

V Regional Integration and Exchange Rate Arrangements

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The Central American–Dominican Republic Free Trade Agreement (CAFTA-DR) with the United States, combined with increasing integration among the Central American countries, provides an opportunity to reflect on the long-run options for exchange rate regimes in Central America.¹ Although the macroeconomic conditions of the Central American countries present similarities and have improved significantly in recent years, their exchange rate regimes cover the whole spectrum: floating regimes in the Dominican Republic and Guatemala, and crawling pegs in Costa Rica, Honduras, and Nicaragua, and full dollarization in the cases of Panama and El Salvador. Looking forward, CAFTA-DR, together with other regional integration mechanisms such as the customs union, is expected to boost trade and financial flows with the United States and also within the region and increase the synchronization of business cycles.² These developments could affect some important factors in the choice of exchange rate arrangements.

This section examines the long-run options of exchange rate regimes available to the Central American countries. It does not address specific short-run considerations that affect the choice of exchange rate regimes in the near future, but focuses on evaluating the exchange rate arrangement options in the long run—that is, over a period of, say, a decade or longer. The analysis employs a uniform methodology across countries and offers a regional perspective. It takes a long-run view by using an approach derived from the literature on optimum currency areas to evaluate the relative suitability of these countries for different exchange rate arrangements. As a measure of comparison, the suitability of the Central American countries for a common currency (pegged to the U.S. dollar, or full dollarization) is compared to that of the European

countries participating in the European Monetary Union (EMU).³

The key conclusions are that even after taking into account the expected impact of further CAFTA-DR-related integration with the United States, Central America would still be less suitable for a common currency (independently floating or dollar-peg/officially dollarized) than Western Europe was in the 1970s. While increased synchronization of business cycles, reduced inflation differentials, and rising trade flows with the United States have made the region relatively more suitable for dollarization/a dollar peg during the decade ending in 2003, there is still a large distance before a common currency would be a realistic option for the region. To ensure that policymakers have, in the long run, the option to choose among the full range of possible exchange rates regimes, it is important to maintain strong macroeconomic frameworks and continue progress with structural reforms and institution building, especially in the financial sector. For countries that are officially dollarized, the focus should be on policies to ensure the sustainability of dollarization regimes, including through sound macroeconomic frameworks, appropriate wage policy, and structural reforms to maintain competitiveness.

Issues Concerning Exchange Rate Regimes in Developing Countries

Despite intense debate over several decades, no consensus has been reached on the most desirable exchange rate regime. Though pegged regimes and certain intermediate regimes, such as crawling pegs and bands, were preferred in the 1980s and early 1990s for their anti-inflation credentials, they fell out of favor following the emerging market crises of the 1990s. This led to the emergence of the “bipolar view,” which favors either hard pegs or freely floating arrangements and considers intermediate regimes

¹The countries considered are Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. These countries are henceforth referred to as the Central American countries.

²See Section II on the macroeconomic implications of CAFTA-DR.

³This comparison should be interpreted with caution, as strong political will toward greater integration was one of the key ingredients behind the success of EMU, which might not be present in Central America.

difficult to sustain. This approach was partly based on the concept of the “impossible trinity” (Fischer, 2001; IMF, 2003; and Obstfeld and Rogoff, 1995). The bipolar view, in turn, came into question following the collapse of Argentina’s currency board. Also, some have argued that the impossible trinity does not prevent a country from choosing an intermediate solution between floating and monetary union (Frankel, 1999, 2004). In this vein, Reinhart and Reinhart (2003), among others, have noted that intermediate regimes are not at all dead, with many developing countries suffering from “fear of floating” (Calvo and Reinhart, 2002).

Empirical studies that compare alternative exchange rate regimes’ macroeconomic performance and crisis vulnerability have also failed to reach consensus. For example, while Ghosh, Gulde, and Wolf (2003) find that countries with pegged regimes experience lower inflation with a growth performance that is no worse than that of countries with floating regimes, Levy-Yeyati and Sturzenegger (2001) argue that this lower inflation comes at the cost of lower growth.

The classification of exchange rate regimes is also subject to controversy. Although it is now generally recognized that *de facto* classifications are preferable to *de jure* ones, there are competing methodologies for classifying *de facto* exchange rate regimes. The IMF, in its *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)*, has since 1999 employed a *de facto* classification based on quantitative and qualitative information, which also includes the authorities’ stated policy intentions (see IMF, 2003). Other *de facto* classifications can be found in Reinhart and Rogoff (2004) and Levy-Yeyati and Sturzenegger (2005). Differences in the methodology employed to classify regimes may account for the different findings of various empirical studies.

Rogoff and others (2004) move away from advocating an exchange rate regime that is best for all countries and instead group countries according to the degree of integration with global financial markets. They view the degree of capital markets integration as the key factor on the basis of which exchange rate regimes can be recommended. They conclude that the benefits of flexible exchange rate regimes increase as countries become more integrated with global capital markets and develop sound financial systems. In developing economies, however, pegs are found to yield lower inflation without an apparent cost in terms of growth, suggesting the presence of a credibility effect. In emerging markets, fixed or limited-flexibility exchange rate regimes incur crises more frequently, but do not have better inflation or growth performance.

Authors that argue that no single exchange rate regime is right for all countries or at all times focus on the *relative* suitability of countries for different regimes (Frankel, 1999). The criteria used in the

choice of the exchange rate regime result both from the theoretical models that compare fixed versus floating arrangements and the literature on optimum currency areas (e.g., Mundell, 1961, and Alesina and Barro, 2002).

The relative suitability of each country for a given exchange rate regime has been linked to macroeconomic and structural variables, such as international trade and the synchronization of business cycles. Countries that trade more among each other, are smaller in size, experience similar shocks, have more highly correlated business cycles and prices, and enjoy higher factor mobility and fiscal flexibility are more likely to benefit from a pegged exchange rate regime, including a currency union. This is because the main advantages of fixed exchange rate regimes and currency unions are the promotion of trade and financial flows, whereas the drawbacks are related to the inability to use the exchange rate as a tool to offset shocks. An additional benefit of pegging the exchange rate is that some countries could “import” policy credibility (Alesina and Barro, 2002). Hence, countries that lack policy discipline (manifested, for example, in high inflation) could benefit most from pegging their exchange rate or joining a currency union where the anchor country has an established record of low inflation and stability. This would result in lower risk premiums and interest rates, while forgoing seignorage.⁴

In addition, a body of the literature has found that currency unions increase trade beyond the levels associated with fixed exchange rate regimes (Frankel and Rose, 2002; Rose, 2000; and Tenreyro and Barro, 2003). Alesina, Barro, and Tenreyro (2002) find that currency unions also increase the co-movement of prices. If this is so, currency unions may create virtuous circles, in that participation in the currency union actually increases the participating countries’ suitability for such a union. Conflicting results, however, have been obtained as to whether currency unions promote trade specialization and increase co-movements in output.

Besides these long-term factors, short-term and operational considerations affect the feasibility of adopting a certain exchange rate arrangement. A low level of reserves, low tolerance for high interest rates, fiscal dominance, or a weak banking system would make a pegged exchange rate regime highly vulnerable. More generally, a crisis situation might make a floating arrangement the only viable option. On the other hand, an underdeveloped financial system, the difficulty of adopting an alternative nominal anchor, or large currency mismatches might cause “fear of floating” and make moving toward flexibility inadvisable in the short run, because the conditions for the devel-

⁴Seignorage would still accrue in the case of a peg or a currency board, but not under full dollarization.

Table 5.1. Exchange Rate Regimes*(End of year)*

	1990	1995	2000	2001	2002	2003
Costa Rica	5	5	5	5	5	5
Dominican Republic	3	7	7	7	7	8 ¹
El Salvador	7	3	3	1	1	1
Guatemala	7	7	7	7	7	8
Honduras	3	5	6	6	6	6
Nicaragua	5	5	5	5	5	5
Panama	1	1	1	1	1	1

Sources: Bubula and Ötger Robe, 2002; and IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*.

Note: 1 = No separate legal tender; 2 = currency board; 3 = conventional fixed peg; 4 = pegged within a horizontal band; 5 = crawling peg; 6 = crawling band; 7 = managed floating; 8 = independently floating.

¹The Dominican Republic was classified as freely floating starting on January 31, 2004.

opment of a reasonably deep and competitive foreign exchange market would be absent or macroeconomic stability might be compromised. Short-term macroeconomic objectives might also argue for the adoption of a regime that is not appropriate from a longer-run perspective; for example, exchange-rate-based stabilizations to reduce high inflation have been adopted by countries better suited for a floating regime. If an exchange rate regime is adopted on the basis of short-term considerations, issues of exiting to a more appropriate long-term choice arise.

Finally, some have de-emphasized the importance of choosing the optimal exchange rate regime and focused instead on the underlying institutions and policies needed to ensure a country's satisfactory macroeconomic performance. Calvo and Mishkin (2003) have questioned the applicability of the standard theory of exchange rate regimes to emerging markets. They underscore that some characteristics of emerging markets, such as weak fiscal and monetary discipline, high currency substitution, and vulnerability to sudden stops in capital flows, make the application of standard theory problematic in emerging economies. They also question the ability of exchange rate regimes to generate desirable institutional traits, and hence conclude that focusing on developing solid institutions is more important than the choice of exchange rate regime in ensuring successful macroeconomic performance.

The literature on exchange rate regimes in Central America reflects the divided debate on exchange rate arrangements. Although Corbo (2002) and Dornbusch (2001) favor dollarization, others emphasize its risks (including political costs) and the costly requirements of such a strategy (Collins, 1996; Palerm, 2002; and Rodlauer, 2004). Garcia-Lopez, Larrain, and Tavares

(2001) favor a currency union among Central American countries, but not full dollarization. Rennhack, Offerdal, and Mercer-Blackman (2004) conclude that for Honduras, Nicaragua, and Costa Rica, a flexible exchange rate regime would be more consistent with their structural characteristics; however, in general they find that the relative suitability for a peg corresponds to the actual regimes of Central American countries. Finally, Papaioannou (2003) finds that although structural characteristics of the Central American countries can partly explain their choice of regime, specific institutional and political conditions are more important determinants.

Current Exchange Rate Arrangements

The classification of Central American countries' exchange rate arrangements is sensitive to the measure used. The IMF classification suggests a range of arrangements.⁵ These range from dollarization in El Salvador and Panama to the floating regimes of the Dominican Republic and Guatemala. Costa Rica and Nicaragua have a crawling peg, and Honduras has a crawling band (Table 5.1). In recent years, the salient changes in regimes have been El Salvador's dollarization in 2001 and Guatemala's shift from managed to independently floating in 2003; the Dominican

⁵The IMF uses a de facto classification that combines quantitative and qualitative information, including the authorities' stated exchange rate policy (IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*, various years). Although the IMF changed from a de jure to a de facto classification in 1999, the data for previous years were obtained from Bubula and Ötger-Robe (2002), who constructed the back series using the same de facto methodology used since 1999.

Box 5.1. History of Exchange Rate Regimes in Central America

The exchange rate regimes of all the Central American countries were dollar pegs before diverging in the 1980s, when most of the pegs had to be abandoned for different reasons, including external shocks, civil conflict, and inconsistent domestic policies. The notable exception is Panama, which has been fully dollarized since 1904.

All the countries, with the exception of El Salvador and Panama, then had “freely falling” exchange rate regimes according to Reinhart and Rogoff (2004). According to their classification, Costa Rica abandoned the peg in 1981, El Salvador in 1983, Guatemala in 1984, Honduras in 1990, and Nicaragua in 1979. The Dominican Republic had a very narrow de facto crawling band until 1982. Some of the countries then went through several different regimes, at times involving multiple currency practices, before converging to their current arrangements.

