the financial sector. As Fisher (2001, p. 22) has surmised, the trend emerging among developing countries, that had moved from fixed but adjustable to managed-floating exchange rates in the past two decades, could well be to move from the floating to the hard-peg ends of the spectrum of exchange-rate regimes in the current and future decades.

The medium-term evolution to monetary unions that appears to be underway does not denationalize or privatize money because the money involved remains a creature of

the fiat of a state or group of states. Others already have looked ahead to a more distant future in which privately issued electronic money might no longer need to be convertible into traditional money or supported by legal tender to be widely accepted as a means of settlement and store of value; Cohen (2000) provides an excellent overview. Money would then exist inside global electronic communications and procurement networks. Financial services likewise would be both product and by-product of the provision of electronic commerce and communication providers, and dedicated financial intermediaries could be bypassed. As a result, monetary and financial union by government construction could become meaningless. Instead of looking so far ahead to new forms of private denationalized moneys, we merely note a resurgence of the historical forces of currency substitution between “official” moneys. These forces are leading to a new wave of currency consolidation across national boundaries.

2. A GLANCE AT HISTORY AND MEDIUM-TERM PROSPECTS

Briefly looking both back and ahead suggests that, in matters of currency competition, we may be returning to conditions once common in many parts of the world when good moneys knew no boundaries and bad moneys could not yet be forced on people. Gresham's Law could come into operation only when a new form of money was declared legal tender at an overvalued legal exchange rate for money and debt contracts denominated in some older form or substantiation of money.

Over time, many countries sought to strengthen the issuing authority's monopoly power in order to afford effective protection for the national currency. Such action led away from the production of national money in monopolistic competition with other such

moneys to positively reserving the domestic market for its use. To assure such exclusivity, use of the domestic currency denomination generally has been required for tax accounting and payments and for tenders on government projects. Additional shelter has been provided by capital controls and by financial regulations that strictly limited the booking of foreign-currency assets and liabilities for domestic residents and gave the national denomination exclusive rights in many home-country applications. Having made their economy captive to the local currency, governments were less constrained to resort to inflationary finance, to routinely abuse seignorage, and to regiment and stifle the development of the financial system and of financial services provided by the private sector. Conversely, (far) *fewer monies* than states would mean *better monies*, as Dornbusch (2001) succinctly put it. Hence, the second point made here is that, apart from pressures for currency consolidation from the trade side in economically integrating regions, there are also pressures that arise almost everywhere in the developing world simply from the greater currency competition that is now allowed in the financial sector.

Barriers to currency consolidation have tended to erode over the past two dozen or more years as worldwide internal and external liberalization have taken hold. As a result, national moneys have been exposed to international competition and had to struggle for survival once again. Doyle (2000), Nuti (2000, p. 175) and Cohen (2000, pp. 3-4) provide or cite estimates of the extent to which the world's most important currencies, particularly U.S. dollars and DM (henceforth euro) were located outside their country of issue. Obstacles to foreign competition have been falling first in developed and then in developing countries as they integrated into the liberal international trade and investment regime and extended national treatment to foreign suppliers with progressively fewer and

soon expiring derogations. Freer cross-border provision of financial services and a changed official attitude to foreign establishment and takeovers have encouraged foreign entry. These developments also have opened the door to more widely denominating and trading domestic claims in international denominations for purchase by both foreign and domestic residents.

3. MOVING THE FINANCIAL BUSINESS OF SMALL COUNTRIES INTO THE MAJOR CURRENCIES

Providing such foreign-currency-denominated loan, debt, equity and reinsurance financing is a business in which foreign providers, domiciled in the country that issues the relevant international currency, tend to have a funding and marketing advantage. Because of this inevitable link to the retention of national ownership and competitive advantage, issues of currency denomination rarely have escaped regulatory and legislative scrutiny, with currency substitution -- the domestic use of a foreign money or currency denomination (Cohen, 2000, p. 2) -- coming in for particular attention.

Granting market access to both domestic and foreign entrants or potential competitors thus raises the question of whether granting access to foreign-currency denomination of a widening list of financial contracts in the domestic market should follow. Certainly offering to do business in that international currency, whether U.S. dollar, euro, or yen, which is the corresponding foreign entrant's domestic issue may be its best competitive weapon. Simply following the principle of national treatment could crimp effective market access by foreign providers if it outlaws this weapon by requiring contracts to be written only in local currency, as is still frequently the case in insurance.

If foreign providers are only allowed to compete in the same (domestic) currency vehicles in which their domestic counterparts as market insiders often can do better, giving foreign suppliers national treatment on such a -- to them restrictive -- standard does not really give them meaningful market access at all. Hence only the combination of national treatment with market access for business done in any currency and for its fittest providers constitutes the kind of effective liberalization that will generate pressures for currency consolidation rapidly and on a large scale. As another example, imposing a requirement on all insurance providers in the national market to reinsure with a national reinsurance monopoly or to cede to a financially unstable monopoly part of any non-retention does not violate national treatment on its face. Nevertheless, effective market access may be denied to highly-rated potential competitors if they are subjected to, to them predatory, reinsurance requirements of this form.

The prerequisite for liberalized market access, now clearly in view, is that individual and corporate citizens in many small countries will be able to choose to make payments in more than one acceptable currency and freely to incur debts and to acquire assets denominated in different currencies. Furthermore, using financial derivatives, they will be able to swap, alter, or hedge their currency exposure increasingly at will. However, they can do so only at considerable cost when their own currency is involved: Risk premiums that are reflected in interest rates and hence cause the forward exchange rates for small currencies to indicate more depreciation than implied by their expected future spot rates add to the cost of hedging. These risk premiums are due mostly to currency risk, in the sense that absent currency risk, very little remains of what had been

identified as country risk on contracts denominated in an external reference currency such as U.S. dollar or DM, as southern members of the Euro Area now can attest.

