

This chapter contains two essays focusing on developing countries. The first deals with the determinants and the implications of inflows of workers' remittances, while the second essay examines the sources of output volatility in these economies. The topics covered are of particular interest in light of the significant magnitude and rapid growth in remittances, and given that the present, relatively benign global macroeconomic conditions provide a window of opportunity to address some of the policy-driven sources of output fluctuations.

The first essay points out that remittances to developing countries have grown steadily over the past 30 years, and currently amount to about \$100 billion a year. For many developing economies, remittances constitute the single largest source of foreign exchange, exceeding export revenues, foreign direct investment (FDI), and other private capital inflows. Moreover, remittances have proved remarkably resilient in the face of economic downturns. The essay finds that remittances can help improve a country's development prospects, maintain macroeconomic stability, mitigate the impact of adverse shocks, and reduce poverty. Remittances allow families to maintain or increase expenditure on basic consumption, housing, education, and small-business formation; they can also promote financial development in cash-based developing economies. The essay therefore argues that significant benefits might flow from measures to reduce the cost of sending remittances, for instance by removing barriers to entry and competition in the remittance market. The analysis also suggests that the potential negative impact on remittances provides further grounds to be wary of exchange rate and similar restrictions. On a cautionary note, remittance-service providers must be appro-

priately regulated to diminish the risk of money laundering or terrorist financing. However, regulatory frameworks must take into account, and where possible minimize, any adverse impact on the cost of sending remittances.

Volatility of output growth has negative effects on long-term growth, welfare, and income inequality, particularly in developing countries. The second essay observes that although output volatility has been on a downward trend in most emerging market and developing countries in recent years, it remains considerably higher than in industrial countries. Also, unlike in industrial countries, the lion's share of output volatility in emerging market and developing countries is driven by country-specific factors, underscoring the key role of domestic policies in reducing output volatility. Thus, the analysis suggests that while these countries have made important strides in strengthening macroeconomic and structural policies in recent years, more can and should be done to further reduce output volatility. A number of reform areas stand out as particularly important, particularly in sub-Saharan Africa and Latin America. These include improving the implementation of fiscal policy, making further progress in developing the financial sector, and carrying forward structural reforms to diversify the production base and reduce vulnerability to terms-of-trade shocks.

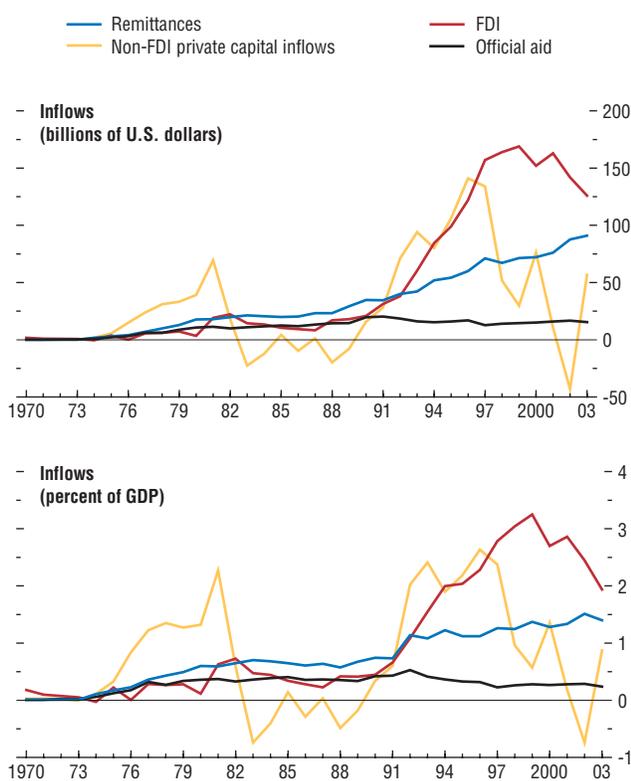
### Workers' Remittances and Economic Development

Flows of workers' remittances to developing countries have grown steadily over the past 30 years, and currently amount to about \$100 billion a year. This rising trend is likely to persist as population aging continues, and pressures for

Note: The main author of this essay is Nikola Spatafora, with support from Reena Aggarwal. Angela Cabugao provided research assistance.

**Figure 2.1. Workers' Remittances and Other Foreign Exchange Flows to Developing Countries<sup>1</sup>**  
(1970–2003)

Remittances to developing countries have been rising steadily over time. Currently, they are almost comparable to FDI, and exceed both non-FDI private capital inflows and official aid in magnitude.



Sources: IMF, *Balance of Payments Statistics Yearbook*; and IMF staff calculations.  
<sup>1</sup>For a detailed definition of the components of remittances, see Appendix 2.1.

migration from developing to advanced economies increase. For many developing economies, remittances constitute the single largest source of foreign exchange, exceeding export revenues, FDI, and other private capital inflows. Moreover, remittances have proved remarkably resilient in the face of economic downturns and crises.

As a result, interest in remittances and their impact is rapidly growing, whether in policy circles including the G-8, among the research community, or indeed among potential remittance-service providers. Remittances are increasingly viewed as a relatively attractive source of external finance for developing countries, one that can help foster development and smooth crises. At the same time there are concerns, chief among them that remittances can be abused to launder money and finance terrorism. Unfortunately, to date there has been little systematic cross-country research on remittances. Against this background, this essay documents some key characteristics of remittances, discusses the available evidence on their determinants and impact, and highlights some of the most salient opportunities and policy challenges, including how to encourage and regulate remittances.

Growing workers' remittances are just one of the many channels through which rising global migration flows may affect developing country welfare. On the positive side, migrants themselves often find better opportunities in their destination countries: they may also learn skills and gain experience that will prove valuable if they repatriate. Further, emigration may encourage the development of commercial networks, promote trade and investment flows, and lead to significant diaspora philanthropy. Set against this, "brain drain" and the loss of specialized human capital may hamper the development prospects of those left behind, for instance by affecting the tax base. A broad discussion of migration, however, would go well beyond the scope of this essay.

### Stylized Facts

Overall, workers' remittances constitute one of the largest sources of external finance for

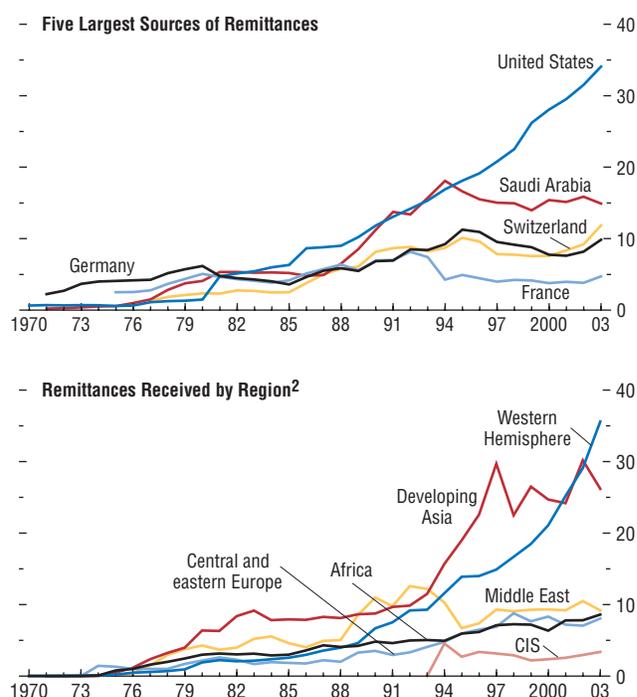
developing countries. Total remittance inflows grew five-fold between 1980 and 2003 to reach \$91 billion, or 1.6 percent of developing countries' GDP—an amount not far short of total inward FDI, and larger than all other private capital inflows (Figure 2.1).<sup>1</sup> These numbers, it should be noted, reflect official balance of payment statistics. As discussed in Appendix 2.1, there are severe problems with these data, which in particular are likely to exclude remittances occurring through informal channels (such as hawala, cash carried by friends and relatives, and in-kind remittances). As a result, actual remittances may be significantly underestimated.<sup>2</sup>