After the freely falling exchange rate period, Costa Rica followed a real exchange rate rule based on the inflation differential with the United States. The rule was modified to take into account targeted rather than actual inflation in 1996. Today the rate of crawl of the colón is adjusted on the basis of the inflation differential between Costa Rica and its main trading partners.

The Dominican Republic adopted a managed floating exchange rate regime in 1992, after a period with a freely falling exchange rate, but then moved to a de facto crawling band, which lasted until 2003. At that time, a severe currency crisis brought the country back to a freely falling regime according to the natural classification, which would still apply today given the high inflation rate. According to the IMF classification, the Dominican Republic had a managed floating regime

from 1991 to 2003 before moving to an independently floating arrangement in January 2004.

After abandoning the peg in 1983, El Salvador had a managed floating regime until 1990, when it moved to a de facto peg. However, in the early 1990s after the cessation of civil conflict, the exchange rate came under appreciating pressures which were resisted using sterilized intervention. Dollarization was adopted in 2001.

Guatemala oscillated between freely falling and managed floats in the years following the abandonment of the crawling band (1984). In 1991, the system converged to a de facto crawling peg, which is still the present regime according to the natural classification. In the IMF classification, however, Guatemala had a managed float in the 1990s and early 2000s, until it moved to an independent float in 2003.

After a brief spell in the freely falling category, Honduras had a de facto crawling band from 1991 to 1998 before converging to a de facto crawling peg according to the natural classification. In the IMF classification, however, Honduras adopted a float in 1992–94. It then moved to a crawling peg and finally a crawling band in 1996. The rate of crawl is determined by the projected inflation differential with its main trading partners and the exchange rate of its main trading partners vis-à-vis the U.S. dollar. The band was widened from 1 to 7 percent in 1998, but movement within the band has been limited.

Nicaragua spent a long period with a freely falling regime owing to hyperinflation. In 1991 the exchange rate was pegged and since 1993 it has been a crawling peg. The rate of depreciation is now preannounced by the central bank.

Republic’s exchange rate system was reclassified from a managed to an independent float in January 2004 (see Box 5.1 for a history of exchange rate regimes in Central America).

The natural classification of Reinhart and Rogoff (2004)⁶ generates a less diverse result. According to this classification, the Dominican Republic and Guatemala also had a de facto crawling band and a de facto crawling peg, respectively, in 2001, the last year for which these data are available (Table 5.2). This contrasts with the IMF classification, which categorized both countries as managed floaters in that year.

⁶Reinhart and Rogoff (2004) use a purely de facto classification, which is based mainly on time-series data on exchange rate variability. The exchange rate data from the parallel market are used whenever there is a discrepancy with the official exchange rate. A new category that is identified in this study is that of freely falling, which is characterized either by annual inflation exceeding 40 percent or, in the six months following a currency crisis, by a shift from a pegged to a floating regime (the crises are themselves identified on the basis of whether the depreciation exceeds a certain threshold).

Updating the Reinhart and Rogoff classification for the countries under consideration for 2002 and 2003 reveals that the Dominican Republic would have shifted to the freely falling category in 2003, after having experienced a deep currency crisis and annual inflation of over 40 percent. Another remaining important difference between the IMF and the natural classification concerns Guatemala, which has a free float under the IMF categorization but a de facto crawling peg under Reinhart and Rogoff’s category.⁷

Long-Run Options for Exchange Rate Regimes in Central America

With increased integration, stronger institutions, and sustained robust macroeconomic frameworks, Central American countries may want to reevaluate

⁷Honduras is classified as a crawling band under the IMF’s classification and a de facto crawling peg under Reinhart and Rogoff’s.

Table 5.2. Exchange Rate Regimes, Natural Classification

(End of year)

	1990	1995	2000	2001	2002 ¹	2003 ¹
Costa Rica	10	8	8	8	8	8
Dominican Republic	14	8	8	8	8	14
El Salvador	4	4	4	2	1	1
Guatemala	14	7	7	7	7	7
Honduras	14	10	7	7	7	7
Nicaragua	14	7	7	7	7	7
Panama	1	1	1	1	1	1

Sources: Reinhart and Rogoff (2004); and IMF staff estimates.

Note: 1 = No separate legal tender; 2 = pre-announced peg or currency board; 3 = pre-announced horizontal band < 2 percent; 4 = de facto peg; 5 = pre-announced crawling peg; 6 = pre-announced crawling band < 2 percent; 7 = de facto crawling peg; 8 = de facto crawling band < 2 percent; 9 = pre-announced crawling band > 2 percent; 10 = de facto crawling band < 5 percent; 11 = moving band < 2 percent; 12 = managed floating; 13 = freely floating; 14 = freely falling.

¹The classification for 2002 and 2003 has been updated by IMF staff using the Reinhart and Rogoff (2003) methodology.

their options for long-run exchange rate regimes. Although operational considerations, institutional constraints, or short-term objectives might, as noted, dictate a different exchange rate regime choice in the short term, it is useful to know what the most suitable long-term regime would be in order to consider future plans.

Several long-run options for the exchange rate regimes of Central America can be considered. Besides the status quo, these options are increased flexibility, possibly with inflation targeting; a common currency area among the Central American countries, either pegged to the U.S. dollar or freely floating versus the U.S. dollar; or full dollarization.

Increased Flexibility

Adjustment to shocks would be one of the main benefits of increased exchange rate flexibility for Central America.⁸ Exchange rate flexibility can help counter shocks to the current account (such as terms-of-trade shocks) as well as reduce the vulnerability to capital flow reversals. Improving short-term competitiveness could be another argument in favor of flexible regimes, but this objective might also be achieved with a one-time devaluation in cases where this is feasible. The more integrated the country is with international capital markets, the more difficult

⁸Broda (2001) finds empirical support for the argument that flexible exchange rates can insulate economies better against terms-of-trade shocks. For a comprehensive analysis of the operational issues involved in moving from a pegged to a floating exchange rate regime, see IMF (2004).

it is to sustain a pegged regime after a step devaluation, because expectations that it might be followed by additional devaluations would typically heighten the risk of large capital outflows.

A flexible exchange rate regime should increase monetary policy independence. The degree of monetary independence is likely to be greater the less integrated the country is with international capital markets; furthermore, monetary independence is likely to be strengthened over time, as policy credibility becomes established.

Increased exchange rate flexibility requires an alternative nominal anchor. The possible choices would be either monetary targeting or inflation targeting. The latter has been the preferred choice of several emerging markets recently that are moving toward greater exchange rate flexibility, given the frequent instability of monetary aggregates. Because adopting a fully fledged inflation targeting requires time,⁹ immediately after the abandonment of a peg, countries have adopted monetary targets as interim arrangements.¹⁰

Freely Floating Currency Area

A currency area that is freely floating against the dollar would have the ability to use exchange rate movements to adjust to real shocks affecting Central America; however, it would lack the credibility benefits stemming from anchoring to the United States. The choice of floating freely would be more

⁹See, for example, Truman (2003) and Schaechter, Stone, and Zelman (2000).

¹⁰This paragraph draws from IMF (2004).

appropriate the stronger the co-movements in output among the Central American countries and the weaker the region's co-movements in output with the United States. The credibility benefits of a Central American currency area are likely to be limited, as no Central American country is sufficiently dominant economically to act as an anchor country.¹¹ Furthermore, the credibility of a common Central American currency independently floating against the dollar would depend on the standards that are set by the Central American countries, such as their anti-inflation credentials, the fiscal discipline pursued in the region, and their record in maintaining them.

Common Currency Area Pegged to the U.S. Dollar

The benefits and costs of a Central American currency pegged to the U.S. dollar would be the mirror image of the option of a common currency that floats freely versus the dollar. A Central American currency pegged to the dollar would have the benefit of importing monetary credibility—which should entail lower inflation and interest rates—and reducing transaction costs, but at the cost of forgoing an instrument to deal with external shocks that affect Central America differently from the United States. Furthermore, a peg to the dollar would require a strong fiscal policy, which renounces monetary financing of the fiscal deficit and maintains fiscal discipline to stem expectations of a future devaluation. Similarly, the central bank's function is more constrained, particularly under a currency board arrangement (or, of course, under full dollarization), calling for a healthy banking system and alternative arrangements to deal with banks' liquidity problems. With a pegged exchange rate regime, policies aimed at increasing the flexibility of factor markets—in particular, labor markets—would be important as alternative ways to counter real shocks.

Pegged exchange rate regimes can also take intermediate forms, such as crawling pegs or bands. Beyond the general considerations that apply to pegged regimes, as reviewed above, the advantage of a crawling peg is the prevention of large misalignments in competitiveness due to the adjustments of the nominal exchange rate with inflation differentials.¹² However, this might have the cost of reducing the anti-inflation properties of the pegged regime. A band (or crawling band) would have the advantage of introducing some exchange rate flexibility and

¹¹Alesina, Barro, and Tenreyro (2002) point out that anchor countries tend to be large relative to their clients.

¹²The rate of crawl is determined differently in each country. Some countries preannounce the rate of crawl and determine it in a forward-looking way with projected inflation; others accommodate inflation differentials.

some degree of monetary policy independence; this choice has been made by some countries exiting pegged regimes. However, the authorities might face tensions between the exchange rate and inflation objectives at the edges of the band.

Full Dollarization

Full dollarization¹³ would have benefits and costs similar to pegging a common Central American currency to the U.S. dollar, but it would be perceived as a more irrevocable commitment. Additional benefits in terms of increased trade with the United States might accrue with dollarization, although the evidence for this is not clear.¹⁴ The lack of seigniorage would represent the main cost of dollarization compared with a regional currency union pegged to the dollar.¹⁵

The choice of exchange rate regimes for the Central American countries is likely to be interdependent. Exchange rate movements of one country have spillover effects on other countries in the region, both because of their effect on bilateral trade (and hence output and inflation) and because some of them compete in third markets. For example, the costs of dollarization are likely to be reduced with an increase in the number of countries that have already dollarized.

In the following subsection, the analysis of the various options proceeds first by considering the individual factors for the exchange rate regime choice, and then by aggregating these determinants into a summary measure, an index.

Choosing Among the Long-Run Options: Key Factors

This subsection evaluates the relative suitability of Central American countries for different exchange rate arrangements. It adopts a long-term perspective, applying a consistent methodology across countries and using a common database. The analysis examines the recent and likely future developments in some of the key variables that affect the choice of the exchange rate regime. In addition, Central America is compared with the European countries partici-

¹³In the rest of the paper, dollarization refers to full dollarization unless otherwise noted.

¹⁴Empirical studies of this issue (for example, Rose, 2000) have focused on the impact of currency unions, supporting that currency unions promote trade well beyond fixed exchange rate arrangements. However, it should be noted that these studies deal mainly with advanced economies, and in the East Caribbean Currency Area convergence and trade have not increased homogeneously either among the participating countries or with the United States in recent years.

¹⁵Dollarization might also reduce the need for open market operations aimed at sterilizing foreign inflows.

pating in EMU to assess the region's absolute suitability for dollarization.

The factors that are examined in this subsection have been identified mainly by the optimum currency area and fixed versus floating exchange rate regime literature. These factors include international trade and other cross-border flows, size of the economy, synchronization of business cycles, terms-of-trade shocks, degree of informal dollarization, inflation, factor mobility, fiscal flexibility, and seigniorage. These variables are examined in turn below.

Openness of the Economy

The effect of the extent of bilateral trade on the desirability of a currency union is ambiguous.¹⁶ On the one hand, the more countries trade with each other, the greater the benefits of a currency union, because the larger the reduction in transaction costs. Similarly, the deeper the financial interaction between countries, the greater the benefits of a currency union. On the other hand, in more open economies, external shocks have a larger impact on output and consumption, and hence the exchange rate is more useful as an adjustment tool (see, for example, Ricci, 1997). Thus, the effect of trade on the desirability of a currency area is ambiguous.¹⁷ Which effect will prevail will depend partly on the extent to which nominal exchange rate changes translate into real exchange rate changes. If prices and wages adjust quickly with the exchange rate, the exchange rate is not an effective adjustment tool and the first effect (reduced transaction costs) might dominate. Typically, the literature on optimum currency areas emphasizes the first effect.