It is inconceivable, for instance that Mexico, if it dollarized completely, would face premiums as high as the 300 to 340 basis points that were observed on its sovereign dollar borrowing in 2000. This is the yield spread over comparable U.S. Treasuries which Mexico's central bank (Banco de México 2000, p. 16) has identified, quite conventionally and yet misleadingly, as pure country risk. Tao and Lau (1998, p. 22) report that interest rates even in Panama, a fiscally disorderly and often poorly governed country, "have remained stable at 0 - 1.3% above LIBOR over the past two decades" because it was dollarized. That is much less than what has been charged on sovereign-dollar borrowing by Mexico even though Mexico for some time now has been fiscally much more virtuous than Panama.

Of course, currency consolidation can not be a panacea for all of a national government's ills such as fiscal mismanagement. Some of the worst governments of small dollarized countries may not always face lower dollar borrowing costs than some of the best governments of non-dollarized countries such as Chile. But a bad government credit rating would not need to carry over to borrowing conditions faced by private enterprises in dollarized developing countries because sovereign borrowing risk may not set the lower limit of the risk premiums charged to borrowers in such countries. With fiscal and monetary policy risks decoupled and intraregional currency risk eliminated, credit to first-rate private obligors can involve less default risk than credit to their fiscally unsound governments.

No doubt sovereign default can still have an adverse effect on the external and internal financial relations of private borrowers. Yet, because a lack of fiscal discipline may ruin the credit rating of the government but not of the entire country, it is perhaps not altogether surprising that an international common currency area is not associated with greater fiscal discipline among the lesser members of the area as Fatás and Rose (2001) have found. When the national economic penalty for any lapse in fiscal discipline is lower, there will be less of a deterrent, and mutual supervision and correction, as under European Union's 1997 Stability and Growth Pact, may have to be added to maintain discipline. Help also may come from financial markets since any deep monetary and financial union encourages and is predicated on the sharing of good regulatory and supervisory practices and on the adoption of advanced risk analysis and transparent risk management systems by *all* its members. Greater independence and alertness in pricing sovereign risk within any country in turn makes it more expensive for government to stray from the path of fiscal sustainability and soundness. The expected net effect on the fiscal self-discipline of members thus is uncertain and not an issue that cuts either for or against monetary union.

4. Microeconomic Drivers of Currency Consolidation

Having made three macroeconomic points about the relation to monetary union of (i) economic union, (ii) currency competition due to effective market access, and (iii) fiscal policy, I now turn to some microeconomic factors leading to currency consolidation for developing countries. In Mexico as in almost all other countries of the Western Hemisphere farther south, pressures and opportunities for dollarizing more and more of

the banking and financial business manifest themselves in several ways. For instance, they are both cause and effect of the widespread takeover of local financial groups by foreign financial conglomerates, particularly those headquartered in the United States. In the end, foreign ownership of banking and finance generally predominates in financially small countries. The insurance subsidiaries in the acquiring U.S. financial groups, like Travelers in Citigroup, will want to offer the same products through the Mexican branches -- in this case of what until 2001 used to be Banacci -- as they do in the United States. These dollar-denominated products may be far more useful to their Mexican customers than peso-denominated policies not only in pension, life, and annuity applications but also in the insurance of industrial property whose replacement cost is more stable and predictable in U.S. dollars than in local currency.

While “the instability of the insurance sector in emerging market economies can be attributed to a wide range of microeconomic and institutional failings” (IAIS 1997, p. 5), currency instability surely plays a large role among them. In light of the latest in a number of currency crises, the Turkish lira can be used to visualize the currency substitution dynamics in this regard. If insurance companies licensed to operate in Turkey try to hedge their lira liabilities with lira assets, they will still be subject to exchange risk as asset deflation and currency crisis go hand in hand in emerging markets. Contrary to IAIS (1997, p. 13) representations, following the principle of currency matching does not ensure protection from exchange-rate risks in such markets because a currency crisis often pulls down the entire economic house. Under these conditions there is not much insurance value that can reliably be offered by the private sector particularly if there is double-digit inflation or higher to start with.

It would make more business sense for Turks to buy their insurance either in U.S. dollars or euros in Euroland, where many of them work, live, or visit relatives, if they could not obtain policies specified and settling in dollars or euros in Turkey. Focusing on the euro portion which is likely to grow rapidly from 2002 on, this in turn puts pressure on Turkish insurance companies, at least after privatization, to offer their own euro-denominated life, pension, and annuity policies. Since they are at a reputational disadvantage in doing so, they may be tempted to offer higher rates of return in euro than the market normally would support. If they nevertheless are successful in offering credible euro-denominated insurance products, this would create a demand and market for euro-denominated Turkish securities. This assumes a normal statistical home bias in the allocation of the investment portfolio by Turkish insurance companies who favor domestic issues to exploit their information advantage or insider status. Euroization of other balance sheet positions and contracts might well follow, as one decision about currency choice leads to another.

As these circles of currency substitution widen and interlock across ever more markets and services within a country, the question becomes how many currencies will remain in wide use under arrangements where foreign currencies may effectively compete. Will the local currency be among the survivors? In my view, regionally centralizing tendencies tend to weigh against such a prospect if the country is financially small to start with and if it lacks a very large internal market in which strong network externalities from the use of the domestic money can still be obtained.

This hollowing out of these lesser national moneys in a widening range of domestic uses without officially giving up one's own national money leads to hazardous

cohabitation. Consider, for instance, an Argentine bank that has “hedged” the typically large share of its U.S. dollar-denominated deposit liabilities with dollar assets, including claims on Argentines who have no substantial dollar receivables. Now assume that there is an overvaluation and default crisis that causes Argentina to abandon 1:1 convertibility of its peso for dollar and to impose fiscal austerity at all levels of government. In that case the school principal of a suburban Buenos Aires school will have a double problem in servicing her dollar-denominated mortgage obligation. Her salary, which is set in peso and depressed by fiscal austerity, will decline just when more pesos are required to service her dollar-denominated debt. Furthermore, asset deflation will tend to reduce the value of the security property even in pesos. Hence the quality of the bank’s claim is reduced, its currency hedge eroded, and its capital adequacy and solvency threatened. New lending will plummet as interest rates surge, private-sector defaults rise, and economic activity declines over a broad front, with even export-oriented businesses hamstrung for lack of working capital and credit. A full-blown crisis will be on hand.