At a regional level, the Western Hemisphere and developing Asia in particular have experienced a major increase in remittance inflows, and currently account for the bulk of total remittance receipts (Figure 2.2). In absolute terms, the five single largest recipients of remittances during 1990–2003 were India, Mexico, the Philippines, Egypt, and Turkey (Figure 2.3). As a share of GDP, however, remittances are especially high among low-income, island, enclave, or generally small economies, such as Lesotho, Tonga, Samoa, Kiribati, and Cape Verde. In 24 countries, remittances during 1990–2003 amounted on average to more than 5 percent of GDP. In such countries, remittances are also very large relative to other sources of foreign exchange, such as aid or exports.

For remittance outflows, data are even patchier than for inflows. The main sources of recorded remittances are the United States, Saudi Arabia, Switzerland, Germany, and France (see Figure 2.2). Since the late 1990s, the United States has been by far the largest source of remit-

**Figure 2.2. Remittances: Sources and Destinations<sup>1</sup>**  
(Billions of U.S. dollars; 1970–2003)

The United States is currently by far the largest single source of remittances. On the receiving end, among developing countries, those in the Western Hemisphere and developing Asia account for the bulk of remittance inflows.



Sources: IMF, *Balance of Payments Statistics Yearbook*; and IMF staff calculations.

<sup>1</sup> For a detailed definition of the components of remittances, see Appendix 2.1.

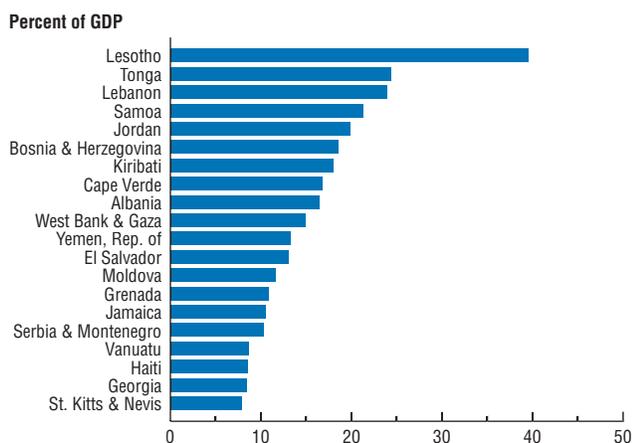
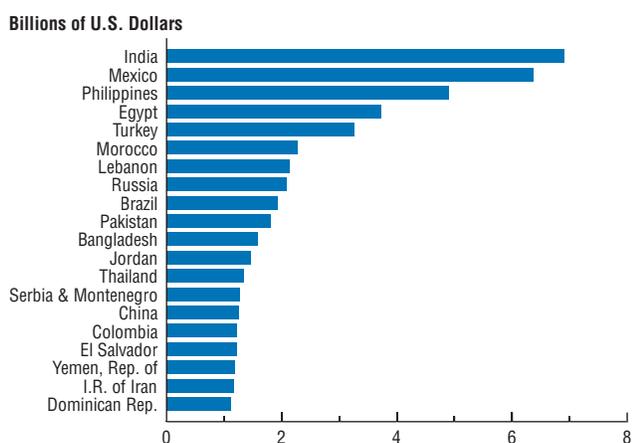
<sup>2</sup> Regional groups are based on the current IMF *World Economic Outlook* country groupings. Only developing countries are included.

<sup>1</sup>See also Ratha (2003) for an analysis of recent trends.

<sup>2</sup>However, over the past two decades, data collection practices appear to have improved. Further, there may have been some shift of remittances from informal to formal channels, reflecting both a general easing of exchange rate restrictions, and increased regulation, especially in the wake of the terrorist attacks of September 11, 2001. As a result, while the actual level of remittances is likely still underestimated, their growth rate may be overestimated.

**Figure 2.3. Developing Countries: 20 Largest Recipients of Remittances<sup>1</sup>**  
(1990–2003 average)

In absolute terms, India, Mexico, and the Philippines are the largest recipients of remittances. However, there are many small economies (typically small islands or enclaves) where remittances amount to 5 percent or more of GDP.



Sources: IMF, *Balance of Payments Statistics Yearbook*; and IMF staff calculations.

<sup>1</sup>For a detailed definition of the components of remittances, see Appendix 2.1. Data refer to the average gross remittances for all available years over the period 1990–2003.

tances, accounting for \$34 billion in 2003.

Remittances from Saudi Arabia reflect its sizable employment of Asian migrant workers ever since the first oil-price boom, but there has been no growth in remittances since the mid-1990s.

Remittances are a relatively stable source of external finance, not exhibiting the fluctuations often associated with private capital inflows. Throughout the 1980s and 1990s, remittance receipts stayed within a small range of 1–1.6 percent of developing countries’ GDP (see Figure 2.1). Non-FDI private capital inflows, exports, and even official aid and FDI all displayed greater volatility (Figure 2.4). In addition, remittances do not display the sharp procyclicality associated with non-FDI capital inflows; indeed, in many countries economic crises have been followed by sharp increases in remittances (e.g., Indonesia after 1997, Ecuador after 1999, and Argentina after 2001).

### Development Impact of Remittances

At a very broad level, remittances help loosen the budget constraints of their recipients, allowing them to increase consumption of both durables and nondurables. Remittances also allow for increased human capital accumulation (through both education and health care), and for increased physical and financial investments (for example, in residential real estate or in starting up small businesses). In turn, these increased expenditures could affect a broad range of development outcomes.<sup>3</sup> For instance, long-run output growth could accelerate as a result of the additional investments in physical and human capital. Such an outcome might be especially likely where a well-developed financial system and institutions allow remittances to be effectively intermediated and efficiently used. Potentially offsetting this, significant remittances could weaken recipients’ incentive to work (Chami, Fullenkamp, and Jahjah, 2003), or

<sup>3</sup>See Rapoport and Docquier (2005) for a fuller survey and discussion.

might lead to real exchange rate appreciation and a concomitant contraction of tradable sectors (the so-called Dutch disease).