The United States is the dominant trading partner for the Central American countries and trade with the United States is more important than intraregional trade. On average, the United States received 60 percent of Central American exports and supplied 42 percent of imports over the past five years (Table 5.3).¹⁸

¹⁶Other current account transactions, for example remittances, would also be relevant in this discussion. However, consistent data on the geographical composition of these flows are not available, and hence the analysis focuses on trade flows, implicitly assuming that the geographical composition of other current account transactions broadly reflects that of trade flows.

¹⁷The trade channel could be less relevant for large countries. For example, Mexico, Canada, and the United Kingdom have joined free trade agreements but chosen not to fix their exchange rates. Transaction costs may have been relatively low for these countries, with their relatively well-developed financial markets in which exchange rate risk can be hedged more easily. Indeed, Frankel and Rose (2002) present evidence of a positive and large impact of a currency union on bilateral trade, but with the qualification that their result may not be applicable to large countries.

¹⁸See Section II for a detailed analysis of trade flows of the Central American countries. Trade data suffer from breaks in the series and other data problems. In spite of this, the overall qualitative results showing that the United States is the main trading partner and

On the other hand, other countries in the region received an average of 17 percent of exports and supplied 11 percent of imports over the same period. In addition, the extent to which these countries trade with the other Central American countries varies greatly, from less than 5 percent of trade for the Dominican Republic to about 30 percent for Nicaragua.¹⁹ In most cases, the share of trade with the United States rose over the past decade and, as shown in Section II, this trend is projected to intensify as a result of CAFTA-DR.²⁰ Trade among the seven Central American countries did not show a clearly rising trend.

On average, the Central American countries are about as open as the European economies were in the 1980s, but they trade less among themselves. If, however, the percentage of trade with the United States is added to the trade among the Central American countries, the Central American countries have more internal trade than the European countries did in the 1970s and 1980s.

The United States is the main creditor of most of the Central American countries. Bank for International Settlements (BIS) data were used to gauge the extent of financial transactions of the Central American countries with the United States and among themselves (Table 5.4).²¹ These data indicate that, with the exception of the Dominican Republic and Nicaragua, the United States is the single largest creditor country of Central America.²² When taken as a group, European banks also have large exposures, in some cases larger than American banks. For most Central American countries, except Nicaragua and Costa Rica, American, European, and Japanese banks account for over two-thirds of BIS reporting banks, leaving a relatively small residual share to be explained. The share of financial transactions among Central American countries is not very high.

trade with the United States is significantly more important than regional trade with the rest of Central America are deemed robust.

¹⁹Although trade among the Central American countries is not homogeneously high, the countries that export similar commodities may compete in the U.S. market. COMTRADE data confirm that the United States is the leading market for most of the Central American exports, especially for the traditional ones.

²⁰Other free trade agreements and other world trade developments might take place—such as competition from other emerging markets and developing economies—that would affect the geographical composition of Central America's trade. Were such changes to lead to a significantly different geographical composition of the region's trade, they would affect the conclusions regarding exchange rate arrangements.

²¹Of course, these are partial data and capture only financial exposures of BIS reporting banks, not those of nonbank corporations or official creditors. Furthermore, they do not include foreign direct investment. Nevertheless, they do provide an indication of the geographic distribution of international financial transactions.

²²For the Dominican Republic and Nicaragua, Spanish and German banks, respectively, are the largest creditors.

Table 5.4. Consolidated Claims of BIS Reporting Banks on Central American Countries
(By nationality of reporting banks; in millions of U.S. dollars)

	Total Claims	Creditor Banks			
		United States	European banks	Japan	Other
Costa Rica	2,988	496	656	24	1,812
Percent of total claims	100.0	16.6	22.0	0.8	60.6
Dominican Republic	2,947	500	1,416	0	1,031
Percent of total claims	100.0	17.0	48.0	0.0	35.0
El Salvador	2,322	905	718	0	699
Percent of total claims	100.0	39.0	30.9	0.0	30.1
Guatemala	1,962	797	547	0	618
Percent of total claims	100.0	40.6	27.9	0.0	31.5
Honduras	761	216	391	0	154
Percent of total claims	100.0	28.4	51.4	0.0	20.2
Nicaragua	342	51	101	0	190
Percent of total claims	100.0	14.9	29.5	0.0	55.6

 Sources: Bank for International Settlements, *Quarterly Review*; and IMF staff calculations.

Size of the Economy

The smaller the economy, the greater the benefits of a currency union. This is because smaller economies are typically also more open.

The Central American countries are relatively small. Their average GDP was US\$13.7 billion in 2003. Comparing them with the European countries 10 years and 20 years before EMU reveals that the Central American countries are significantly smaller, with Luxembourg the only European economy of the same order of magnitude. This is all the more true for the size of the Central American countries in relation to the United States, their potential anchor country, compared with the European countries in relation to Germany.²³

Co-Movements of Business Cycles

The higher the co-movements of business cycles, the lower the costs of forgoing exchange rate flexibility. In fact, when the co-movements in business cycles are high, the appropriate policies of the anchor country (or the union) would also be appropriate for economic stabilization in the other countries.

²³Although the comparison of EMU countries is made vis-à-vis Germany (because Germany was considered the anchor country of European Monetary Union), it bears underscoring that the European Monetary Union ended up being a more symmetric monetary arrangement than initially envisaged. This would not be the case for Central America if it decided to dollarize.

As discussed in Section II, the synchronization of business cycles vis-à-vis the United States and partly within the region has risen in recent years and is expected to increase further with CAFTA-DR. Table 5.A1 in the Appendix complements the correlation analysis by also taking into account the size of output fluctuations in Central America relative to that in the United States and European countries.²⁴ The reason for focusing on this measure is that besides capturing the co-movements between the output growth of two countries, as correlation does, the table also reflects the magnitude of the variability of the individual growth rates of the two countries. This is important because if, for example, the output of the anchor country is much less variable than that of the client country, despite moving together, the anchor country's response to the shocks will be largely irrelevant.²⁵ The degree of output co-movements with the

²⁴The measure used is the standard deviation of the difference in the logarithm of the real output of country *i* relative to the real output of country *j* calculated over different periods for the various pairs of Central American countries and the United States and for various pairs of European countries.

²⁵This measure is used in Bayoumi and Eichengreen (1997). Alesina, Barro, and Tenreyro (2002) use a similar measure, but they first estimate a second-order autoregression for the logarithm of relative outputs and then calculate the mean square error using the residuals. The idea is that only the unpredictable part of the shocks is considered. However, if a country has a fixed exchange rate regime, it will not be able to use the exchange rate as an adjustment tool, even when the shocks are predictable.

United States increased in the past decade (1994–2003) compared with the previous one (1984–93) for all the Central American countries except Honduras. On average, co-movement in output increased within the region as well over the same period. The degree of output co-movement of the Central American countries among themselves is on average less pronounced than co-movement between individual Central American countries and the United States.

A comparison between Europe 10 and 20 years before EMU and Central America reveals a similar degree of output co-movement. In fact, the average of all output co-movement measures among the 12 European countries that formed EMU was 0.028 and 0.022 in the decades ending in 1979 and 1989, respectively, compared with 0.025 in Central America in the decade ending in 2003.

The co-movement of output of the Central American countries, as measured by pair-wise correlation, is strongest with the United States, suggesting the importance of the common link with the United States. The average correlation of the Central American countries' output growth with the United States was 0.44 in the decade ending in 2003, while the average pair-wise correlation between Central American countries was only 0.22.²⁶ Furthermore, the pair-wise correlations in output growth between the Central American countries, after removing the influence of the United States, revealed a significantly lower degree of co-movement, with the average correlation falling to 0.16 (Table 5.A2).²⁷

Terms-of-Trade Shocks

The smaller the size of terms-of-trade shocks and the higher the co-movements in the terms of trade, the greater the benefits of a currency union. The correlation of terms-of-trade shocks depends in part on the product composition of trade.

Terms-of-trade shocks are sizable in Central America and much more important than they were for Europe before EMU (Table 5.A3). In fact, at 9.9 percent, the average absolute annual change in the Central American countries' terms of trade over the past decade was more than double that for Europe in the decade ending in 1989 (3.9 percent). The United

States has much smaller terms-of-trade shocks, with an average annual change of 1.5 percent over the past decade. The importance of terms-of-trade shocks for Central America results in part from the fact that these countries still rely heavily on traditional exports, with food being the main export for most of them, followed by manufactured goods.²⁸ Indeed, over the past decade, the importance of terms-of-trade shocks declined more for those countries that diversified their export base the most: Costa Rica, the Dominican Republic, and El Salvador.²⁹ On the other hand, the variability of the terms of trade of Guatemala, Honduras, and Nicaragua increased over the same period.

The co-movements in the terms of trade of the Central American countries fell in the past decade, are stronger with the United States than within the region, and are much weaker than in Europe (Tables 5.A4 and 5.A5 in the Appendix).³⁰ The average correlation among the terms of trade of all Central American countries and the United States fell from 0.2 in 1984–93 to 0.02 in 1994–2003. Furthermore, though the average correlation of the terms of trade of the Central American countries with the United States was 0.12 in the last decade, the average correlation of the terms of trade within the region became very small and negative (–0.01). Nicaragua has all negative correlations; Costa Rica has all negative correlations with Central America, but a very small positive correlation with the United States; Honduras also has several negative correlations. Finally, the correlation in the terms of trade of European countries was significantly stronger than among the Central American countries and the United States.

Currency Substitution in the Economy

The higher the degree of currency substitution of the economy, the smaller the costs of moving to a currency union. This relationship exists because the higher the degree of currency substitution is, the more limited are the effects of nominal exchange rate changes on the real exchange rate. This will happen

²⁶The exception is Honduras, for which the correlation with the United States was negative in the last decade. Excluding Honduras, the average correlation with the United States is 0.55.

²⁷The influence of the United States' business cycle is removed by first regressing the individual countries' output growth on the United States' output growth, and then calculating pair-wise correlations between the residuals of these regressions. Correlation is examined instead of the standard deviation of the country differences in output growth, as was done above, because the latter is by construction always smaller for residuals than the original differences in output growth.

²⁸Within the food category, coffee, bananas, and fish/shellfish are the main exports, whereas the countries that have diversified their export base export larger shares of various manufactured goods.

²⁹The variability of terms-of-trade shocks also diminished for Panama, even though Panama's exports consist mainly of food.

³⁰Although this result may appear at odds with the earlier finding of increased synchronization in business cycles with the United States, it might be because the main transmission channels for the increased synchronization in business cycles do not involve terms-of-trade movements. Possible candidates are financial flows, as well as other current flows such as remittances, which for some Central American countries are as large as exports. Furthermore, increasing trade with the United States can be consistent with both higher synchronization in business cycles and decreasing correlation in the terms of trade if trade is largely at the interindustry level.

not only because the exchange rate will not affect the domestic price of goods whose prices are set in dollars, but also because, in economies with high currency substitution, the pass-through of exchange rate changes to domestically set prices is typically high.

As detailed in Section VI, the degree of currency substitution of the Central American economies is high (although it varies considerably across countries). Excluding the countries that have fully dollarized, financial dollarization amounts to almost 40 percent of total banking system assets, much greater than in Europe in 1979 and 1989.

Inflation Rates and Co-Movements of Prices

The higher and more variable the inflation rate and the higher the degree of co-movements in prices, the greater the benefits of a currency union. That is because the higher the inflation, the greater the benefits of “buying monetary credibility.” Also, the larger the co-movements in prices, the smaller the chances of misalignments in competitiveness when the exchange rate is fixed.