5. INTERNATIONAL PORTFOLIO DIVERSIFICATION WORKS BEST IN LIQUID MARKETS USING THE DOMINANT CURRENCY DENOMINATION

There is a more general point to what was just discussed. Economists have often deduced that, from the point of view of obtaining optimal consumption insurance through portfolio diversification, the investment portfolios of otherwise comparably positioned investors from Canada, France, and Japan should look very much alike. The failure for them to do so, because citizens strongly favor claims on their own country's obligors, has

been labeled the home bias puzzle (see Lewis 1999). Hausmann et al. (2000, pp. 142-144) have argued that for emerging-market economies all of which are financially small, there is even a presumption against investing at home from the point of view of consumption insurance. The reason is that in a currency crisis, just when income and output fall and internal and external sources of credit dry up, domestic asset values collapse. Adding a large negative wealth shock to a negative current-income shock would impart a double blow to consumption for investors at home.

Had these investors instead been invested in international foreign-currency claims when the sharp real depreciation of the domestic currency occurred they would have benefited from the real appreciation of the domestic value of their foreign holdings. This would have reduced, rather than amplified, the blow to consumption from a currency and financial crisis. Hence, to obtain optimal consumption insurance, investors in small emerging-market countries should invest outside their own country and currency to an extent even greater than fitting for the average international investor. When Uruguayans hold 85 percent of their savings in U.S. dollar-denominated accounts in their own country they are acting to reduce this double exposure to a degree that depends on whether they deposit in domestically-owned banks or in local branches of foreign banks.

Even in Uruguay's large neighbor, Argentina, about 50 percent of bank assets are held in foreign-controlled institutions by a variety of measures (IMF 2000, p. 153). Multinational financial institutions are almost always headquartered in the key-currency countries that have long been leading the development of the financial services industry and have determined its international coordination and supervision. They bring their privileged key-currency connection with them wherever they establish around the globe

and make that denomination their stock in trade. Cross-border banking via the Internet (see IMF 2000, p. 157) may add to the advantage of the dominant currencies since they yield the widest range of transaction services that are true to the quoted price and match the denomination in which the widest range of financial investments and products are quoted. Hence cross-border e-banking may compete not only with local banks but also with local currencies.

For banks as well as insurance companies many of the prudential issues posed by growing foreign ownership are unresolved. On the one hand, developing countries are advised by some to buy, lease, or pay for access to existing securities trading and foreign exchange and payments settlement systems rather than build their own (*IMF Survey*, May 21, 2001, p. 174) and to rely on external supervision of the financial institutions operating in their countries. The end result of this disenfranchisement could be this:

As financial services are imported, the need for a domestic safety net and corresponding regulation and supervision declines. As financial services are imported from abroad, the question is raised whether small, undiversified economies should have domestic equity and debt markets - and in the extreme, banking systems. (Claessens, Glaessner and Klingebiel 2000, p. ix.)

On the other hand, Mathieson and Roldos (2001, previewed in *IMF Survey*, May 21, 2001, p. 173) have pointed out for banks what holds analogously for insurance companies and other major financial institutions and exchanges:

One of the biggest questions for policymakers is what position parent banks will take if branches (a legal part of the parent bank) or subsidiaries (separately capitalized entities) run into trouble. Indeed, what happens to local banks if their foreign parent bank has problems of its own? These relationships have yet to be tested in crises.

Because competitive pressures contribute to their health, large international currencies tend to convey other advantages to foreign users over denominating in small currencies. To protect their international standing, pre-eminent currencies and their financial infrastructure must be well managed. Lapses in the sound conduct of monetary and financial policy, as in the United States during much of the 1970s and in Japan during and beyond the 1990s, tend to diminish the international role of the respective currency, thereby exerting a powerful disciplining effect in the long run. By contrast, emerging-market countries typically have currencies whose purchasing power is unreliable. Even in the absence of persistently high inflation, they commonly experience real exchange rates that are both highly variable and prone to drift up between major corrections, not necessarily around a fixed mean. Hence denominating annuities and pensions and lump-sum or life insurance settlements of any kind in such currencies would provide far less calculable real-value assurance than denominating in one of the large currencies. The latter are key to international pricing in product and finance markets and reliable stores of value and of future purchasing power over a broad range of goods. The added purchasing-power risk thus detracts from the suitability of small currencies for extended use in intertemporal trades, and this contributes to the case for currency consolidation.

International financial derivatives, such as interest and currency swaps, forwards, futures, and options received a big boost from the collapse of the Bretton Woods system. As Plender (2001, p. 12) has pointed out, this occurred because the collapse of that system shifted the task of managing currency volatility from the public to the private sector. Regional currency consolidation will lower currency risk in some respects that are important for production and sales organization and for trade in goods and services in the region. But they will not lower exchange risk between the large currencies, such as dollar, euro, and yen, which have accounted for the bulk of the currencies involved in the construction of international financial derivatives. The U.S. dollar has been most prominent of all on the ground that the underlying debt and equity claims suitable for listing, securitization and exchange trading in international financial markets are themselves commonly denominated in dollars, and to a lesser extent in euro and yen. Countries can use only very few other currency denominations for borrowing in international financial markets. Generally, large risk premiums and illiquidity, reflected in wide bid ask spreads, discourage denominating in peripheral currencies. Since calculability of risk exposure and a high degree of liquidity of positions taken by major participants, including hedge funds, are essential to the functioning of the market in derivatives, standardization on a common currency, including through the use of ADRs, is convenient in many, though not all, applications.

Because arbitrage between the local-currency prices of securities originally issued in domestic markets and the corresponding American or Global Depository Receipts technically can not be instantaneous because the supply of ADR or GDR securities is fixed in the short run, the question may be asked which quotation is more authoritative in

the sense of being freer of self-correcting error when pricing discrepancies occur. It is conceivable that the prices of major corporates headquartered in the Western Hemisphere outside the United States are set decisively in New York and then translated back with some local addition of “noise” into local currency if home listing is maintained. If true, this would mean that the calibration of news and the price-making function have shifted from the home base of operations to the foreign global financial center and from local currency to U.S. dollars. The variance of exchange-translated security prices in the local market would be greater than that of the corresponding ADRs and this would discourage use of the local market and of its local-currency trading by foreign and domestic residents alike. For this and other reasons, in many emerging-country markets, few equity securities are left to trade. Indeed, on account of illiquidity, high transaction costs, and foreign acquisitions of leading domestic companies soon after they had been publicly listed, equity markets in a number of developing countries are on the brink of extinction. However, domestic debt instruments, in particular government debt claims, continue to be favored by local pension funds.