Even where remittances only have a minimal growth effect, they could have a marked impact on welfare. To the extent that the poorer sections of society depend on remittances for their basic consumption needs, increased remittances would be associated with reductions in poverty, and possibly inequality.<sup>4</sup> Again, the relatively stable nature of remittances suggests that countries with access to significant remittance inflows may be less prone to damaging fluctuations, whether in output, consumption, or investment. In extreme cases, remittances might reduce the probability of financial crises. Such considerations are strengthened by the fact that remittances, unlike capital inflows, are unrequited transfers, which do not create future debt-servicing or other obligations.

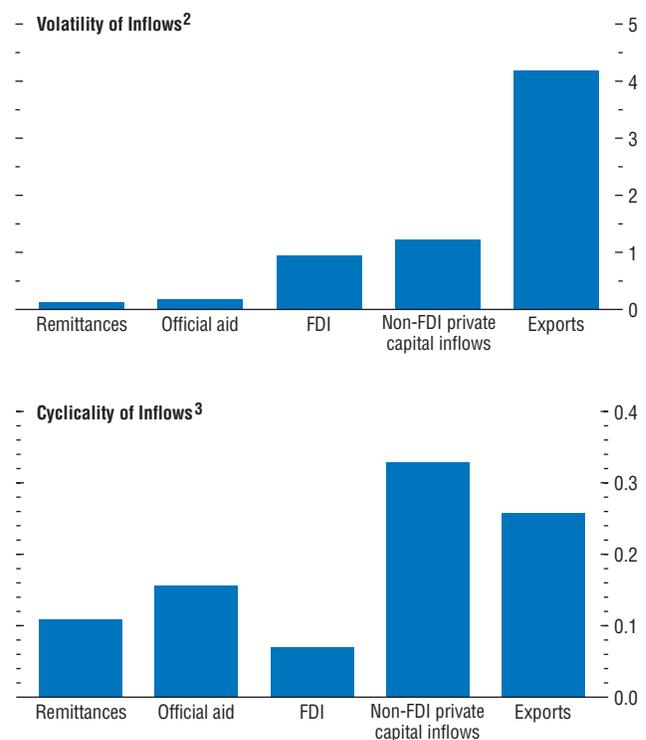
As a first step, these hypotheses are tested using data on a broad sample of up to 101 countries, over the period 1970–2003. The sample and data are described in detail in Appendix 2.1. Results are also presented separately for a subsample of up to 50 economies that are relatively more dependent on remittances (specifically, where the average ratio of remittances to GDP exceeds 1 percent). Box 2.1 analyzes in greater detail the impact of remittances, and more generally of emigration, in the Caribbean countries, a group of small economies characterized by very large remittance inflows.

One important analytical consideration is that remittances may both influence and themselves be influenced by the economic variables of interest, such as output growth. In those countries and in time periods where growth is relatively weak, remittances may increase both because emigration increases and because workers

<sup>4</sup>Set against this, poorer and lower-skilled households may benefit relatively little from remittances, both because they are less able to meet the costs associated with emigrating in the first place (Chiquiar and Hanson, 2005) and because immigration policy in advanced economies often favors skilled workers with a permanent occupation (Carling, 2004).

**Figure 2.4. Remittances and Other Foreign Exchange Flows: Volatility and Cyclical<sup>1</sup>**  
(1980–2003)

Remittances to developing countries, as compared with other forms of inflows, are very stable and display relatively little procyclicality. This makes them an attractive source of external finance.



Sources: IMF, *Balance of Payments Statistics Yearbook*; and IMF staff calculations.

<sup>1</sup>For a detailed definition of the components of remittances, see Appendix 2.1.

<sup>2</sup>Volatility is defined as the standard deviation of the ratio of the relevant inflow to GDP.

<sup>3</sup>Cyclicity is defined as the correlation between the detrended relevant inflow and detrended GDP.

### Box 2.1. Workers' Remittances and Emigration in the Caribbean

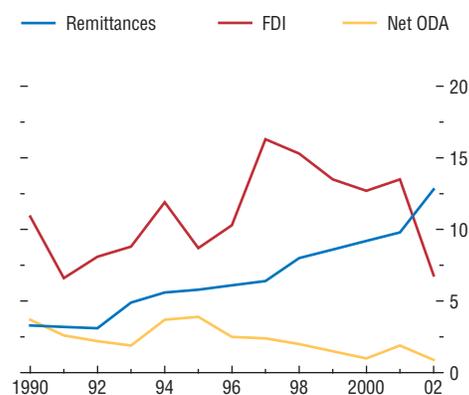
The Caribbean is the world's largest recipient of remittances, as a share of its GDP, and also has the highest emigration rate in the world, with evidence of massive brain drain.<sup>1</sup> The region therefore provides an excellent case study of the determinants and effects of remittances and emigration.

Over the past decade, remittance flows to the Caribbean region have steadily increased, while other sources of external funding have declined. As a result, remittances currently constitute the second largest source of external finance for the Caribbean, behind private capital flows. Between 1990 and 2002, remittances increased from 3 percent to 13 percent of the region's GDP (see the figure). In contrast, over the same period, foreign direct investment (FDI) declined from 11 percent to 7 percent, while official development assistance (ODA) decreased from 4 percent to 1 percent of GDP. As of 2002, 8 Caribbean countries (Haiti, Dominica, the Dominican Republic, Grenada, Guyana, Jamaica, St. Kitts and Nevis, and St. Vincent and the Grenadines) ranked among the world's top 30 recipients of remittances, relative to GDP.

Remittances to the Caribbean are an important source of finance for private investment. Mishra (2005b) uses data from 1980–2002 for 13 Caribbean countries to analyze the macroeconomic impact of remittances. The estimates (based on a panel-data regression model that allows for country- and year-specific fixed effects) show that remittances have a statistically and economically significant impact on private investment. A 1 percentage point increase in remittance inflows increases private investment by 0.6 percentage point (all measured relative to GDP). This result is striking, given the common perception that remittances are used largely for

#### Remittances, FDI, and ODA to the Caribbean<sup>1</sup>

(1990–2002; percent of GDP)



Sources: IMF, *Balance of Payments Statistics Yearbook* (BOP); World Bank, *World Development Indicators*; OECD; country authorities; and IMF staff calculations.

<sup>1</sup>Remittances are calculated as the sum of the following items from the BOP: workers' remittances, compensation of employees, and migrants' transfers. FDI is in terms of gross inflows.

consumption purposes. It is, however, consistent with the micro-level studies discussed in the main text, which show that remittances have a strong impact on investment in real estate, small enterprises, and agriculture.

There is also evidence that, in countries with larger remittances, real private consumption is less volatile. Micro-level studies, again discussed in the main text, indicate that remittances act as insurance, increasing significantly in response to adverse shocks (the Caribbean region is one of the most vulnerable regions in the world to natural disasters; see Rasmussen, 2004). So far, few studies have confirmed this insurance hypothesis at the macroeconomic level. However, Mishra (2005b) finds that remittances to the Caribbean do increase after a negative output shock, although with a lag. A 1 percent decrease in real GDP is associated with an increase in remittances of about 3 percent after a two-year lag.

Note: The author of this box is Prachi Mishra. The data quoted in this box are largely drawn from Mishra (2005a).