Inflation rates and inflation variability have fallen in recent years (Table 5.A6). Inflation rates have declined for all the Central American countries, and for some, rates have converged close to advanced country levels. At the same time, the variability of inflation in individual countries, as well as the cross-country dispersion across Central America, has diminished. Co-movements in prices have increased in Central America in the past decade: they are, however, somewhat less strong than in Europe, as measured both with the anchor country and among all pairs of countries excluding the anchor country (Table 5.A7).

The average inflation rate in Central America in the past decade was 9.5 percent, somewhat higher than the 7.8 percent in Europe in the decade ending in 1989. Similarly, the difference between the average excluding the anchor country (that is, the United States for Central America and Germany for Europe) was greater in the case of Central America.

Factor Mobility

The greater factor mobility, the lower the costs of forgoing exchange rate flexibility. This is because greater factor mobility can lead to resource reallocation that can bring about the necessary adjustment, even in the absence of exchange rate flexibility.

Quantitative information on factor mobility is scarce. An analysis of labor market flexibility is beyond the scope of this section; therefore, only some very crude indicators of labor market flexibility are considered here. The average unemployment rate for the Central American countries was about 8 percent

in the five years up to 2002, somewhat lower than that of European countries in the five years up to 1989 (9.6 percent).³¹ Also, according to another measure based on the variability of employment shares in the main sectors of the economy, the Central American countries appear to have greater variability of sectoral employment, perhaps suggesting greater labor market flexibility.³² Furthermore, emigration from the Central American countries also functions as a shock absorber to a larger extent than in Europe.

Regarding capital mobility, the IMF’s *Annual Report on Exchange Arrangements and Exchange Restrictions* suggests that the Central American countries have fairly liberal regimes compared with other emerging markets. Although the same classification is not available for the European countries in 1979 and 1989,³³ it is likely that the Central American countries now have on average a more liberal regime than the European countries had in 1979, but less liberal than the European countries in 1990, the year in which all capital account restrictions among the prospective EMU participants were removed.

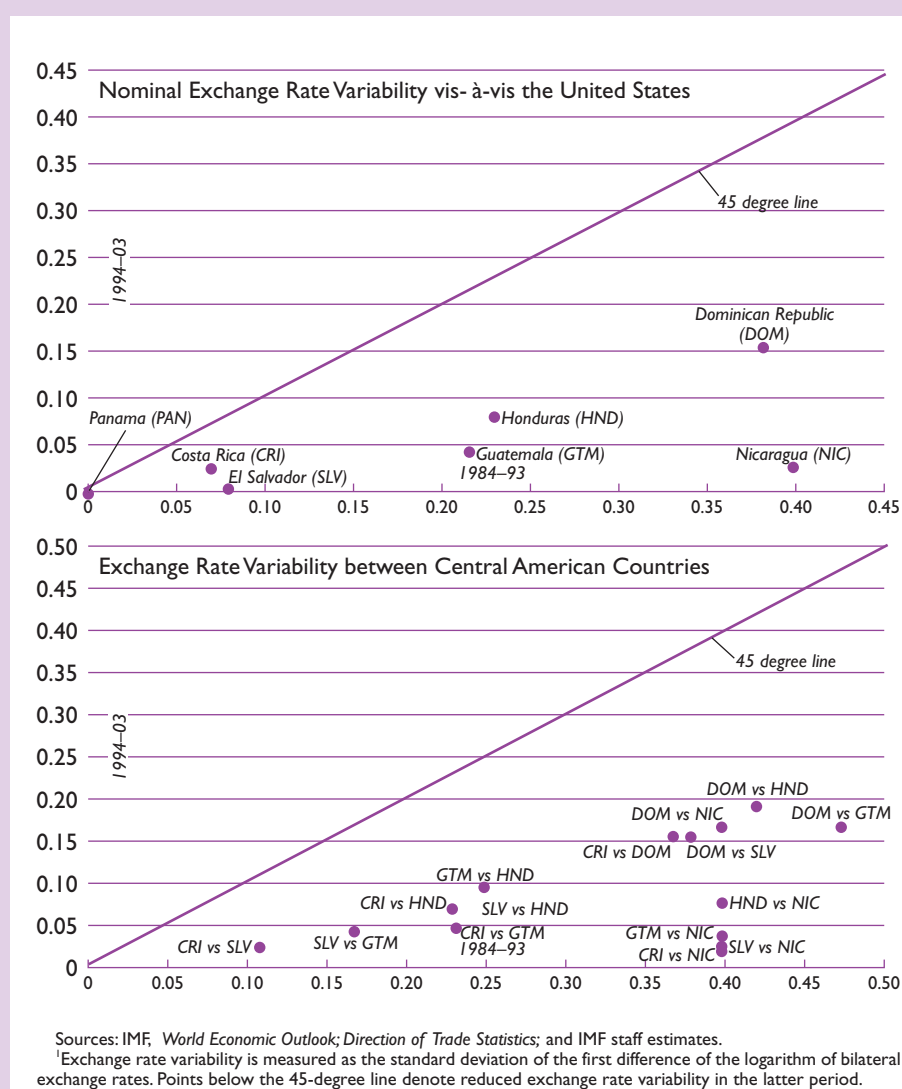
Fiscal Flexibility

The greater the fiscal flexibility, the lower the costs of forgoing exchange rate flexibility. Fiscal flexibility is also difficult to measure. International fiscal transfers are very rare; hence, what is more relevant is the extent to which fiscal policy in individual countries can respond flexibly to shocks. Though an in-depth analysis of fiscal flexibility is beyond the scope of this section, a rough measure is the debt-to-GDP ratio, because the higher the debt level is, the less room there is for maneuvering using fiscal policy countercyclically. Nevertheless, comparisons with the European countries based on the debt-to-GDP ratio are not appropriate, as the ability to absorb the debt is much more limited in Central America because of their less advanced domestic financial markets and their intermittent access to international capital markets. The level of debt of most Central American countries suggests little scope for using fiscal policy countercyclically. Even countries whose debt is not high could be constrained by the availability of financing (see Section IV).

³¹A higher unemployment rate is considered an indication of a less flexible labor market. Because of data availability problems, these data are only indicative.

³²Higher variability in the shares of sectoral employment in total employment might indicate greater flexibility of the labor market. For the European countries, the comparison excludes Portugal, as it has a very extreme value, indicating very high variability in sectoral employment.

³³The Central American countries currently have more restrictive regimes than do the European countries.

Figure 5.1. Nominal Exchange Rate Variability, 1984–2003¹

Seigniorage

The lower the seigniorage, the smaller the cost of giving up the national currency. Simple calculations indicate that seigniorage in Central American countries is in the range of 1 to 2 percent of GDP on average.³⁴ Seigniorage has been falling over the years

with inflation and is likely to fall further as inflation is reduced.³⁵ Hence, this measure of seigniorage is likely to overestimate the costs of dollarization. Furthermore, in comparing a Central American currency union whose currency is pegged to the dollar, the forgone seigniorage is likely to be less, because with

³⁴This figure represents the average annual increase in base money as a percentage of GDP in 2001–02. The reason for not using a more recent year was that the Dominican Republic had a large increase in seigniorage in 2003, at the same time as inflation spiked as a consequence of the currency and banking crisis. Costa

Rica, the Dominican Republic, Guatemala, Honduras, and Nicaragua are used in the calculations, as El Salvador and Panama are already dollarized.

³⁵Estimates of seigniorage losses due to dollarization would decrease further if reserve requirements included in base money were remunerated.

a peg to the dollar, Central America's inflation is likely to be even lower than it would be with a freely floating Central American currency.

Finally, the bilateral exchange rates of the Central American countries reveal reduced variability, which can be interpreted as a summary indicator of the degree of integration. As Figure 5.1 shows, bilateral exchange rate variability of the Central American countries vis-à-vis the United States declined without exception between the periods 1984–93 and 1994–2003.³⁶ The same is true for all of the possible pairs of Central American countries. This could be interpreted as *prima facie* evidence of increased synchronization of these economies.

The analysis of this subsection suggests that if the region were to consider a common currency area, it would be more sensible to peg it against the U.S. dollar (or dollarize) rather than float it against the dollar. This is suggested because the Central American countries trade more and are more synchronized with the United States than among themselves. Importantly, CAFTA-DR is expected to boost integration with the United States more than within the region. However, the analysis of the individual factors in this section does not allow conclusions to be reached on Central America's suitability for pegging their exchange rate versus the U.S. dollar or dollarizing. This task is tackled in the next subsection.

Choosing Among the Long-Run Options: An Index Approach

This subsection uses an index approach to formally analyze the suitability of the Central American countries for different exchange rate regimes. The index will provide a summary measure of relative suitability, taking into account most of the factors highlighted above. As underscored in the analysis of the previous subsection, because the Central American countries currently trade more and are more synchronized with the United States than regionally, and because of the potential benefits of anchoring to the United States, this subsection focuses on assessing the relative suitability for dollarization³⁷ rather than for a Central American currency area with a freely floating currency versus the dollar. In addition, for each Central American country the index will provide information on the choice between dollarization (or a peg to the U.S. dollar) versus a freely floating domestic currency

vis-à-vis the dollar. A low value of the index would denote high suitability for dollarization, while a high value of the index would denote low suitability for dollarization and hence high suitability for a freely floating currency versus the dollar.

An index is constructed to aggregate all the factors relevant to evaluating the long-run suitability for different types of exchange rate regimes. Although the analysis above has analyzed specific factors relevant to the exchange rate regime choice, an index has the advantage of summarizing all the information once the relative weight of the individual factors is estimated from a large cross-section of country data. The index used here adopts an optimum currency area approach and provides a way of formalizing the relative suitability of Central American countries for different exchange rate regimes.³⁸ Initially, a comparison will be made between these countries' suitability in 1993 and 2003. Projections will then be formulated to evaluate how the Central American countries' suitability might evolve in the future once the macroeconomic effects of CAFTA-DR have fully occurred. Finally, a comparison with EMU member countries before the monetary union will provide a benchmark against which to compare the absolute suitability of Central America for dollarization.

The approach follows Bayoumi and Eichengreen (1997). As detailed in the Appendix, the first step is to estimate an equation that can explain the variability in bilateral exchange rates using variables that are deemed to determine the suitability for an optimum currency area, such as the synchronization of business cycles, the amount of trade, the similarity in the composition of trade, and the size of the countries. The specification of the equations is modified to better fit emerging markets and developing countries (Box 5.2). The regressions use a sample of 53 countries, including the G-7, all Latin American countries, all the European countries that are members of EMU, Australia, and New Zealand. The equations use two different specifications: one with nominal exchange rate variability as the dependent variable and one with the variability of an indicator of exchange market pressure. The latter is defined as an average of the variability of changes in bilateral nominal exchange rates and official reserves. The rationale for this is that some of the countries in the sample maintained a fixed exchange rate regime over the sample period, and hence an indicator of pressure in the foreign exchange market appears more appropriate as a dependent variable.

³⁶Panama has a variability of zero in both periods because it was dollarized over the entire period.

³⁷In the remainder of this subsection, we refer to "dollarization" as the regime choice for anchoring to the United States (which also includes a dollar-peg/currency).

³⁸Although the index is an optimum currency area index, this should not be construed as an argument in favor of dollarization; rather, it is a common tool to assess relative suitability of exchange rate regimes.

Box 5.2. Regression Results

The estimated equation is specified as follows:

$$y = \beta_0 + \beta_1 SD(Y) + \beta_2 SD(P) + \beta_3 SD(TOT) + \beta_4 TRADE + \beta_5 SIZE, \quad (1)$$

where y is either the exchange market pressure (*EMP*) indicator—defined as the average of the variability in bilateral exchange rates and official international reserves—or the variability of bilateral exchange rates, denoted by $SD(EXR)$. $SD(Y)$ captures the variability in relative output changes, $SD(P)$ the variability in relative inflation differentials, $SD(TOT)$ the variability in relative changes in the terms of trade, $TRADE$ the extent of bilateral trade, and $SIZE$ country size measured by the arithmetic average of the log of real GDP in U.S. dollars of the two countries. All variability variables are measured by standard deviations of the underlying variables as described in the Appendix. $TRADE$ and $SIZE$ represent period averages.