The dollar may “intrude” even into exchange contracts between other currencies. IMF (1999, p. 49) explains, for instance, that nondeliverable foreign exchange forwards (NDFs) in emerging markets tend to be settled in U.S. dollars for the difference between the implied exchange rate on the contract and the prevailing spot rate on the maturity date of the contract. The IMF notes further that net settlement in *domestic* currency existed in many industrial countries in the 1970s and 1980s prior to the removal of exchange controls. The big currencies thus tend to get bigger when capital controls are removed. The next main section gives some concrete indications why after first offering a puzzle.

A Vignette from Financial Markets. Finding international financial puzzles is a growth industry, but the question here is whether attention to currency denomination can be part of the solution. If two closed global equity funds have essentially the same underlying holdings and quality of management, their percentage discount from net asset value would be expected to be the same in efficient markets regardless of the currency denomination in which they are traded. Why then is the mean percentage discount of the 65 U.S. dollar-traded, out of a total of 69 world equity funds shown with complete data in a recent listing (New York Times, May 27, 2001, p. 26), 15.37% (with a variance of the sample mean of 1.41 percentage point), while the mean percentage discount of the four remaining world equity funds that are traded in Canadian dollars is 35.26% (with a variance of the sample mean of 10.60 percentage points)? The t-statistic of 5.74 for testing that the true difference between these mean discounts is 0 is significant at the 1% level and the question remains how currency denomination can explain these striking differences. Would shifting the trading basis of the four funds to U.S. dollars, together with suitable global marketing, tend to reduce their discount from 35% toward 15%?

6. TWO STRIKES AGAINST OPERATING IN THE CURRENCY OF A FINANCIALLY SMALL COUNTRY

If the currency of a financially small country is to serve anyone in a legitimate welfare sense, it would have to be the citizens of its own country. This, however, it fails to do in emerging-market countries where currency crises, asset-price deflations, and financial and economic meltdown tend to coincide. One of the greatest current failings of the international financial institutions and of the G7 is their failure publicly to recognize

the needless pain and suffering caused by small countries hanging on to a separate currency that is being eroded by market forces and to recommend multilateral alternatives.

Let me make this point in some detail before introducing relevant evidence. Reacting to three major financial crises in emerging markets since mid-1997, the IMF and the World Bank in May 1999 launched the Financial Sector Assessment Program (FSAP). The program received a strong endorsement in the Report of the G-7 Finance Ministers and Central Bank Governors on "Strengthening the International Financial System and the Multilateral Development Banks" that was issued in Rome on July 7, 2001. One of three components of the FSAP (see Hilbers 2001) is an assessment of the financial system, including macroeconomic factors, that could affect the performance of the system and conditions in the system that could affect the macro-economy. This component relates most directly to the Financial System Stability Assessment (FSSA) of individual countries. The FSSA is used as part of the annual Article IV consultations which the IMF holds with its member countries to review their macroeconomic and exchange-rate policies. The FSSA is designed to identify macroeconomic vulnerabilities in which "macroeconomic indicators associated with financial system soundness (such as volatility in exchange rates and interest rates)" (Hilbers 2001, p. 3) play a part. This parenthetical mention of exchange rate volatility appears to refer to a stressful atmospheric condition that requires adjustment rather than to a form of trouble that can be avoided by replacing the local currency fully, and not just in part, with a strong international currency as market forces increasingly demand. The G-7 statement issued in Rome similarly promises stepped up efforts "to reduce volatility and improve the functioning of the international

monetary system" (point 7) without ever hinting that, for many emerging countries, getting rid of their troublesome own currency would contribute importantly to both goals.

In fact, the real interest rates and real exchange rates of financially small countries in a region that retain their own currencies tend to be tossed about like corks in a stormy sea, except that, for real exchange rates, the normal sea level may not be stationary.

Tables 1 and 2 provide the evidence. The statistics shown in the tables are sample standard deviations (SSD) of real interest rates and of rates of change in real exchange rates for consumers (with CPI) and producers (with PPI). Both tables are organized so that the first two panels in each allow inter-period comparisons while the last two can be used to compare results obtained with alternative data constructs for the entire sample period. That period is 1978-1999 for the year-to-year rate of change in real exchange rates and 1978-1998 for the real interest rate *during* each year. "Real" or inflation-adjusted data are constructed with both the CPI and the PPI but reported for sub-periods only with use of the CPI to avoid clutter.

Table 1 shows the SSD of the year-over-year rate of change in the real exchange rates of Canada, Mexico, the United States, and Japan with the U.S. dollar (USD), the deutsche Mark (DM, for continental Western Europe), and the yen (for parts of Southeast Asia). The last column adds the SSD of the crudely trade-weighted average of these three rates of change only two of which are applicable for the United States and Japan. Four major points emerge:

- The SSD of changes in real exchange rates of a country like Canada, that is at a similar level of financial development as the region's leader, is two to four times as large with key countries in other regions than with the key country in the same

region. For instance, Canada's full-period CPI-based SSD is 4.5% with USD, compared with 12.6% with DM and 14.1% with yen. The last two percentages are similar to the SSD for U.S. real exchange-rate changes with DM and yen. The difference for Mexico is far less pronounced -- 18.4% with USD compared with 26.5% for DM and 25.2% with yen. Nevertheless, there is clearly a regional competition and cohesion effect that keeps real exchange rates closer together within the same region than across regions even when exchange rates float between all the countries involved in the comparison.