<sup>1</sup>The Caribbean region includes Antigua and Barbuda, Barbados, Belize, Dominica, the Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

The magnitude of remittances to the Caribbean region is not surprising, given that the region has the highest emigration rates in the world: about 12 percent of its labor force has emigrated to OECD countries. The aggregate emigration rates, however, mask significant variation in the composition of emigrants by skill; in particular, the emigration rate is much higher among workers with more schooling. A majority of the Caribbean countries have lost more than half of their labor force in the tertiary education segment (with more than 12 years of schooling), and more than 30 percent of their labor force in the secondary education segment (9–12 years of schooling). The tertiary-educated labor force in Jamaica and Guyana decreased during 1970–2000 by 89 percent and 83 percent, respectively, owing to emigration to the OECD. In fact, almost all the Caribbean nations are among the top 20 countries in the world with the highest tertiary migration rates (Docquier and Marfouq, 2004; Mishra, 2005a). This likely reflects the combination of “pull” factors (higher wages abroad), “push” factors (limited domestic job opportunities for the highly educated), and low migration costs (not least because of the geographical proximity of the United States).

Mishra (2005a) finds that the costs of skilled-worker emigration are indeed significant. Calculations based on a labor demand-supply framework indicate that the changes in domestic labor supply and wages stemming from high-skill emigration lead to welfare losses for those workers and producers who stay in the country of origin. Adding to these losses are other costs to the economy, such as government expenditure on educating emigrants and the decline in productivity of those who stay behind. Set against this, of course, the migrants themselves experience large welfare increases.

There are two approaches the Caribbean countries could take with regard to migration and remittances: (1) introduce growth-enhancing reforms at home, thereby improving the investment climate and creating incentives that retain the highly skilled; and (2) seek to increase the

benefits of emigration by adopting a “diaspora approach.” This approach uses the diaspora to build networks for trade, tourism, and investment promotion; harnesses its knowledge, skills, and assets; and attracts increasingly efficient forms of remittances.

Highly skilled workers might be less likely to emigrate if the higher education system were reoriented toward providing skills demanded within the region, in particular by the service sectors that dominate these economies. Such reorientation could include, for example, the establishment of hotel management institutes designed to meet the needs of the tourism industry. Given the heavy subsidies to tertiary education, governments also need to design policies to ensure that migrants internalize the costs of their education.

There is also scope to increase the growth benefits from migration, for instance by encouraging remittances. As discussed in the main text, remittances can boost welfare and growth, including through their impact on physical and human capital investment. Using remittances to finance development presents both an opportunity and a challenge. On the one hand, remittances are large and increasing, whereas aid and FDI have been declining; this suggests that the importance of remittances as a source of investment financing can only increase. On the other hand, it is not straightforward to design policies to encourage remittances and to channel them toward productive uses. The evidence presented in this box suggests that remittances are already having an important positive impact on the Caribbean economies. It is important that governments continue to ensure a favorable climate for remittance flows, and where possible enhance it by reducing some of the barriers, such as high transaction costs and long delays in check clearance, that discourage remittances.<sup>2</sup>

<sup>2</sup>See Suki (2004) for an in-depth discussion, in the context of the Dominican Republic, of specific, micro-level reforms that governments could promote.

**Table 2.1. Regression Results: Impact of Workers' Remittances**

Dependent Variable	Impact of Workers' Remittances <sup>4</sup>	
	Full sample	Remittance-dependent <sup>5</sup>
Growth <sup>1</sup>		
Output growth	-0.30	-0.27
Education	-0.43	1.93
Investment	0.48	0.12
Poverty <sup>2</sup>		
Poverty headcount	<b>-0.02*</b>	<b>-0.02*</b>
Poverty gap	<b>-0.01*</b>	<b>-0.01*</b>
Volatility <sup>3</sup>		
Output volatility	<b>-0.29**</b>	<b>-0.17**</b>
Output worst drop	<b>-0.74**</b>	<b>-0.63**</b>
Consumption volatility	<b>-0.45**</b>	<b>-0.19*</b>
Investment volatility	<b>-1.31**</b>	0.01
Credit ratings	<b>0.22**</b>	<b>0.22**</b>

<sup>1</sup>"Output growth" is measured in real, per capita terms. "Education" is measured using the secondary enrollment rate. "Investment" is measured using the investment/GDP ratio.

<sup>2</sup>All poverty measures are consumption based where available and income based otherwise, and are in logs. The poverty headcount is defined as the share of the population below the poverty line. The poverty gap is defined as the average percentage amount by which the poor lie below the poverty line. The poverty line is defined as \$1.08 a day at 1993 international prices.

<sup>3</sup>All variables are measured in real, per capita terms. "Volatility" is defined as the standard deviation of the annual growth rate. "Worst drop" is defined as the largest annual percentage decrease.

<sup>4</sup>Workers' remittances are measured using the remittances/GDP ratio, except for the poverty regressions, where they are measured using logs of the remittances/GDP ratio. Coefficients are standardized: they indicate by how many standard deviations the dependent variable will change, if workers' remittances increase by one standard deviation. Bold-facing, followed by either \* or \*\*, denotes significance at the 10 percent or 5 percent level, respectively. See Appendix 2.1 for details of the additional control variables.

<sup>5</sup>"Remittance-dependent" economies are defined as those where the remittances/GDP ratio exceeds 1 percent.

already abroad increase their financial help to families back home. Such endogeneity would bias the results from any simple regression analysis. The essay tries to minimize this problem by employing instrumental variable techniques.<sup>5</sup> The main results of the analysis are as follows.

<sup>5</sup>As instruments for remittances, following Rajan and Subramanian (2005), we rely on two key geographic and cultural variables, which are both plausibly exogenous, and likely causally related to migration and hence to remittance flows. These variables are (1) the geographic distance between the country that is the recipient of remittances ("home country"), and the country that acts as host for the largest number of the source country's migrant workers ("host country"); and (2) the presence of a common language in home and host countries. Since these instruments do not allow for sufficient variation over time, it is impossible to estimate the impact of remittances using a panel specification.

<sup>6</sup>Faini (2002, 2004) finds a significant positive relationship between growth and remittances using cross-country data, but his results are not robust to alternative specifications. Chami, Fullenkamp, and Jahjah (2003) find a significant negative relationship between growth and remittances; however, the instruments they employ do not seem well placed to handle the endogeneity problem.

<sup>7</sup>Roughly the increase observed in Mexico during the past 25 years, and equal to one between-country standard deviation.

- Using a standard cross-country growth regression framework, there is no statistically significant direct link between real per capita *output growth* and remittances (Table 2.1).<sup>6</sup> Likewise, there is no significant relationship between remittances and some of the other variables, such as education levels and investment ratios, which are included as controls in the growth regression. Further, these results apply regardless of the level of financial development in the recipient economy. It has been argued that that the growth impact of remittances might be felt most strongly in certain sectors, including in particular residential real estate: migrants might be most willing to remit funds if these are used for purposes that reinforce their links to their home country (Bouhga-Hagbe, 2004). Indeed, there is some evidence that construction activity is correlated with remittance inflows, but the sample size here is very limited.
- Turning to the link between *poverty* and remittances, if remittances are used mainly to finance basic consumption, they may have an effect on poverty even though their growth impact may be minimal. The results indeed suggest a strong link between poverty, whether measured using the poverty headcount or the poverty gap, and remittances (see Table 2.1; Adams and Page, 2003, and Adams, 2004a, report similar results). The impact may seem to be economically small: on average, a 2½ percentage point increase in the remittances/GDP ratio<sup>7</sup> is associated with less than a ½ percentage point decrease in the share of people living in poverty. However, the analysis controls separately for the impact of average income and of inequality, as proxied by the

Gini coefficient, and these variables are themselves likely to be influenced by remittances.<sup>8</sup> As a result, the true impact of remittances on poverty may be substantially larger.