The standard deviations and the means are calculated for a panel of 53 countries over three different sample periods: 1970–2003, 1980–2003, and 1990–2003. With 53 countries, there are 1,378 pairs of countries and hence potentially 1,378 observations in the regressions. In practice, the regressions include 1,308 observations as a result of missing values in the data.

The fact that many countries included in the sample—particularly Central and South American countries—experienced economic turbulence during the sample period suggests that both dependent and independent variables of the regression may be dominated by several outliers. To reduce the influence of outliers, the underlying variables of volatility measures were transformed before calculating their standard deviations.¹

Table 5.A8 in the Appendix reports the results of regressions estimated for *EMP* and $SD(EXR)$ over three different sample periods.

Most of the estimated coefficients have the expected sign and are highly significant. The few coefficients with the wrong sign are generally statistically insignificant. The results also indicate that the goodness of fit of the regressions is highly satisfactory, accounting for 70 to 90 percent of variation in *EMP* and $SD(EXR)$, respectively, when the full sample (1970–2003) was used. Furthermore, the estimated coefficients are relatively stable across different sample periods, supporting their use for forecasting purposes.

¹A monotonic transformation given by $z = x / (1 + x)$ for $x > 0$ and $z = x / (1 - x)$ for $x < 0$ was carried out. This transformation maps the underlying variable x into an interval $(-1, 1)$.

A monetary variable, the variability of inflation differentials, is added to the explanatory variables. This is because the variability of bilateral exchange rates of developing countries (and relative reserve movements) is determined to a large extent by monetary phenomena. Alesina, Barro, and Tenreyro (2002) also stress the importance of co-movements in prices as well as output in determining the suitability of a country for an optimum currency area. Instead of the dissimilarity variable used by Bayoumi and Eichengreen, a variable that captured the variability in the terms of trade was used. Finally, other variables that are discussed in the previous sections, such as indicators of labor market mobility and fiscal flexibility, either did not turn out to be statistically significant (for example, unemployment) or could not be included because of data availability constraints.

As shown in the estimated indices, the Central American countries became more suitable for dollarization between 1993 and 2003. In fact, the indices for all countries became smaller in 1994–2003 than in 1984–93, indicating lower exchange rate variability versus the U.S. dollar and hence greater suitability for dollarization (Figure 5.2 and Table 5.A8 in the Appendix). The index for 1984–93 (1994–2003) was calculated with the values of the explanatory variables over that decade. The greater suitability in

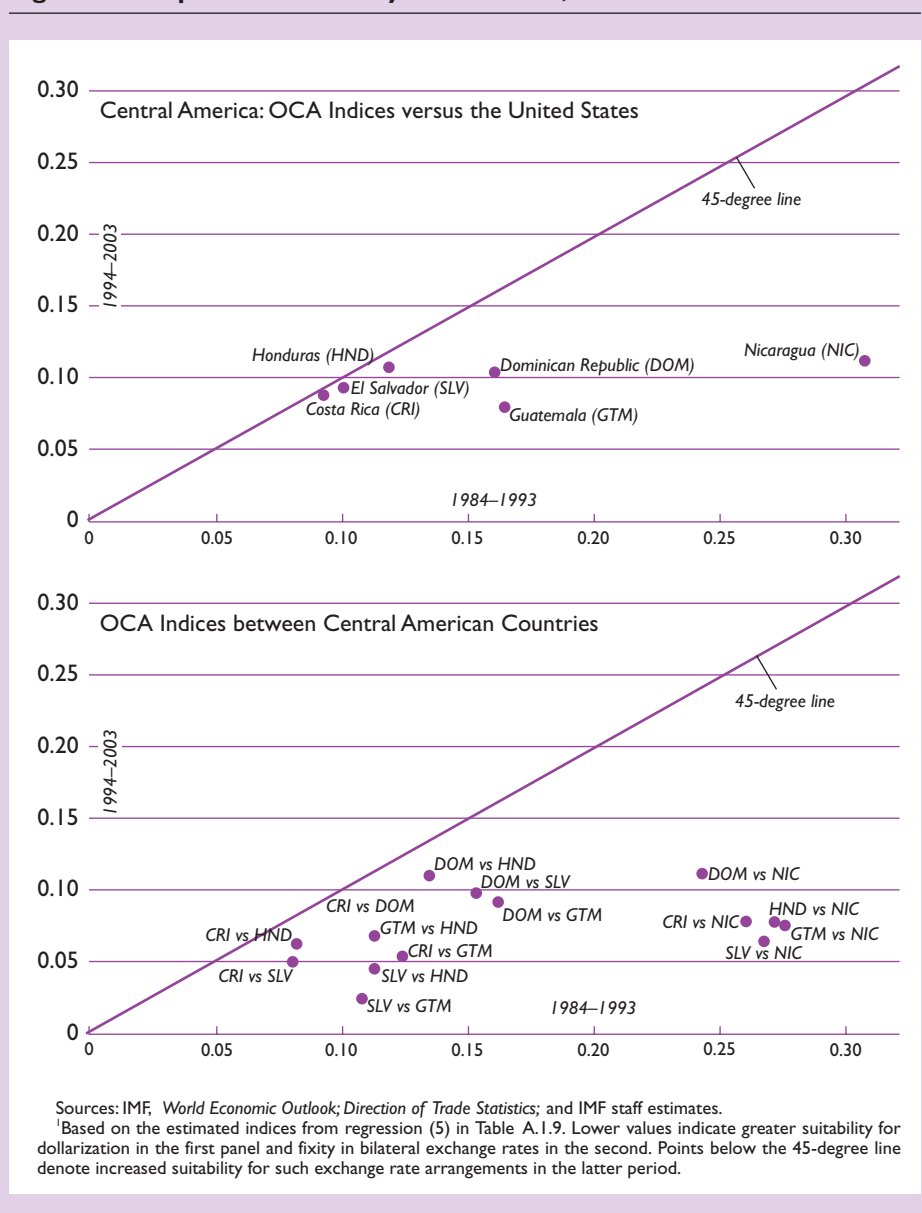
2003 compared with 1993 is explained by the clear increase in the synchronization of business cycles and inflation differentials in the past decade. This result holds when using any of the regressions presented in Table 5.A9 in the Appendix, as well as for all pairs of Central American countries, suggesting also increased suitability for a currency area within the region.³⁹

Although all Central American countries became more suitable for dollarization, the degree of change in the index varied among the countries. Nicaragua had by far the largest increase in relative suitability because of its macroeconomic stabilization, followed by Guatemala and the Dominican Republic, and the remaining Central American countries had more modest changes in the indices.

The range of suitability for dollarization does not always reflect the existing exchange rate regimes of the Central American countries. Panama is the country most suited for dollarization, and Guatemala follows (Figure 5.3). Costa Rica and El Salvador are next. The Dominican Republic, Honduras, and Nicaragua are the least suited for dollar-

³⁹Nevertheless, it is not possible to ascertain whether the greater integration within the region is due to the common greater integration with the United States.

Figure 5.2. Optimum Currency Area Indices, 1984–2003¹



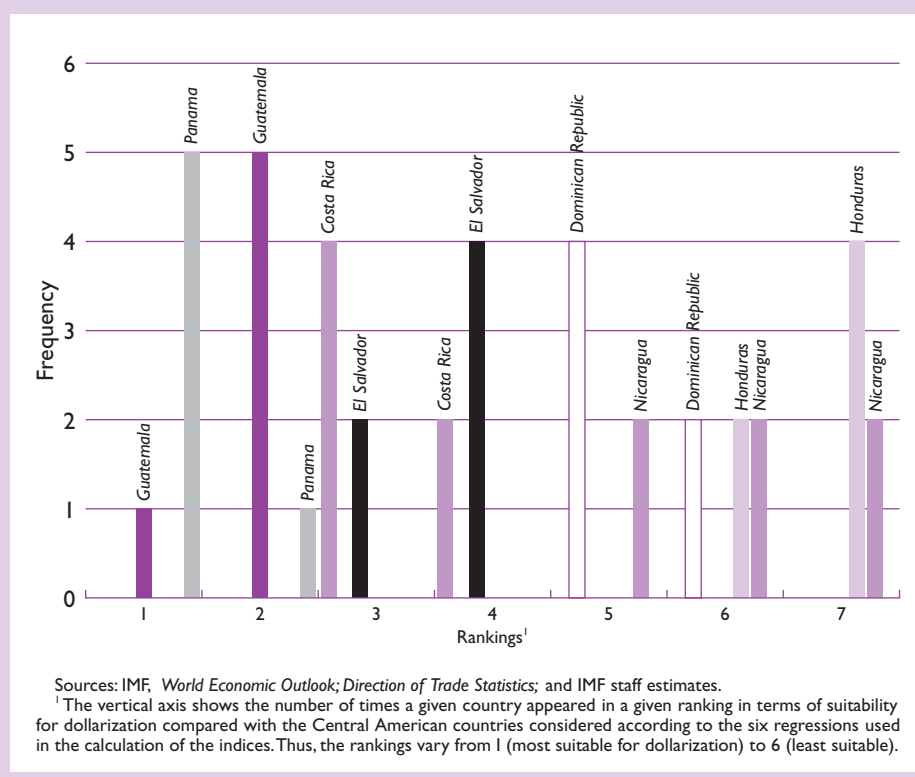
ization and hence the most suited to maintain a flexible exchange rate versus the U.S. dollar).

A comparison of Central America with European countries before EMU reveals that Central America is less suited for dollarization than was Europe for a currency area pegged to the Deutsche mark. To assess the absolute suitability of the Central American countries for dollarization, the indices for Central America vis-à-vis the United States calculated over the period 1994–2003 were compared with the indices for members of EMU vis-à-vis Germany in the 1970s, 1980s,

and 1990s.⁴⁰ On average, the estimated indices for Central America in 1994–2003 are higher than those estimated for European countries in all three decades, indicating that the European countries were more suitable for a currency area with Germany than the Central American countries were for dollarization in 2003 (see Figure 5.4 and Table 5.A9 in the Appendix).

⁴⁰The indices for Europe did not show a monotonic convergence over the three periods considered.

Figure 5.3. Comparison of OCA Indices vis-à-vis the United States, 1994–2003



None of the Central American countries has indices comparable to the European countries most suited for a currency union with Germany, such as the Netherlands, Austria, and France. However, some Central American countries have levels of the indices that are comparable to those of the European countries that appeared less suited for EMU, such as Greece, Ireland, Portugal, and Spain, in the 1980s and the 1990s. Considering the average of the indices among Central American countries and comparing them with the average of the indices among Western European countries, excluding Germany, the analysis shows that Central America is less suited to forming a currency union than Europe was in the 1990s. However, depending on the regression used to calculate the indices, the comparison with Europe in the 1980s provides mixed results.

CAFTA-DR and other regional initiatives are likely to make Central America relatively better suited for dollarization. The macroeconomic impact of CAFTA-DR was analyzed in Section II. The results presented in that section projected that trade and synchronicity in business cycles with the United States would increase significantly, thus potentially making the re-

gion more suitable for dollarization.⁴¹ On the basis of Section II's analysis and other assumptions (described in Box 5.3), the indices of the Central American countries are projected to decline, thus making these countries more suitable for dollarization (Table 5.A10). Nevertheless, on average, Central America would still remain less suitable for dollarization than the European countries were for a currency union with Germany in the 1970s, 1980s, and 1990s.⁴²

The results presented here should be interpreted with caution. The approach used can provide insights from a long-term perspective but might have some limitations in its application to developing countries. This exercise assumes that the determinants of exchange market pressure and exchange rate variability are the economic variables that have been considered

⁴¹Also, the variability of output in Central America is projected to decline, increasing the degree of co-movement with the United States. Dynamic effects of currency unions could also be considered, but given the uncertainty in the applicability of the empirical studies conducted so far for advanced economies to developing countries, this is not done here.