- The SSD of the change in Mexico's real exchange rate with USD and on weighted average is three to five times as great as that of Canada. For instance, using the PPI, for the full period, the SSD of Canada is 3.3% with USD and 3.5% on weighted average including an 80% weight on USD. The corresponding figures for Mexico are 17.0 and 17.7% according to the last panel of Table 1. Hence financially small developing countries exhibit much greater variability in their rates of change in real exchange rates than advanced countries in the same region.
- Comparing the weighted-average results in the last column of panels 1 and 2 shows that from 1978-1987 to 1988-1999 there has been a marked reduction in SSD for Mexico and the United States and a small increase for Canada, with the situation of Japan essentially unchanged.
- Because the PPI is more weighted toward tradable goods than the CPI, SSD tends to be appreciably lower for real exchange rates constructed with the PPI than with the CPI.

Table 2 shows results that are similar to those in the first two bullets above and quite different for the last two bullets.

- Real interest rate variability is far less for consumers investing and using their own currency in the local economy than for foreigners making uncovered investments in local currency instruments in the local money market hoping to gain purchasing power in the foreign market from which they invest. For instance, comparing the entries in the OWN column with those in subsequent columns of panel 3 shows that adding the exchange risk increases the SSD of the real returns in a country by a factor of between 2 and 10, and less for investors in the same region than across regions. Hence the regional competition and cohesion effect noted before is evident here also. Presumably developing countries pay for the lower real-interest variability on borrowing in their own minor currency at home by accepting a higher average expected real interest rate in that currency compared with borrowing in a major international currency.
- The SSD of real interest rates offered by Mexico to its own residents and to foreign investors planning to consume elsewhere is appreciably greater than for rates offered by Canada. Hence, as for changes in real exchange rates, the stability of real returns offered by financially small countries is considerably less than that of highly advanced countries in the same region. For instance, U.S. investors in Mexico face an SSD of 24.6 percentage points if they invest their dollars temporarily in Mexican pesos compared with 12.7 percentage points if temporarily invested in Canadian dollars. Furthermore, Mexicans

investing in their own currency have experienced an SSD of 10.4 percentage points compared with 2.1 percentage points for Canadians investing and consuming in Canada (panel 3).

- Turning to the inter-period comparison allowed by the first two panels shows that real interest variability in Canada for both Canadians and roundtrip foreign investors in Canada has fallen dramatically from 1978-1987 to 1988-1999 as the level and variability of inflation in Canada have declined. However, the same cannot be claimed for Mexico during the most recent of the two periods which was one of economic and financial opening.
- Unlike with the rates of change in PPI-based versus CPI-based real exchange rates, the SSD of producer OWN real interest rates tends to be significantly greater than of the corresponding consumer interest rates.

While a comparison and contrast of the SSD values shown in Tables 1 and 2 is revealing in some respects, it leaves out other relevant differences. For instance, variations in producer real interest rates may be especially important for business profits, business investment, asset valuation, the quality of bank claims, and, for all these reasons, the level of general economic activity. In financially small developing countries real interest rates tend to be driven up by crises while in advanced countries real interest rates may fall to counter adverse shocks. Hence in the former group of countries real interest rate variability is not only high but destabilizing while it is both low and potentially stabilizing for economic activity in the latter.

Furthermore, nudging the short-term real interest rate down (-) thereby inducing the currency gently to depreciate (+) may be possible for Canada when a stimulus is needed.

However, the frequently abrupt real depreciations (+) in developing countries force up real interest rates (+) concomitantly, causing the direction of causation and the sign of the correlation between the two variables to change. By contrast, if there is a currency depreciation that is larger than desired in Canada, it may be curtailed by an interest-rate hike to keep monetary conditions unchanged. Hence real interest rates and changes in real exchange rates should show a more consistently negative correlation in Canada than in Mexico where the correlation, at least during crises, could well be positive. Our full sample weakly confirms the expected difference in pattern. For instance, the correlation of Canada's weighted-average rate of change in the real exchange rate with the change in Canada's own real interest rate is -0.41 and statistically significant at the 10% level in the t-distribution with 19 degrees of freedom using the PPI for deflation. The corresponding value for Mexico is essentially zero (-0.06) indicating more episodes than in Canada when the real interest rate is pushed up by episodes of strong and unintended real depreciation.

All the other adverse results of having a Mexican peso, officially floating since the crisis of December 1994, reported by Hausmann et al. (2000), now can readily be imagined. They include monetary outcomes that are pro-cyclical, with real interest rates low in expansions and high in contractions, exchange rate flexibility that has gone with higher, not lower instability in interest rates, and an absence of functional monetary sovereignty that can be used to manage the floating currency and to keep it from crisis. In May 2001 the Banco de Mexico once again lowered interest rates in a futile attempt to discourage excessive capital inflows and over-appreciation of the domestic currency. If there is an Argentine default crisis later in 2001, Mexico's interest rates inevitably will

rise thereby haplessly repeating the pattern that led to the currency and financial crisis of December 1994.

7. COMMON CURRENCY IN E-TRADE AND E-COMMERCE

Because of the instability of minor currencies and their comparatively low yield in terms of network externalities, many regional and global electronic spot markets and electronic trading platforms price in U.S. dollars or, prospectively, in euro. It may be instructive to consider a simple example. Certain electronic auctions conducted in Canada are bid in U.S. dollars to encourage cross-border participation. One could, of course, reflect on the screen, second-by-second, what the auction price amounts to in Canadian dollars. However, little would be gained by this instant currency conversion. For instance, if the USD price achieved at auction is final and binding, paying with a debit or credit card on a Canadian dollar account could cost an extra two percent commission for the exchange conversion. Uncertainty would be added for the Canadian buyer at auction because the exchange rate would be the interbank sell rate prevailing when the charge is processed by the bank.

Instead of putting up with this cost and uncertainty, the Canadian could, of course, have a U.S. dollar account with his or her Canadian bank or in the United States. But if the balance in that account must be maintained by drawing on income earned in Canadian dollars, the problem of uncertain settlement costs does not really go away.