- As for the link between *volatility* and remittances, micro-level studies suggest that remittances play a critical role in reducing the vulnerability of individuals to shocks such as natural calamities or civil wars (Rapoport and Docquier, 2005). The results here indicate that the presence of remittances also reduces the volatility of aggregate output, consumption, and investment (Table 2.1).<sup>9</sup> Further, the impact is economically large: a 2½ percentage point increase in the remittances/GDP ratio is on average associated with a one-sixth decrease in output volatility. Of particular interest, an increase in remittances is associated with a reduction in the magnitude of the “worst drop” in output over the sample period, confirming that remittances may help dampen crises and recessions. Owing to data constraints, one cannot test the hypothesis that remittance inflows may help reduce the likelihood of balance of payments crises; however, remittances display a significant, positive association with credit ratings for sovereign debt. Overall, this provides strong evidence that remittance inflows help stabilize economic activity in recipient countries.

The impact of remittances, especially on output growth, may be hard to detect using macroeconomic data alone. First, as discussed, it is hard to disentangle the precise direction of the links, a problem that may not be fully solved by instrumental variable techniques. Further, some of the channels involved, such as those operating through human capital accumulation, may only be detectable over very long time periods. As a result, other studies that exploit household-level data, and usually draw on extensive surveys or on national censuses, may prove more convincing. Typically, these studies do find that households with access to remittances provide their children with significantly more education, engage in small-business formation on a greater scale, and accumulate more assets; further, the impact of remittances is especially large among poorer households, since these are subject to more severe credit constraints.<sup>10</sup> On the whole, there are good grounds to conclude that remittances may play an important role in fostering growth, although more research is needed to understand the precise channels through which this might occur.

Set against this, remittances, like any other foreign exchange inflow, may carry a potential for Dutch disease-type issues. They may, for instance, lead to real exchange rate appreciation and increases in property prices,<sup>11</sup> with

<sup>8</sup>Indeed, remittances must presumably influence poverty by changing either average income or inequality. Given that data on poverty, income, and remittances is measured relatively frequently, while data on inequality is only updated irregularly, the measured impact of remittances on poverty likely reflects some part of the effect that arises through the impact of remittances on inequality. See Adams and Page (2003) for more discussion.

<sup>9</sup>This chapter's other essay, “Output Volatility in Emerging Market and Developing Countries,” provides a fuller discussion of output volatility. Here, given the different focus, a slightly different definition of volatility is adopted. Also, with a smaller sample, a more parsimonious specification is employed for the regression equations.

<sup>10</sup>The positive impact of remittances is confirmed *inter alia* by Adams (2004b) for education and real estate investment in Guatemala; Woodruff and Zenteno (2004) and Massey and Parrado (1998) for entrepreneurship in Mexico; Yang (2004) for education and entrepreneurship in the Philippines; Cox Edwards and Ureta (2003) for education in El Salvador; Hanson and Woodruff (2003) for education in Mexico; Taylor, Rozelle, and deBrauw (2003) and Rozelle, Taylor, and deBrauw (1999) for crop yields in China; McCormick and Wahba (2001) for entrepreneurship in Egypt; Adams (1991, 1998) for real estate investment in Egypt and Pakistan; Brown (1994) for business investment in Tonga and Western Samoa; and Lucas (1987) for crop productivity and cattle accumulation in Southern Africa. Set against this, Ahlburg (1991) finds that remittances to Tonga and Western Samoa result mainly in higher consumption, and rarely fund productive investments. However, Durand, Parrado, and Massey (1996) find that in Mexico even remittance-financed consumption increases can exert substantial multiplier effects on output.

<sup>11</sup>For instance, Bourdet and Falck (2003) argue that increases in remittances account for most of Cape Verde's 14 percent real appreciation over the past decade. Similarly, in Armenia, remittance inflows have recently had an extraordinary effect on the local housing market, with apartment prices in central Yerevan now comparable to North American prices.

negative effects on those not fortunate enough to receive remittances. Nevertheless, and consistent with our analysis, Rajan and Subramanian (2005) find that remittances, unlike official aid or natural resource revenues, do not have systematic, adverse effects on a country's competitiveness, including in labor-intensive, low-skilled, and tradable sectors. Part of the explanation may be that, since remittances accrue to private agents rather than to governments, they do not carry the same potential for stimulating corruption or wasteful spending. Also, given the relative stability of remittances, they seem unlikely to cause the real exchange rate volatility, or to require the difficult adjustments in other tradable sectors, that are often associated with fluctuations in natural resource exports.

The analysis so far has focused on historical outcomes. Looking ahead, remittance flows could also be exploited to accelerate *financial development* in recipient countries. In particular, to the extent that recipients can be persuaded to turn their remittances into deposits with financial institutions, remittances have the potential to bring a larger share of the population into contact with the formal financial system, expanding the availability of credit and saving products such as education loans, mortgages, and savings accounts ("banking the unbanked"). In turn, financial development will itself have positive effects on growth and development, both directly and by encouraging a more effective utilization of remittances. In a related vein, those banks involved in channeling remittance payments are increasingly finding that remittance flows (and the fees they generate for financial institutions) can be effectively securitized, like other future-flow receivables (Ketkar and Ratha, 2001). For instance, since 1994 there have been almost 40 issues of remittance-backed bonds in Latin America, accounting for over \$5 billion. Such securitiza-

tion has been an attractive way for some developing country banks to achieve investment-grade ratings, significantly reducing their borrowing costs.

While remittances yield important economic benefits, there is also a risk that they could be used to facilitate *money laundering* and the financing of terrorism. These important concerns are examined in Box 2.2 (see also El-Qorchi, Maimbo, and Wilson, 2003), which in particular argues that informal remittance-service providers need to be brought into the formal arena through an appropriate regulatory framework. Regulations should be clear and simple, and should neither impede the flow of remittances nor drive remittance systems further underground.

### Determinants of Remittances

Given the broadly positive impact of workers' remittances on the economy, it is important to identify what factors may encourage remittances. The existing literature on the determinants of remittances is therefore briefly summarized. Since this literature is typically limited to one-country studies, with little comprehensive analysis, the essay then analyzes data on a broad sample of countries.

Remittances can be analyzed using two broad approaches: the "altruism" approach, and the "portfolio" approach.<sup>12</sup> The altruism approach is based on the economics of the family; remittances are driven by migrant workers' concern for the income and consumption needs of family members left in the home country. Under the portfolio approach, in contrast, migrant workers earn income, and must then allocate their savings between home country and host country assets. Here, remittances are fundamentally driven by an investment motive. Many studies combine the two approaches in their empirical analysis.