⁴²The averages presented in Table 5.A10 exclude Panama, as this country does not participate in CAFTA-DR.

Box 5.3. Projections for Indices of Central American Countries

An exercise was conducted to project the indices of the Central American countries for the period 2004–13, taking into account the possible impact of CAFTA-DR. This box describes how the projections for the independent variables were carried out.

As noted by Bayoumi and Eichengreen (1997), projecting optimum currency area indices from the estimated equations is difficult, given that the explanatory variables are standard deviations or averages taken over a decade. In fact, there are at most three nonoverlapping observations for each explanatory variable that can be obtained from the full sample used in this study. As a result of such data limitations and because of the structural breaks observed in many countries in the sample, a simple extrapolation using a deterministic time trend could be misleading in many cases. An exception is the *SIZE* variable, which has exhibited a relatively stable trend over the sample period, and hence was extrapolated using a linear time trend in the projections.

Given these limitations, a less ambitious approach was taken in this study with regard to the projections of the indices for Central America vis-à-vis the United States.

- First, for those explanatory variables for which little empirical or theoretical guidance is available for projections, their actual values over the period of 1994–2003 (the final 10-year period in the sample) were used as projected values. The variability of inflation and the terms of trade fall in this category.
- Second, the variability of relative output was projected by assuming the inception of CAFTA-DR in 2005 and using information taken from Mexico's post-NAFTA experience (see Section II). The standard deviation of each country's real GDP growth was scaled down by the same proportion as the percentage reduction in Mexico's output variability following the inception of NAFTA. Regarding co-

movements in output vis-à-vis the United States, two alternatives were considered for comparison by assuming either no change in output correlation after the inception of CAFTA-DR or an increase to a level comparable to that of post-NAFTA Mexico.¹

- Finally, the average trade ratio was projected using information taken from Hilaire and Yang (2003), whose simulation results indicate that trade volumes between CAFTA-DR countries and the United States could more than triple after the inception of CAFTA-DR. It is assumed that the trade-promoting impact of CAFTA-DR will occur at an equal and constant rate across all Central American countries, reaching its full effect in five years' time, and each country's GDP is assumed to grow at the same rate as its 10-year historical average. For comparison, an alternative was also considered under which the trade effect of CAFTA-DR progresses more slowly to reach its full effect after only 10 years.

Four sets of projections were carried out and for each of these all six regressions were used; the results are reported in Table 5.A10. The first set of projections assumes that the full effect on trade takes 10 years to materialize and assumes only a reduction in output volatility, with no increase in output correlations. The second set has the same assumptions as the first, but also assumes that output correlations with the United States become the same as Mexico's after NAFTA. The third and fourth sets are the same as the first and the second, respectively, but with the assumption that the full trade effect of CAFTA-DR materializes after five years.

¹The method used for the output variability of individual countries could not be applied to the correlation with the United States because of the initial correlation, which in some cases was negative, as well as the constraint of keeping the correlation in the interval $[-1, 1]$.

here as explanatory factors, that is, long-term structural factors. Although in the long run this is a sensible assumption, in the sample period under consideration several other factors (for example political developments and various obstacles to capital flows) could have contributed to exchange rate and exchange market pressure developments and might have persisted long enough to affect the results.

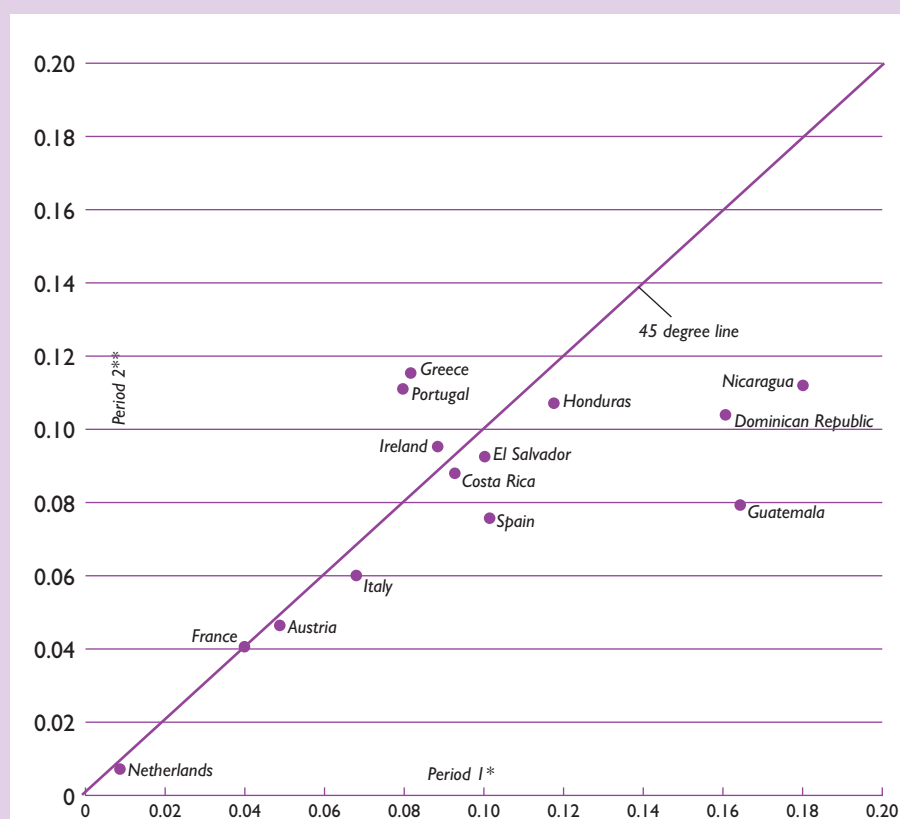
Conclusions

This section analyzed the relative suitability of the Central American countries for various types of exchange rate regimes by adopting a uniform methodology and a regional perspective. It does not recommend or endorse any change of regime; the goal is to

provide analytical background to countries' long-term considerations of their exchange rate regimes as they continue to integrate as a region and globally. Central America has made substantial strides in improving macroeconomic stability and economic integration over the past decade. CAFTA-DR and other regional initiatives are expected to further integration with the United States, and also within the region. These developments need to be taken into account in assessing the long-run exchange rate regime options available to the Central American countries.

The analysis suggests that if Central America were to choose to form a currency area, it would appear more desirable to peg the currency to the U.S. dollar or dollarize rather than adopt a common Central American currency that floats versus the U.S. dollar. This is because the economic links and

Figure 5.4. Central America and Europe: Optimum Currency Area Indices



Sources: IMF, *World Economic Outlook*; *Direction of Trade Statistics*; and IMF staff estimates.

*Period 1: 1984–93 for Central American countries; 1970–79 for Europe.

**Period 2: 1994–03 for Central American countries; 1980–89 for Europe.

Lower values of the index denote greater suitability for exchange rate fixity with Germany for European countries, and for dollarization for Central America. Points below the 45-degree line indicate greater suitability for these exchange rate arrangements in the latter period.

synchronization in business cycles existing at present and expected to result from CAFTA-DR are greater with the United States than within the region.

The suitability of Central America for dollarization has increased in the past decade but still falls short of that of European countries for a currency area with Germany. Given the increased synchronization in economic cycles, reduced inflation differentials, and rising trade flows, the Central American countries have become more suitable for dollar peg or dollarization between 1993 and 2003.⁴³ Despite these develop-

⁴³The relative suitability for dollarization of different countries does not always reflect these countries' present exchange rate regimes. For example, Guatemala, which has one of the most flexible regimes, appears to be one of the candidates most suited for dollarization. The countries that are relatively less suited for a currency area are Honduras and Nicaragua.

ments, the region still appears less suitable for a currency union than member countries of EMU were in the 1970s, 1980s, and 1990s, even taking into account the predicted effects of CAFTA-DR.

The relative suitability of the Central American countries for dollarization does not always reflect existing exchange rate arrangements. Panama is the most suited country for dollarization, and Guatemala follows. Costa Rica and El Salvador are next. The Dominican Republic, Honduras, and Nicaragua are the least suited for dollarization and hence the most suited for a flexible exchange rate versus the U.S. dollar.

If the Central American countries were to choose dollarization as their long-term objective, the prerequisites and convergence criteria should be considered carefully. This is particularly important in light of the

fact that fiscal discipline is key when adopting an inflexible exchange rate regime. Indeed, the Maastricht fiscal convergence criteria have been important milestones for EMU. In addition to fiscal discipline, several other structural and institutional reforms are also prerequisites for dollarization, in particular, reforms that increase the flexibility of factor markets and strengthen the financial sector. For economies already dollarized, the focus should be on policies that ensure adequate competitiveness and the sustainability of regimes, including through appropriate wage policies.

Shorter-term considerations regarding the choice of exchange rate regimes and country-specific circumstances may lead to conclusions that differ from those suggested in this section. Existing constraints may limit the choices of exchange rate regimes in the short run or simply make a different choice more desirable. Whatever the exchange rate regime chosen in the short run, consolidating prudent economic management, introducing the necessary structural reforms, and building institutions would ensure that policymakers have, in the longer run, the option to choose among the full range of possible exchange rate regimes.

Appendix. Technical Appendix

The Bayoumi and Eichengreen Optimum Currency Area Index

Bayoumi and Eichengreen developed a procedure to operationalize the optimum currency area theory. They have applied this approach to several parts of the world, but the paper taken as a specific reference in this section is the one that applies it to Western Europe (Bayoumi and Eichengreen, 1997).

Bayoumi and Eichengreen first estimated an equation that relates exchange rate variability to variables that are deemed to determine a country's suitability for participating in a currency area. They focused on the variability of nominal bilateral exchange rates, because a currency union would be equivalent to fixing the nominal exchange rates. The explanatory variables are a proxy for the synchronization of output movements, the extent of bilateral trade, the dissimilarity in the commodity composition of exports, and the size of the economies. Other variables that the optimum currency area literature has identified, such as factor mobility and automatic stabilizers, have not played an important role across national borders, and hence were not included in this specification.

The exact definitions of the variables employed by Bayoumi and Eichengreen are as follows. The dependent variable, $SD(E)$, is the standard deviation of the difference in the logs of the bilateral exchange rates over a given sample period. Hence, the higher this variable, the higher the exchange rate variability

between the currencies of the two countries and the less suitable they are for a currency union. The independent variables are the following:

$SD(Y)$, the standard deviation of the differences of the relative output of the two countries over a given sample period—the higher this variable, the less synchronized business cycles are.

$TRADE$, the mean of the bilateral exports to GDP over the given sample period—the higher this variable, the larger the extent of bilateral trade.

DIS , the sum of the absolute differences between the shares of five categories of export commodities in total exports in the two countries over a given sample period—the higher this variable, the larger the dissimilarity in the export composition.

$SIZE$, the mean of the logs of the GDP of the two countries in dollars, reflecting the countries' size.

This is a cross-section equation with as many observations as there are pairs of countries. The sample period determines over which time horizon the standard deviations and means are calculated.

The expected signs are all positive, except for that on bilateral trade. The higher the standard deviation of relative output movements, the greater the dissimilarity in the composition of trade; and the larger the size of the countries, the greater the expected exchange rate variability, and hence the less suited these countries are to forming a currency union. On the other hand, the trade variable is expected to have a negative sign, as the more countries trade with each other, the smaller the expected exchange rate variability.

The equation estimated by Bayoumi and Eichengreen is

$$SD(E_{ij}) = -0.09 + 1.46 SD(Y_{ij}) + 0.022 DIS_{ij} \\ (0.02) (0.21) (0.006) \\ - 0.054 TRADE_{ij} + 0.012 SIZE_{ij}, \\ (0.006) (0.001)$$

$$R^2 = 0.51, \text{ number of observations} = 210$$

where the subscripts ij denote the pair formed of countries i and j . Standard errors are reported in brackets.