Of course, once a problem is seen to be acute, help may be on the way, though such help is never costless or foolproof. Ogden (2001) describes some of the coping mechanisms currently available to allow buyers in different currency areas to make

accurate value-for-money judgments when they are making real-time purchase decisions. Retailers set their prices in their operating currency and these prices are translated into over 130 currencies by the use of an internet-based system to present every shopper with a price in their own currency. (Other companies are striving for a nonmonetary Pentecost effect by having users of the internet automatically receive messages posted in one language in their respective tongue instead.) Consumers pay immediately online through a secure system. Their card account is debited with exactly the amount to which they agreed while retailers are credited immediately in the preferred currency at the exact price set by them. Still according to Ogden (2001), more sophisticated solutions currently are emerging by contract with online foreign-exchange specialists. The goal is to readily quote fixed prices on both sides of a foreign currency transaction for a set period of time. This allows the seller to promote goods and services at fixed prices for foreign buyers while protecting the seller's revenues for the duration of the campaign. Of course such quotation systems will work only if buyers are unable to engage in currency arbitrage or realistically prevented from all buying in the currency denomination affording the lowest price once the international price relations posted by the vendor have begun to differ markedly from those implied by the grid of current exchange rates. Hence it remains tricky and potentially quite costly to reconcile a single global market and the desire for nominal-cost certainty with the use of a multiplicity of currencies for market making.

With digital signatures now having legal effect, validity, and enforceability in the United States (see Tech Law Journal 2000) and in a growing list of other countries or country groups, ordering, shopping, and settling in international money anywhere in the region, indeed in the world, have become increasingly attractive. This however creates

pressures not just to convert to such money but either to be paid in it or to have payments indexed to it. In business applications, there are even stronger pressures for currency consolidation. Transnational bidding on business that should lead to standing orders is handicapped if persistent exchange-rate movements keep interfering with what subcontractors or component suppliers must ask. To avoid the disruption of continuing relationships by exchange-rate movements whose eventual results for competitiveness can not be hedged, those who seek to be integrated into the region-wide supply chain try to control their costs, from parts to labor, in the same currency in which they must bid.

8. SHOULD SMALL COUNTRIES KEEP NOMINAL EXCHANGE-RATE FLEXIBILITY?

Flexible exchange rates are often advertised as a low-cost and fast-acting compensatory mechanism for countries with nominal rigidities that are subject to either real or nominal shocks. The unspoken assumption, frequently falsified (see, for instance, Buitert 1997; Hausmann et al. 2000) is that exchange rates can be counted on to move reliably so as to facilitate efficient adjustment rather than having a disturbing way of their own. Intending more than a facile critique of perfect-foresight models, Buitert (1999, p. 50) gives a sardonic example of the heroic deeds to be accomplished by monetary policy enabled by flexible rates against a supposedly unitary shock:

There is assumed to be only one kind of shock, a national aggregate supply shock. The national monetary authority is assumed to observe the national supply shock immediately and perfectly. It then sets national monetary

policy instantaneously and optimally to cope with this shock. The national authority knows the true structure of the economy and this structure of the economy makes certainty-equivalent strategies optimal.

Some Canadian (see Laidler 1999), Chilean, and Mexican (see Schwartz and Torres 2001) economists continue to try to prove that flexible exchange rates work just fine for their countries particularly against well-defined shocks to the relative price of their natural resources. A panel of academics assembled at the IMF Institute has taken stock of the current state of the debate in this regard (see *IMF Survey*, April 16, 2001, pp. 123-126). But these countries have yet to include complete U.S. dollarization or other forms of monetary union among the alternatives seriously evaluated and considered. In Mexico at least, such a union would preclude the very currency and financial crises from which some advocates of flexible rates erroneously get their asymmetric "supply shock" observations.

As Calvo and Reinhart (2000) have explained, in many countries there is deep and cogent doubt that floating exchange rates in fact have tended to move to facilitate adjustment in the goods and factor markets. Small open economies in emerging-market countries rarely find that when things start to go badly -- usually first because there is an international-portfolio or private capital-account shock -- exchange rate movements quickly reverse the tide and let conditions improve again. Instead, currency crises commonly make things much worse before they start getting better, and, contrary to once popular belief, flexible exchange rates do not preclude such crises.

Even when real exchange rates move in textbook fashion to accommodate the needs of trade balance and national expenditure adjustment, some of the other tacit assumptions that make such movement unequivocally beneficial are less and less likely to be satisfied. One of these is that countries are homogeneous internally but heterogeneous internationally in their production structure and shock exposure. Likewise, factor mobility, particularly that of labor, often is assumed to be high internally and low internationally. Mexico's adjustment to the 1999-2000 increase in the price of crude oil shows what can be wrong with these assumptions. The oil price increase and the effect on Mexico's federal budget and current account may have encouraged increased private capital inflows that contributed to an appreciation of the Mexican peso in both nominal and real terms. But only small additional amounts of capital and labor have been attracted to oil and gas exploration and development under PEMEX auspices while the real appreciation has slowed the development of the non-oil sector in the country at large.

If small countries were indeed internally homogenous and externally heterogeneous so that they had a specialized nationally-integrated production structure for final goods, shocks to both domestic supply conditions and to (mostly) foreign demand for the small country's specialized output in theory could be cushioned and adjustment could be speeded by movement in nominal and real exchange rates. But for many small open economies, this picture of the production structure bears little relation to the reality they confront in a regionalizing, and to a lesser extent globalizing, economic system. Becoming a component part of international, most particularly regional, supply chains means that anything that disrupts this chain from the side of either demand or supply anywhere will be felt everywhere else in the region.

By the same token, if many countries in the region share in the production of final goods, such as automobiles or electronic appliances, through the production or assembly of parts, any shock to aggregate demand for the final good will affect all who contribute to its supply as well. Under these conditions exchange-rate movements among the partners in the region can not be part of efficient adjustment. Hence in an economically interlocking world little remains of the classical case for flexible exchange rates. Once countries are firmly committed to low inflation and do not cherish the freedom to engage in inflationary experiments they will benefit further by irrevocably relinquishing the option to change their exchange rate with their hard-currency neighbors. Indeed, currency union would enhance the regional integration process by markedly raising trade and GDP within the union (Frankel and Rose 2000). Even if a common currency “only” doubles, rather than triples trade among those who have started to share it, as Nitsch (2001) has claimed, a dense web of intraindustry relations is facilitated by a common currency. The allocation of investment by countries is likely to be more efficient if hedging against exchange rate movements within the region is not a consideration. The important point emphasized by Devlin et al. (2000, p. 17) after a painstaking review of the literature generally finding no or only moderately adverse effects of exchange rate instability on trade is that creating a financially integrated currency union is not at all identical to just reducing exchange rate volatility to zero between the respective countries. It is much more comprehensive and powerful in its integrative effect.