<sup>12</sup>See Rapoport and Docquier (2005), Gupta (2004), Chami, Fullenkamp, and Jahjah (2003), Jadhav (2003), El-Sakka and McNabb (1999), Taylor (1999), Poirine (1997), Elbadawi and Rocha (1992), Russell (1986), and Lucas and Stark (1985) for fuller surveys and analyses of the determinants of remittances.

## Box 2.2. Regulating Remittances

Remittance flows are an important source of financing for many countries. As discussed in the main text, a large proportion of remittances likely flow through informal remittance systems. The use of informal remittance-service providers may pose a particular risk of misuse for money laundering and financing of terrorism.<sup>1</sup> There is a need to deal with this risk by integrating informal remittance-service providers into the formal arena through a regulatory framework. Such a framework, however, must take into account, and where possible minimize, any adverse impact on the cost of sending remittances and on the cost of sending remittances and on the incentive to provide remittance services.

The regulatory framework, in both remitting and receiving countries, should focus on remittance-service providers that are not currently under any regulatory or prudential financial oversight, which includes compliance with Anti-Money Laundering and Combating Financing of Terrorism (AML/CFT) requirements. Banks and other financial institutions that conduct remittance operations but are already under the supervision of the relevant authorities, including for AML/CFT requirements would not need to be subject to this remittance regulatory framework.

For regulatory purposes, the Financial Action Task Force (FATF), the international standard setter advises in its Special Recommendation VI that countries should license or register money- or value-transfer providers, and that the latter should meet AML/CFT requirements. Countries will need to decide on a registration or licensing regime on the basis of domestic

circumstances and their accepted tradition for regulatory practices. FATF has recognized that government oversight should be flexible and commensurate with the risk of misuse.

Registration systems and licensing systems are alternative approaches to applying a regulatory framework to remittance-service providers, each consistent with FATF recommendations. Registration systems raise few barriers to participation in the financial system but require sufficient resources for ex post monitoring by the supervisors to ensure compliance with the supervisory and AML/CFT requirements, using the information acquired during the application process. Licensing systems filter participation at the application stage to ensure that the remittance-service providers are suitable; this can reduce the level of compliance oversight afterwards. Because licensing puts more of the emphasis on the application phase, the initial requirements can result in fewer providers signing up.

Remittance-service providers should be consulted before regulations and the associated requirements are issued. Remittance-service providers in general want to protect against flows from criminal proceeds, and even support adoption of a formal regulatory environment to avoid being associated with criminals who engage in money laundering or financing of terrorism activities. Consultation is also important when assessing whether a registration or licensing regime should be adopted, since it will allow the authorities to gauge whether informal providers will be amenable to participating in the selected framework. If there are preexisting remittance-service provider associations, this will make the authorities' task easier. If not, the authorities need to find different avenues for seeking the views of remitters to be regulated, including promoting the forming of associations and supporting self-regulation to ease providers into the formal system.

Requirements should be clear and simple, regardless of whether a registration or a licensing regime is adopted. This may include, depending on a country's choice of a registration or a licensing regime, an application process, the need for

Note: The main authors of this box are Chee Sung Lee and Maud Bökkerink.

<sup>1</sup>Kapur (2004) among others argues that “. . . remittances are an important mechanism to fund terrorism, civil wars, and liberation struggles. . . . In Somalia . . . a large portion of the remittances went to supply arms to the rural guerrillas who toppled the government in January 1991.” Other examples include support in Sweden for the Free Aceh Movement, in Canada for the Liberation Tigers of Tamil Eelam, and in the United Kingdom for the Kashmiri cause.

**Box 2.2 (concluded)**

background checks, onsite and offsite monitoring, and compliance programs.

- As most remittance-service providers are small businesses, application procedures should be clear-cut and simple. Authorities should require an annual renewal of the authorization granted, so that regulators have at least yearly contact with providers. The authorities should be in a position to determine the principal provider but special attention needs to be focused on providers who are agents, franchise outlets, or subsidiaries of larger providers with extensive networks.
- Owners and managers of remittance-service providers need to be identified and subjected to at least a background check. Countries that choose a licensing regime may need to carry out thorough fit-and-proper tests to keep persons with criminal records from owning or managing a money transfer office. Applicants involved in financial crimes or possessing a history of insolvency should not be granted authorization.
- Countries should have onsite inspections and offsite monitoring to ensure compliance with regulatory requirements. For this purpose, remittance-service providers could be required to report and submit selected financial data and other information. This may help improve information on financial flows and the regulators' understanding of the remittance business.
- Under current circumstances, one important remaining vulnerability concerns the settlement of balances because remittance-service providers may continue to use formal and informal arrangements for this purpose. This area is likely to remain opaque to supervisors, and further work on understanding settlements is needed.
- If a risk-based assessment determines that the remittance sector is vulnerable to abuse for money laundering and the financing of terrorism, all the remittance-service providers should put in place an AML/CFT compliance program.

AML/CFT requirements include the need for appropriate customer identification, record

keeping, and the reporting of suspicious transactions.

- Appropriate documentation to identify customers is a strict regulatory requirement for all financial sector activities, including remittance services. This requirement may pose difficulty for remittance-service providers' customers, who include undocumented or illegal migrant workers. Countries have addressed this difficulty in several ways. One practice is to set the cash threshold above which identification is needed at a level higher than average remittance amounts. Some countries allow the use of identification cards issued by a national consulate.
- Record keeping by remittance-service providers is essential and some countries have devised simple formats or provided software to assist providers. Guidelines are needed to ensure that transactions are transparent and traceable, to assist investigations when abuse is detected.
- The requirement for suspicious transaction reporting could pose difficulties for remittance-service providers. Awareness-raising, education, and training will be needed to improve the quality and number of suspicious transaction reporting.

Countries should impose sanctions for non-compliance with regulatory requirements. There are two levels of sanctions. First, the authorities must have the power to take actions against providers that choose not to register nor be licensed. Second, registered or licensed providers who do not comply with supervisory or AML/CFT requirements should be subject to sanctions similar to those imposed on other financial institutions, ranging from warnings and fines to revocation of permission to operate.

Some other important considerations for a regulatory framework are as follows.

- In developing countries, where beneficiaries are often in remote areas or otherwise have no access to banks and other financial institutions, customers may continue to rely mainly on informal remittance-service providers. In these countries, implementation of an effec-

tive regulatory framework will be especially difficult.

- Country authorities may employ consumer protection considerations to encourage customers to use registered or licensed providers. There are two main elements here. First, to deter fraudulent operations or scams, authorities should conduct awareness and education campaigns to inform consumers about choices, rights, and pitfalls when using the remittance system. The advantages of using a registered or licensed remittance-service provider compared with an informal one should be clearly presented. Second, authorities should ensure transparency of transaction fees and exchange rates.
- For a regulatory framework to be effective, supervisors must have the skills, capacity, and

resources to conduct oversight and enforcement. Further, if remittance-service providers are to be enticed to join the formal regulated system, the regulatory regime should not impose on them an excessive administrative and cost burden.

An effective regulatory framework for remittances will—especially in developing countries— increase the administrative burden on already stretched supervisory authorities. To the extent that the costs of financing the regulatory framework are entirely passed on to remittance-service providers, and thus to their users, this could contribute to the perseverance of the informal sector. The international community must therefore work with countries to help bring them into compliance with the international standards, especially by providing technical assistance.