Bayoumi and Eichengreen then used the estimated equation to predict the optimum currency area indices. The latter are the predicted value of the dependent variable (the standard deviation of the difference in the logs of the bilateral exchange rates) obtained by using a projected value of the explanatory variables, which are projected by extrapolating the trend. They calculated optimum currency area indices for 1987, 1991, and 1995, and reported those against Germany for 15 western European countries. Smaller values for this index denote greater suitability for a currency area.

Table 5.A1. Co-Movements in Output¹

	Central America and the United States ²									
	United States	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua	Panama		
United States	0.021	0.026	0.045 0.032	0.021 0.024	0.031 0.023	0.023 0.024	0.049 0.039	0.077 0.070		
Costa Rica		0.026	0.045 0.032	0.021 0.024	0.031 0.023	0.023 0.024	0.049 0.039	0.077 0.070		
Dominican Republic		0.035	0.028	0.050	0.040	0.035	0.056	0.089		
El Salvador		0.024	0.022	0.010	0.025	0.027	0.045	0.071		
Guatemala		0.022	0.022	0.032	0.027	0.022	0.045	0.073		
Honduras		0.043	0.035	0.032	0.027	0.022	0.047	0.076		
Nicaragua		0.029	0.023	0.018	0.015	0.035	0.047	0.076		
Panama		0.027	0.026	0.029	0.022	0.031	0.025	0.037		

	Europe ³														
	Germany	France	Italy	Spain	Portugal	Belgium	Luxembourg	Ireland	Netherlands	Austria	Finland	Greece	Denmark	Sweden	United Kingdom
Germany	0.035	0.011	0.020	0.029	0.025	0.018	0.017	0.031	0.015	0.019	0.027	0.030	0.012	0.029	0.016
France	0.042	0.014	0.020	0.021	0.028	0.013	0.016	0.029	0.007	0.016	0.025	0.034	0.019	0.025	0.019
Italy	0.031	0.013	0.017	0.033	0.030	0.020	0.019	0.033	0.020	0.025	0.033	0.049	0.027	0.032	0.027
Spain	0.052	0.023	0.024	0.023	0.037	0.022	0.030	0.035	0.022	0.026	0.031	0.041	0.030	0.033	0.028
Portugal	0.042	0.011	0.007	0.016	0.021	0.028	0.030	0.032	0.032	0.028	0.036	0.043	0.031	0.045	0.028
Belgium	0.037	0.024	0.026	0.022	0.033	0.024	0.011	0.035	0.011	0.021	0.027	0.039	0.022	0.027	0.025
Luxembourg	0.038	0.015	0.017	0.019	0.025	0.016	0.027	0.035	0.016	0.025	0.025	0.040	0.024	0.025	0.026
Ireland	0.030	0.016	0.015	0.015	0.031	0.016	0.021	0.018	0.034	0.036	0.042	0.050	0.038	0.048	0.031
Netherlands	0.039	0.011	0.016	0.017	0.025	0.017	0.021	0.018	0.018	0.018	0.028	0.037	0.021	0.024	0.023
Austria	0.042	0.009	0.010	0.016	0.021	0.008	0.029	0.015	0.016	0.012	0.026	0.041	0.023	0.030	0.029
Finland	0.040	0.019	0.017	0.025	0.034	0.015	0.022	0.021	0.018	0.022	0.019	0.039	0.032	0.018	0.029
Greece	0.035	0.025	0.025	0.028	0.044	0.028	0.034	0.032	0.024	0.023	0.026	0.028	0.029	0.040	0.028
Denmark	0.038	0.014	0.010	0.016	0.029	0.013	0.029	0.019	0.014	0.015	0.012	0.021	0.019	0.034	0.019
Sweden	0.025	0.022	0.025	0.016	0.037	0.027	0.030	0.031	0.020	0.024	0.026	0.031	0.021	0.022	0.032
United Kingdom															

Sources: IMF, *World Economic Outlook*; and IMF staff estimates.¹ The co-movements in output are measured as the standard deviation of the difference in the logarithm of the real output of two countries. Lower values indicate greater co-movement.² In the upper part of the matrix the period is 1984–93; in the lower part 1994–2003. Bold indicates that output co-movements increased in later period.³ In the upper part of the matrix the period is 1970–79; in the lower part 1980–89. Bold indicates that output co-movements increased in later period.

Table 5.A2. Source of Output Co-Movements

	Correlations of Output Growth							
	United States	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua	Panama
United States		0.230	0.125	0.327	-0.463	0.246	-0.284	-0.387
Costa Rica	0.599		0.699	0.363	0.425	0.405	0.380	0.069
Dominican Republic	0.533	0.114		-0.147	0.399	0.641	0.120	-0.224
El Salvador	0.311	0.409	0.154		0.104	0.048	0.015	-0.040
Guatemala	0.592	0.524	0.550	0.809		0.383	0.022	-0.106
Honduras	-0.184	-0.436	0.058	-0.226	-0.012		-0.103	-0.249
Nicaragua	0.523	0.153	0.522	0.429	0.547	-0.324		0.881
Panama	0.719	0.388	0.428	-0.067	0.327	0.132	0.244	

	Correlations of Output Growth After Eliminating the United States' Influence ¹						
	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua	Panama
Costa Rica		0.694	0.307	0.645	0.311	0.498	0.225
Dominican Republic	-0.149		-0.198	0.522	0.606	0.177	-0.162
El Salvador	0.292	0.003		0.294	-0.037	0.119	0.099
Guatemala	0.433	0.456	0.616		0.490	-0.067	-0.248
Honduras	-0.458	0.102	-0.188	-0.075		-0.064	-0.205
Nicaragua	0.066	0.449	0.289	0.637	-0.348		0.876
Panama	0.266	0.305	-0.200	0.517	0.023	0.431	

Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

Note: The upper part of each matrix reports correlations over the period 1984–93, while the lower part refers to the period 1994–2003.

¹To eliminate the United States' influence, the output growth series were first regressed over U.S. growth and the correlations taken on the residuals.

Table 5.A3. Terms of Trade¹

	1984–93	1994–2003		1970–79	1980–89
Central America	8.18	9.94	Europe	4.43	3.95
Costa Rica	7.37	0.32	Austria	1.67	2.35
Dominican Republic	14.29	2.72	Belgium	1.92	1.82
El Salvador	14.03	12.46	Finland	...	...
Guatemala	6.57	7.71	France	3.53	3.20
Honduras	4.86	8.25	Germany	3.11	4.13
Nicaragua	5.35	35.21	Greece	13.37	7.24
Panama	4.77	2.93	Ireland	6.14	2.41
			Italy	3.82	3.97
United States	1.83	1.48	Luxembourg	...	...
			Netherlands	1.53	1.66
			Portugal	4.14	7.72
			Spain	5.07	5.03

Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

¹Averages of absolute annual percentage changes in the terms of trade.

Table 5.A4. Co-Movements in the Terms of Trade¹

	Central America and the United States ²									
	United States	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua	Panama		
United States		0.026	0.045	0.021	0.031	0.023	0.049	0.077		
United States		0.090	0.179	0.172	0.074	0.096	0.067	0.058		
Costa Rica	0.019		0.199	0.128	0.053	0.130	0.125	0.084		
Dominican Republic	0.028	0.037		0.190	0.189	0.255	0.213	0.193		
El Salvador	0.176	0.182	0.168		0.117	0.219	0.204	0.151		
Guatemala	0.087	0.091	0.077	0.183		0.128	0.114	0.057		
Honduras	0.091	0.096	0.086	0.197	0.031	0.440	0.088	0.111		
Nicaragua	0.413	0.402	0.421	0.492	0.435	0.085				
Panama	0.039	0.036	0.046	0.191	0.086		0.406	0.085		

	Europe ³											
	Germany	France	Italy	Spain	Portugal	Belgium	Luxembourg	Ireland	Netherlands	Austria	Finland	Greece
Germany		0.033	0.032	0.062	0.072	0.048	...	0.078	0.036	0.035	...	0.188
France	0.030		0.047	0.055	0.069	0.050	...	0.070	0.046	0.047	...	0.196
Italy	0.031	0.031		0.053	0.081	0.056	...	0.080	0.045	0.053	...	0.186
Spain	0.038	0.040	0.036		0.083	0.070	...	0.071	0.064	0.075	...	0.182
Portugal	0.107	0.125	0.126	0.117		0.041	...	0.109	0.058	0.053	...	0.211
Belgium	0.049	0.047	0.052	0.065	0.101		...	0.089	0.022	0.024	...	0.195
Luxembourg	...	...	...	...	...	...	...	...	...	...	...	...
Ireland	0.044	0.034	0.051	0.056	0.119	0.039	...	...	0.081	0.088	...	0.178
Netherlands	0.058	0.044	0.058	0.072	0.122	0.028	...	0.035	0.031	0.024	...	0.185
Austria	0.057	0.046	0.053	0.064	0.126	0.038	...	0.035	0.031	0.128	...	0.187
Finland	0.152	0.135	0.147	0.163	0.220	0.140	...	0.135	0.117	0.128	...	...
Greece	0.091	0.100	0.095	0.109	0.100	0.076	...	0.107	0.097	0.108	0.185	...

Sources: IMF, World Economic Outlook; and IMF staff estimates.

¹The co-movements in terms of trade are measured as the standard deviation of the difference in the logarithm of the terms of trade of two countries. A lower number indicates greater co-movement.²In the upper part of the matrix the period is 1984–93; in the lower part 1994–2003. Bold indicates that terms of trade co-movements increased in later period.

Table 5.A5. Correlations of Terms of Trade

	Central America and the United States ¹											
	United States	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua	Panama				
United States												
Costa Rica	0.033			0.635	0.602	-0.464	-0.089	0.307				
Dominican Republic	0.615	-0.265	0.144	0.760	0.848	0.003	-0.157	0.549				
El Salvador	0.238	-0.570	0.406	0.481	0.210	-0.750	-0.287	0.059				
Guatemala	0.253	-0.314	0.536	0.207	0.887	-0.209	-0.143	0.692				
Honduras	0.312	-0.305	0.416	0.075	0.947	-0.154	-0.176	0.753				
Nicaragua	-0.590	-0.092	-0.512	-0.337	-0.278	-0.309	0.285	-0.174				
Panama	-0.014	-0.375	0.115	-0.269	0.287	0.450	-0.091	0.012				
	Europe ²											
	Germany	France	Italy	Spain	Portugal	Belgium	Luxembourg	Ireland	Netherlands	Austria	Finland	Greece
Germany												
France	0.871		0.820	0.669	-0.078	0.097	...	0.617	0.506	0.576	...	0.205
Italy	0.872	0.860	0.650	0.744	0.224	0.458	...	0.706	0.658	0.587	...	0.074
Spain	0.873	0.882	0.890	0.766	-0.053	0.248	...	0.562	0.651	0.327	...	0.254
Portugal	0.486	0.163	0.194	0.388	0.308	0.572	...	0.693	0.881	0.419	...	0.331
Belgium	0.645	0.422	0.544	0.602	0.867	0.704	...	0.052	0.047	0.267	...	-0.225
Luxembourg	...	...	...	...	...	...	...	0.423	0.562	0.525	...	-0.059
Ireland	0.706	0.760	0.537	...	...	...	...	...	...	...	...	...
Netherlands	0.296	0.561	0.313	0.753	0.235	0.220	...	...	0.815	0.507	...	0.388
Austria	0.376	0.480	0.476	0.398	0.115	0.271	...	0.341	0.342	0.342	...	0.395
Finland	-0.258	-0.076	-0.157	0.603	0.006	0.070	...	0.442	0.255	-0.028	...	0.282
Greece	0.378	0.155	0.304	-0.413	-0.522	-0.493	...	-0.348	0.482	-0.028	...	...
				0.197	0.602	0.770	...	-0.214	-0.050	-0.356	-0.554	...