9. IS A CURRENCY BOARD ARRANGEMENT SUFFICIENT FOR CURRENCY CONSOLIDATION?

A number of business and banking groups seeking some form of monetary union with the United States, for instance in Mexico, recently have come out in favor of a CBA because they view such an arrangement as politically more acceptable than complete dollarization. This section argues quite generally that currency boards may, or may not, advance the objective of monetary union. It all depends on how appropriate the choice of the peg is to their trade and finance and what better alternatives are available in their economic neighborhood.

Currency boards in theory have a fixed reserve ratio against high-powered money and a fixed exchange rate with something "hard" in common with the gold standard. Yet while there were rules of the classical gold standard that were sufficiently widely observed to make the standard credible and speculation generally stabilizing (Eichengreen 1994, p. 43), CBAs now make their own rules. For instance, Argentina's and Hong Kong's CBAs have very little in common in the way they operate, in the extent to which they are backed by reserves and constrained by their particular status, and in the fluctuations they have experienced in their credibility. As described in Dodsworth and Mihaljek (1997) for instance, there is little that is classical or ruled out in the operation of Hong Kong's currency board since it was re-established in 1983. Indeed, some of its defenses against speculative attack, such as using more than 10 percent of its foreign exchange reserves in August 1998 to discourage short selling, by buying shares in the local stock market, have been unprecedented.

Apart from each CBA's being increasingly *sui generis* and thus in need of detailed individual assessment, there is also the question of the choice of currency peg that is appropriate for each. It is not true that any of the major hard currencies will do equally

well for all, and some countries are simply out of reach of any commendable CBA for lack of any hard-currency neighbors in the surrounding economic region. For instance, Hong Kong, Argentina, and Lithuania, all with a U.S. dollar-based currency board, are surrounded (or will be surrounded when the renminbi starts to float against the U.S. dollar) by countries whose real exchange rates may develop very differently. Because these countries are unduly exposed to foreign-induced misalignment of their trade-weighted exchange rate, the rationale for sticking with their CBA can become doubtful. When such a misalignment becomes acute, as between Argentina and Brazil in the aftermath of Brazil's currency crisis of January 1999 and again in the spring and summer of 2001, risk premiums surge. They may feed on themselves by placing the benefits of maintaining the CBA further in doubt.

CBA's that peg unnaturally to a currency from outside their major trading region are prone to stress. Singapore's switch from a sterling-based currency board in 1967 to the U.S. dollar, though precipitated by the desire to disassociate from the pound's devaluation from \$2.8 to \$2.4, was appropriate to its trade and finance as well. Singapore broadened its exchange-rate reference further a few years later when it made the transition to managed floating. By contrast, Lithuania's perverse insistence on maintaining a dollar-based currency board in what is rapidly becoming a sea of euros has been costly. Real GDP fell over 4 percent in 1999 and little or no growth has been reported for 2000 as the strength of the dollar against the euro persisted during the year.

Thus while CBAs incorporate a strong policy commitment to fixed exchange rates which is backed up by a high level of international reserves, this commitment may still not be sustainable politically when it is perceived to be harmful to the economy and to its

secure integration in the region. “The attempt to defend the currency may simply cause a meltdown of investment and output, causing corporate bankruptcies and a debt crisis all the same. That is yet another reason to cry for today’s Argentina” (Velasco 2001, p. 24).

Only currency boards linked to the respective key currency within economically and financially heavily integrated and interdependent regions are likely to provide adequate insurance against disruptive changes in real exchange rates with their main trading partner or partners. U.S. dollar-based currency board arrangements with Mexico and Central American and Caribbean countries, and euro-based CBAs in Eastern European countries thus could qualify as useful precursors to more complete and less reversible forms of currency consolidation. Currency boards established in distant outposts far away from the "peg" country and its currency area, however, represent false starts from the point of view of currency consolidation: they are likely to lead either to floating or eventually to a monetary union not based on a major international currency in the respective region.

Even a currency board with the dominant currency next door may not survive for long when its financial system is exposed to direct competition from its vastly more experienced neighbor. The strength of trade and finance relations, say of countries in the vicinity of the United States or of euroland, makes the almost complete financial integration and interest rate convergence that is available upon formally adopting the U.S. dollar or euro more attractive than staying in the half-way house of a currency board. Hence if currency consolidation is to be allowed, some form of monetary union is the way to achieve it. Whether that union should take the form of unilateral dollarization or of

multilateral and co-managed monetary union as in euroland is another important matter meriting detailed analysis already started elsewhere (von Furstenberg 2000a; 2000b).

10. CONCLUSIONS

Due in part to the liberalization of international capital flows and, to a lesser extent, of trade in financial services, small open economies now make much more use of foreign money, especially the dominant currency of their region, than international trade analysis and past measures of effective exchange rates have tended to recognize. Some of the proper weighting can be estimated with techniques developed at the Federal Reserve (see von Furstenberg, 2001, pp. 323-324 for a summary and application). Technological developments also have favored currency consolidation. Thus the native denominations of financially small countries, in particular emerging-market countries, are at a distinct disadvantage in both spot transactions in the electronic marketplace and in intertemporal trade and insurance. Even direct consumption insurance counsels residents of emerging-market countries exposed to currency crises to keep away from investing in their own currency at home lest shocks to their income be compounded by shocks to their wealth. Foreign financial institutions from the key-currency countries are the principal suppliers of financial services because conducting business transactions in the key currencies is what the market demands.

Erratic and frequently destabilizing exchange-rate behavior and country risk premiums that are due, in good part, to currency risk are the downside to keeping separate currencies in small countries. Doing so is more likely to discourage and disrupt their membership in international supply chains than to promote adjustment to supply shocks.

Even CBAs are unlikely to prove a highly durable substitute for the more complete forms of currency consolidation provided by regional monetary union. However, they may lead the way to such union if they are established with a peg to the currency that is most suitable for intense commercial and financial relations with neighboring countries in the respective region.