At a broad level, remittance flows are clearly tied closely to migration patterns<sup>13</sup> (although a full joint analysis of remittances and migration is beyond the scope of this essay).<sup>14</sup> Drawing on the existing literature, the analysis here focuses on five broad groups of variables that could affect remittances (by changing either migrant stocks or the average remittances per migrant worker).

- *Economic activity in the migrant workers' host country.* Improved host country economic prospects increase migrants' employment chances and wages. This allows existing migrants to send more remittances, and may also encourage greater emigration from the home country, increasing future remittances.

Empirically, host country economic activity is measured using "world output,"<sup>15</sup> world oil prices are included as an additional control.

- *Economic activity in the migrant workers' home country.* Negative shocks to output, employment, and wages in the home country reduce the income of any family members left behind by the migrants. This may again encourage existing migrants to send more remittances, as well as push more people to emigrate. Home country economic activity is measured here using domestic GDP, lagged to minimize endogeneity problems.
- *Economic policies and institutions in the home country.* The presence of exchange rate restrictions and black market premia may discourage

<sup>13</sup>For a panel of 22 advanced economies during the period 1991–2000, remittance outflows are strongly and significantly correlated with the presence of foreign workers (after controlling for a time trend and country-specific fixed effects). A 2 percentage point (one within-group standard deviation) increase in the number of foreign workers as a share of the population is significantly associated with a ¼ percentage point (0.6 within-group standard deviation) increase in remittance outflows as a share of GDP. Likewise, Swamy (1981) reports a strong relationship between remittance inflows and the number of emigrants for Greece, Yugoslavia, and Turkey.

<sup>14</sup>Also, for many countries, data on the stock of migrant workers residing abroad, and their incomes, are very limited.

<sup>15</sup>Specifically, a weighted average of output in foreign countries, with weights equal to either (1) the share of migrant workers from the home country residing in each foreign country, where such data are available; or (2) the trade shares otherwise.

**Table 2.2. Regression Results: Determinants of Workers' Remittances<sup>1</sup>**

Explanatory Variables <sup>2</sup>	Models <sup>3</sup>		
	I	II	III
World output	1.44**	5.56**	1.47**
Home output	-2.52**	-3.20**	-2.11**
Dual exchange rates	-0.59**	...	-0.52**
Restrictions on foreign exchange deposits held abroad	...	-0.79**	...
Bank deposits to GDP	...	...	0.03

<sup>1</sup>Workers' remittances are measured using the remittances/GDP ratio.

<sup>2</sup>"World output" is the log of weighted average real GDP in partner countries with weights as described in the text. "Home output" is the log of lagged real GDP per capita (from the Penn World Tables). "Dual exchange rates" and "Restrictions on foreign exchange deposits held abroad" are indicators set equal to unity if such practices exist, and zero otherwise (from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*, 2003). Finally, "Bank deposits to GDP" are total demand, time, and saving deposits in deposit money banks as a share of GDP. Additional controls include political risk, and law and order (both from the International Country Risk Guide), the U.S. six-month LIBOR, world oil prices, country-specific fixed effects, and a time trend.

<sup>3</sup>Bold-facing, followed by either \* or \*\*, denotes significance at the 10 percent or 5 percent level, respectively.

migrants from sending remittances. In particular, it is likely to shift remittances away from formal channels, such as banks, toward informal and unrecorded channels; any remittances may also be kept in the form of foreign currency cash. Macroeconomic instability, as manifested in high inflation or real exchange rate overvaluation, may have similar effects. In contrast, greater financial sector development, by making remittances easier and cheaper to send and receive, may encourage remittances. Empirically, economic policies and institutions are measured here using an indicator of whether multiple exchange rate systems are present; an indicator of restrictions on holding foreign exchange deposits; black market premia; financial sector depth, as measured by the ratio of bank deposits, bank assets, or

stock market capitalization to GDP; and inflation.

- *General risks in the home country.* Political instability, or low levels of law and order, may discourage migrants from sending remittances, at least for investment purposes—for instance, because of the risk of expropriation or theft. Such risks are proxied here by the International Country Risk Guide measures of political risk and of law and order.
- *Investment opportunities.* Greater potential returns on host country assets as opposed to home country assets may encourage migrants to invest their savings in the host country, rather than sending them back as remittances. Investment opportunities on host country assets relative to home country assets are proxied here using the U.S. LIBOR.<sup>16</sup>

The analysis uses annual data on a panel of 87 countries during the period 1980–2003. The 1980s and the 1990s were also analyzed separately; since the results are similar to those for the full sample, they are not reported. The data are described in greater detail in Appendix 2.1. A panel regression is estimated, with workers' remittances as a share of recipient-country GDP as the dependent variable. Throughout, we control for country-specific fixed effects<sup>17</sup> and a time trend.

Overall, the regression results confirm that policies and regulations can play an important role in determining remittance inflows (Table 2.2). More specifically, world output has a statistically significant, positive impact on remittances: stronger economic activity in migrants' host countries increases the remittances sent to their home country.<sup>18</sup> Home country output has a significant negative impact on remittances, consis-

<sup>16</sup>For most developing countries, reliable measures of domestic rates of return are not available.

<sup>17</sup>These fixed effects may capture the impact on remittances of much of the cross-country variation in migration flows. However, their presence implies that we cannot estimate separately the impact of any largely time-invariant geographical, historical, or cultural factors affecting migration levels (such as geographical distance, or the presence of a common language, a shared border, or a single market between the host countries where migrants work and their home country).

<sup>18</sup>This suggests that, while remittances are typically relatively stable, they may nevertheless be subject to significant external shocks, especially where migrant workers are heavily concentrated in a single country and/or sector. In a dramatic illustration, the sharp drop in mining jobs in South Africa led to a collapse in remittances to Lesotho, from more than 50 percent of GDP in 1991–92 to less than 20 percent in 2003–04. In contrast, world oil prices have no significant effect on average remittances.

tent with the earlier finding that remittances help smooth fluctuations. The presence of multiple exchange rates also has a significant negative impact on remittances. Data on black market premia and on restrictions on holding foreign exchange deposits are only available for a limited number of countries, but within this subsample both variables likewise have a significant negative impact on remittances. Economically, the effects of policies and regulations are quite large: a full removal of all exchange rate distortions and restrictions is associated with an increase in remittances of 1–2 percentage points of GDP.<sup>19</sup> Financial development did not have a significant impact on remittances, nor did the broad measures of political risk or law and order.<sup>20</sup> Finally, relative investment opportunities, as proxied by the U.S. LIBOR, also had no significant effect on remittances; the fact that remittances are little affected by rate-of-return considerations may help explain their relative stability when compared with many types of capital flows.