Sources: IMF, *World Economic Outlook*; and IMF staff estimates.¹In the upper part of the matrix the period is 1984–93; in the lower part, 1994–2003. Bold indicates that terms of trade correlation increased in later period.²In the upper part of the matrix the period is 1970–79; in the lower part, 1980–89. Bold indicates that terms of trade correlation increased in later period.

Table 5.A6. Inflation Performance

	Average ¹		Coefficient of Variation	
	1984–93	1994–2003	1984–93	1994–2003
Central America	467.90	9.46		
Costa Rica	17.23	12.99	0.33	0.33
Dominican Republic	27.83	9.50	0.69	0.70
El Salvador	19.67	4.75	0.33	0.85
Guatemala	17.22	7.88	0.94	0.32
Honduras	10.79	15.66	0.94	0.48
Nicaragua	3,181.73	14.37	1.47	0.69
Panama	0.84	1.09	0.74	1.09
United States	3.80	2.45	0.32	0.27
	Average ¹		Coefficient of Variation	
	1970–79	1980–89	1970–79	1980–89
Europe	8.76	7.78	...	...
Austria	6.10	3.80	0.34	0.54
Belgium	7.13	4.90	0.47	0.59
Finland	10.41	7.28	0.26	0.45
France	8.92	7.34	0.55	0.41
Germany	4.88	2.75	0.56	1.59
Greece	7.13	12.30	0.21	0.17
Ireland	12.75	9.26	0.26	0.63
Italy	12.46	11.38	0.37	0.61
Luxembourg	7.00	4.72	0.80	1.32
Netherlands	7.07	2.84	0.50	1.21
Portugal	7.13	16.56	0.33	0.17
Spain	14.12	10.25	0.24	0.76

Sources: IMF, *World Economic Outlook*; and IMF staff estimates.

¹In percent, period average.

Table 5.A8. Optimum Currency Area Index: Regression Results

Dependent Variable	Regressor ¹						NOBS ³
	Constant	SD(Y)	SD(P)	SD(TOT)	TRADE	SIZE	
1. Exchange Market Pressure⁴							
(EMP)							
Regression (1)	0.106 ^{***}	1.072 ^{***}	0.558 ^{***}	0.028	-1.699 ^{***}	0.005 ^{***}	1,308
Regression (2)	0.137 ^{***}	0.635 ^{***}	0.609 ^{***}	-0.008	-1.988 ^{***}	0.001	1,308
Regression (3)	0.125 ^{***}	0.825 ^{***}	0.552 ^{***}	-0.020	-1.483 ^{***}	0.000	1,308
2. SD(EXR)⁵							
Regression (4)	-0.003	0.493 ^{***}	0.920 ^{***}	0.081 ^{***}	-1.355 ^{***}	0.007 ^{***}	1,308
Regression (5)	0.020	0.372 ^{***}	0.914 ^{***}	0.014	-1.824 ^{***}	0.006 ^{***}	1,308
Regression (6)	0.024	0.377 ^{***}	0.894 ^{***}	-0.029 [*]	-1.586 ^{***}	0.005 ^{***}	1,308

Sources: IMF, *World Economic Outlook, Direction of Trade Statistics*; and IMF staff estimates.

Note: One, two, and three asterisks indicate significance at 10, 5, and 1 percent, respectively.

¹For the definitions of regressors, see Box 5.1.

²All variables included in the regressions are calculated over the specified sample period.

³With 53 countries covered by the sample, there are 1,378 observations in total, out of which 1,308 observations are used in estimation after excluding missing values.

⁴EMP is defined as the average of standard deviations of percentage changes in bilateral exchange rate and foreign reserves.

⁵SD(EXR) refers to the standard deviation of percentage changes in bilateral exchange rate.

Table 5.A9. Optimum Currency Area Indices for Central America and Europe vis-à-vis Anchor Country

	Regression (1)		Regression (2)		Regression (3)		Regression (4)		Regression (5)		Regression (6)	
	1984-93	1994-2003	1984-93	1994-2003	1984-93	1994-2003	1984-93	1994-2003	1984-93	1994-2003	1984-93	1994-2003
1. Central America¹												
Costa Rica	0.176	0.169	0.174	0.169	0.162	0.157	0.083	0.075	0.092	0.088	0.088	0.086
Dominican Republic	0.235	0.180	0.225	0.179	0.212	0.167	0.158	0.092	0.160	0.104	0.152	0.101
El Salvador	0.179	0.171	0.177	0.169	0.163	0.155	0.094	0.086	0.100	0.093	0.093	0.086
Guatemala	0.226	0.157	0.224	0.158	0.209	0.144	0.155	0.069	0.164	0.079	0.159	0.075
Honduras	0.191	0.189	0.191	0.185	0.177	0.173	0.109	0.099	0.118	0.107	0.113	0.102
Nicaragua	0.324	0.184	0.328	0.181	0.306	0.163	0.300	0.114	0.307	0.112	0.299	0.099
Panama	0.213	0.157	0.190	0.158	0.188	0.145	0.084	0.060	0.089	0.073	0.087	0.071
Average	0.221	0.173	0.216	0.171	0.203	0.158	0.140	0.085	0.147	0.094	0.142	0.089
Average of own indices ²	0.229	0.162	0.236	0.168	0.224	0.159	0.161	0.070	0.167	0.074	0.162	0.070
2. EMU Countries^{1,3}												
France	0.119	0.136	0.110	0.122	0.109	0.127	0.039	0.045	0.040	0.041	0.043	0.048
Italy	0.145	0.156	0.136	0.130	0.134	0.139	0.066	0.062	0.068	0.060	0.070	0.063
Spain	0.183	0.167	0.171	0.157	0.166	0.150	0.094	0.068	0.102	0.076	0.098	0.074
Portugal	0.166	0.208	0.164	0.194	0.153	0.187	0.167	0.086	0.079	0.111	0.093	0.107
Ireland	0.177	0.186	0.199	0.174	0.164	0.171	0.079	0.086	0.088	0.095	0.085	0.093
Netherlands	0.096	0.105	0.138	0.085	0.091	0.096	0.122	0.013	0.040	0.007	0.034	0.013
Austria	0.138	0.148	0.147	0.133	0.128	0.134	0.131	0.042	0.046	0.046	0.050	0.048
Greece	0.173	0.201	0.191	0.165	0.155	0.182	0.171	0.078	0.110	0.091	0.098	0.111
Average	0.150	0.163	0.167	0.143	0.149	0.138	0.147	0.060	0.065	0.064	0.066	0.066
Average of own indices ²	0.170	0.167	0.150	0.166	0.157	0.140	0.070	0.079	0.078	0.088	0.075	0.085

Sources: IMF, *World Economic Outlook: Direction of Trade Statistics*; and IMF staff estimates.¹The United States is considered the anchor country for Central America, and Germany for Europe.²Average of optimum currency area indices constructed for pairs of countries, excluding United States for Central America and Germany for EMU countries.³Belgium, Finland, and Luxembourg are excluded because of missing values in trade related data.

Table 5.A10. Central America: Projections for the Optimum Currency Area Indices vis-à-vis the United States

	OCA Index						Difference Between Projected Index and Index in 1994–2003 ¹					
	1	2	3	4	5	6	1	2	3	4	5	6
Simulation 1												
Costa Rica	0.164	0.164	0.152	0.074	0.087	0.085	-0.005	-0.005	-0.005	-0.001	-0.001	-0.001
Dominican Republic	0.172	0.171	0.159	0.087	0.098	0.096	-0.009	-0.008	-0.007	-0.005	-0.005	-0.005
El Salvador	0.167	0.165	0.151	0.084	0.090	0.084	-0.004	-0.004	-0.004	-0.002	-0.002	-0.002
Guatemala	0.155	0.154	0.141	0.067	0.077	0.073	-0.003	-0.003	-0.003	-0.002	-0.002	-0.002
Honduras	0.180	0.177	0.166	0.093	0.101	0.097	-0.009	-0.008	-0.008	-0.005	-0.006	-0.006
Nicaragua	0.183	0.180	0.163	0.114	0.111	0.098	-0.001	-0.001	-0.001	0.000	-0.001	-0.001
Average	0.170	0.169	0.155	0.087	0.094	0.089	-0.005	-0.005	-0.005	-0.002	-0.003	-0.003
Simulation 2												
Costa Rica	0.161	0.162	0.149	0.072	0.085	0.083	-0.009	-0.007	-0.008	-0.003	-0.003	-0.003
Dominican Republic	0.167	0.168	0.155	0.085	0.097	0.095	-0.014	-0.011	-0.011	-0.007	-0.007	-0.007
El Salvador	0.160	0.161	0.146	0.081	0.088	0.081	-0.011	-0.008	-0.009	-0.005	-0.005	-0.005
Guatemala	0.152	0.153	0.139	0.066	0.076	0.072	-0.005	-0.005	-0.005	-0.003	-0.003	-0.003
Honduras	0.167	0.169	0.155	0.087	0.096	0.092	-0.022	-0.016	-0.018	-0.011	-0.011	-0.010
Nicaragua	0.179	0.177	0.159	0.111	0.109	0.096	-0.006	-0.004	-0.005	-0.003	-0.002	-0.002
Average	0.164	0.165	0.151	0.084	0.092	0.087	-0.011	-0.008	-0.009	-0.005	-0.005	-0.005
Simulation 3												
Costa Rica	0.163	0.163	0.151	0.072	0.085	0.083	-0.007	-0.006	-0.006	-0.003	-0.003	-0.003
Dominican Republic	0.169	0.169	0.157	0.085	0.096	0.094	-0.011	-0.010	-0.009	-0.007	-0.008	-0.007
El Salvador	0.166	0.164	0.150	0.082	0.088	0.082	-0.005	-0.005	-0.005	-0.003	-0.004	-0.004
Guatemala	0.153	0.153	0.140	0.066	0.075	0.071	-0.004	-0.005	-0.004	-0.003	-0.004	-0.004
Honduras	0.178	0.175	0.164	0.091	0.098	0.095	-0.011	-0.011	-0.010	-0.007	-0.009	-0.008
Nicaragua	0.183	0.180	0.163	0.113	0.110	0.098	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Average	0.168	0.167	0.154	0.085	0.092	0.087	-0.007	-0.006	-0.006	-0.004	-0.005	-0.004
Simulation 4												
Costa Rica	0.159	0.161	0.148	0.070	0.083	0.082	-0.011	-0.008	-0.009	-0.005	-0.005	-0.004
Dominican Republic	0.164	0.166	0.153	0.082	0.094	0.092	-0.016	-0.013	-0.013	-0.009	-0.010	-0.009
El Salvador	0.159	0.160	0.145	0.079	0.086	0.080	-0.012	-0.010	-0.010	-0.007	-0.007	-0.006
Guatemala	0.150	0.151	0.138	0.065	0.074	0.070	-0.007	-0.007	-0.006	-0.004	-0.005	-0.005
Honduras	0.164	0.167	0.154	0.085	0.094	0.090	-0.025	-0.019	-0.020	-0.013	-0.013	-0.012
Nicaragua	0.178	0.177	0.159	0.111	0.109	0.096	-0.006	-0.004	-0.005	-0.003	-0.003	-0.003
Average	0.162	0.164	0.149	0.082	0.090	0.085	-0.013	-0.010	-0.010	-0.007	-0.007	-0.007

Sources: IMF, *World Economic Outlook, Direction of Trade Statistics*; and IMF staff estimates.

Note: See Box 5.3 for a description of how the projections are calculated. 1–5 indicate regression numbers.

¹Negative values denote greater suitability for dollarization in projections than in indices for 1994–2003.

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