As Hoekman and Braga (1997) have pointed out and as devastating currency crises in emerging markets demonstrate every few years, foreign exchange transactions and insurance services, together with other services are an input to the production of most industries. Such services are directly and indirectly consumed by households. An inefficient domestic currency arrangement detracts from the efficiency that can be achieved by many types of services, including insurance, in the domestic economy. For these reasons, any failings in the monetary and exchange arrangements to which a country may cling can be very costly to the economy as a whole. If currency consolidation holds the promise of alleviating many of these failings it should be encouraged through multilateral agreements so that the deep financial infrastructure required for deep and mutually beneficial integration can be built.

Table 1. Sample Standard Deviation of the Annual Rate of Change in the Real Exchange Rate of Selected Countries Using the CPI or PPI, 1978-1999 and Sub-periods

1. 1978-1987 CPI	with US Dollar	with DM	with Yen	Weighted
Canada - dollar	0.0380	0.1546	0.1691	0.0445
Mexico - peso	0.2098	0.3083	0.3005	0.2183
US - dollar	0	0.1588	0.1682	0.1555
Japan - yen	0.1407	0.1026	0	0.1023
2. 1988-1999 CPI	with US Dollar	with DM	with Yen	Weighted
Canada - dollar	0.0515	0.1037	0.1182	0.0555
Mexico - peso	0.1609	0.2272	0.2018	0.1689
US - dollar	0	0.0834	0.0996	0.0723
Japan - yen	0.1034	0.1121	0	0.0987
3. 1978-1999 CPI	with US Dollar	with DM	with Yen	Weighted
Canada - dollar	0.0448	0.1261	0.1408	0.0496
Mexico - peso	0.1844	0.2646	0.2521	0.1928
US - dollar	0	0.1204	0.1328	0.1151
Japan - yen	0.1192	0.1060	0	0.0986
4. 1978-1999 PPI	with US Dollar	with DM	with Yen	Weighted
Canada - dollar	0.0326	0.1161	0.1071	0.0354
Mexico - peso	0.1703	0.2506	0.2127	0.1774
US - dollar	0	0.1177	0.1086	0.1021
Japan - yen	0.0988	0.0952	0	0.0808

Notes: Bilateral real average annual exchange rates indexes were constructed from the relevant bilateral exchange rates obtained, directly or through cross rates, from line rf or rh of the International Monetary Fund's monthly publication, *International Financial Statistics* (henceforth IFS) using either the Consumer Price Index (CPI, IFS line 64) or Producer Price Index (PPI, IFS line 63) ratios for the two countries as noted. The data reported here is the sample standard deviation of the ratio of successive year-average values of the respective bilateral real exchange rate indexes from a mean ratio close to 1. If real exchange rates are nonstationary, it is the standard deviation of step-ahead proportional innovations in their random walk. The sample standard deviation of the weighted exchange rates is obtained for both Canada and Mexico by weighting the bilateral real exchange rate with the U.S. dollar, Europe (DM), and Southeast Asia (yen) by 80%, 10%, and 10%, respectively before calculating the standard deviation of this weighted average of 3 bilateral real exchange rates. For the U.S. and Japan, equal weights are given to the respective two bilateral real exchange rates remaining for them in the present scheme.

Table 2. Sample Standard Deviation of the Gross Annual Average Money-Market Real Interest Rate of Selected Countries Using the CPI or PPI, 1978-1998 and Sub-periods

1. 1978-1987 CPI				
	OWN	US\$/US Investor	DM/G. Investor	Yen/J. Investor
Canada - dollar	0.0260	0.1759	0.2930	0.1690
Mexico - peso	0.0458	0.2234	0.3268	0.3056
US - dollar	0.0322	0.0322	0.1801	0.1833
Japan - yen	0.0173	0.1857	0.1556	0.0173
2. 1988-1998 CPI				
	OWN	US\$/US Investor	DM/G. Investor	Yen/J. Investor
Canada - dollar	0.0158	0.0656	0.1235	0.1406
Mexico - peso	0.0678	0.2126	0.2988	0.2819
US - dollar	0.0122	0.0122	0.0962	0.1092
Japan - yen	0.0173	0.1047	0.1014	0.0173
3. 1978-1998 CPI				
	OWN	US\$/US Investor	DM/G. Investor	Yen/J. Investor
Canada - dollar	0.0211	0.1270	0.2153	0.1521
Mexico - peso	0.1037	0.2464	0.3302	0.3209
US - dollar	0.0268	0.0268	0.1355	0.1444
Japan - yen	0.0185	0.1496	0.1299	0.0185
4. 1978-1998 PPI				
	OWN	US\$/US Investor	DM/G. Investor	Yen/J. Investor
Canada - dollar	0.0400	0.1282	0.2083	0.1426
Mexico - peso	0.1104	0.2477	0.3298	0.3143
US - dollar	0.0389	0.0389	0.1318	0.1312
Japan - yen	0.0419	0.1560	0.1301	0.0419

Notes: Gross short-term interest rates during each year t , $1+i_t$, with i from IFS line 60b (federal funds rate) where available and line 60c (treasury bill rate) otherwise, were deflated by price indexes centered at yearends by taking a geometric average of the price indexes (P) reported for adjoining years. Dividing the gross rate of return in local currency by $(P_{t+1}P_t)^{0.5}/(P_tP_{t-1})^{0.5}$ is equivalent to multiplying by $(P_{t-1}/P_{t+1})^{0.5}$ to obtain $1+r_t$, the real gross rate of return on local currency for investors in their OWN country. To obtain the equivalent rate for foreign investors, U.S., German, or Japanese, going with their currency into and out of local-currency investments, $(1+i_t)(x_t/x_{t-1})$ is constructed first, where x is the yearend foreign currency price of a unit of local currency from IFS line ae or ag. This result is then multiplied by $(P^*_{t-1}/P^*_{t+1})^{0.5}$ to convert to a real gross rate of return for the foreign investors temporarily investing their currency uncovered in the local market but consuming at home at price level P^* . The sample standard deviation of the resulting gross real rates of return here reported is, of course, the same as that of the corresponding net real rates; their distribution is assumed to be stationary.

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