It should be noted that remittance payments often incur significant transaction costs (involving both explicit fees and exchange rate spreads), and in some cases time delays. There are no systematic cross-country, time-series data on such costs (see Figure 2.5 for some estimates). However, the costs have drawn significant attention in the context of remittances from the United States to Latin America.<sup>21</sup> Overall, some key stylized facts and observations

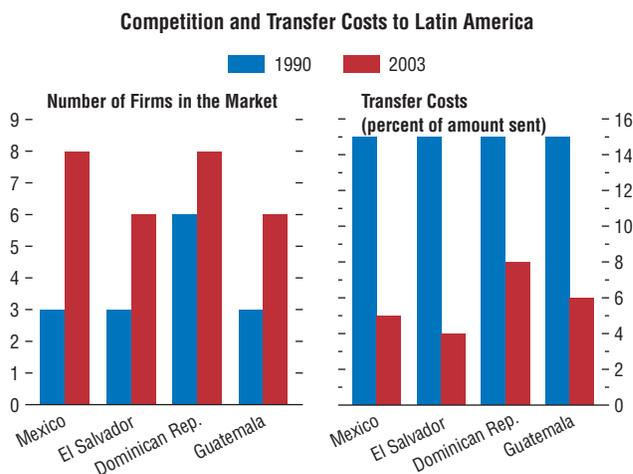
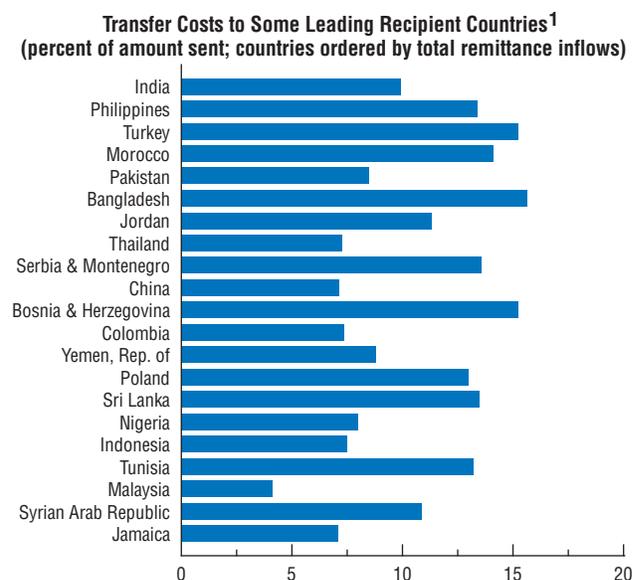
<sup>19</sup>Owing to a lack of systematic data, this essay does not analyze the role of the tax treatment of remittances. However, anecdotal evidence suggests that incentives such as tax exemptions or preferential credits for migrants may affect significantly the share of remittances sent through the banking system. For instance, in Tajikistan, eliminating the taxation of remittances led to an increase in recorded remittances from \$4 million in 2002Q1 to \$56 million in 2004Q1.

<sup>20</sup>Results are only shown for the ratio of bank deposits to GDP, but the conclusion holds regardless of the precise measure of financial development employed.

<sup>21</sup>For analyses of remittances to Latin America, see Amuedo-Dorantes, Bansak, and Pozo (2004), DeSipio (2000), Lindsay Lowell and de La Garza (2000, 2002), Meyers (1998), Orozco (2000, 2003, 2004a, 2004b), Suki (2004), Suro (2003), and Suro and others (2002).

**Figure 2.5. Cost of Sending \$200 in Remittances from the United States**

The cost of sending remittances displays significant variations across countries. Over the past 15 years, competition has increased and costs have been reduced—but in some cases remain very high.



Sources: Western Union; Women's World Banking; and IMF staff calculations.  
<sup>1</sup>The cost of sending remittances is calculated as the percentage difference, as of February 2005, between the value of \$200 in a country's local currency, converted using official exchange rates, and the actual payout from Western Union net of all service fees and exchange rate charges.

are as follows. First, transaction costs have declined significantly over the past few years, but often still amount to 5–10 percent or more of the sum remitted. Second, transaction costs display significant variation across countries. They seem to be especially low in some high-volume markets, such as remittances to Mexico; this may reflect greater intensity of competition among remittance-service providers, or the ability of such providers to spread fixed infrastructure costs over a larger volume of customers. Third, further reductions in transaction costs, even assuming no change in the volume of remittances sent, would automatically lead to increases in remittance receipts for developing countries. They could also encourage a shift in remittances away from informal, cash-based channels and toward formal channels.

### Conclusions and Policy Challenges

For many developing countries, remittances are a very large source of foreign exchange, and have proved far more stable and less procyclical than other such sources. Remittances can help improve a country's development prospects, maintain macroeconomic stability, mitigate the impact of adverse shocks, and reduce poverty. Remittances allow families to maintain or increase expenditure on basic consumption including food, on housing, education, and small-business formation; they can also promote financial development in cash-based developing economies.

To maximize the benefits from potential remittance flows, however, a number of key policy challenges need to be tackled.

- While the cost of sending remittances has declined in recent years, it remains very variable, and in several cases is still high. To the extent possible, efforts must be undertaken to reduce the cost of sending remittances, including by removing barriers to entry and competition in the remittance market. For instance, authorities could publicize information about available options for money transfers and the associated costs.
- Different macroeconomic and exchange rate policies may act to encourage or discourage remittances, and especially those flowing through the formal financial system. This potential impact must be taken into account by authorities, particularly in those countries where remittance inflows (actual or potential) are significant. For instance, the analysis provides additional grounds to be wary of exchange rate restrictions, such as restrictions on personal payments or the presence of multiple exchange rate systems. To some extent, unstable macroeconomic policies and exchange rate misalignments may also deter remittances.
- Remittance receipts could be leveraged by households to obtain better access to banking and financial services. Such an outcome would be more likely if formal financial intermediaries, including banks and microfinance institutions, entered the remittance market more actively. Again, governments may help here by reducing entry barriers.
- Remittance-service providers must be appropriately regulated and supervised to minimize the potential risk of money laundering, terrorist financing, or consumer fraud. However, regulatory frameworks must take into account, and where possible minimize, any adverse impact on the cost of sending remittances, and the incentive to provide remittance services.
- Better information is needed on the magnitudes and sources of remittances, including both inflows and outflows. Without such information, other challenges (such as regulating remittances, or developing new financial products to serve the needs of remittance senders and recipients) will remain extremely difficult.
- Remittances, like any other foreign exchange inflow, carry a potential for Dutch disease-type issues. In general, this does not appear to have had major adverse effects on economic performance. However, it does suggest that, in the presence of significant changes in remittance inflows, authorities may need to accept a greater degree of exchange rate flexibility than would otherwise be the case.

## Output Volatility in Emerging Market and Developing Countries

*The main author of this essay is Dalia Hakura with consultancy support from Christopher Otrok. Stephanie Denis provided research assistance.*

High output volatility can adversely affect economic growth, welfare, and poverty, particularly in developing countries (see Box 2.3). Although the volatility of output growth in emerging market and developing countries has declined over the past years, it remains differentiated between regions—it is much higher in sub-Saharan Africa than in Asia—and well above the levels in industrial countries, suggesting there is considerable scope to reduce it further (Figure 2.6). Understanding the determinants of output volatility in emerging market and developing countries could provide guidance on designing economic policies that would help in this task.

Against this background, this essay will examine key trends in the volatility of output growth in emerging market and developing countries and investigate the main drivers of these trends. In particular, it will address the following questions.

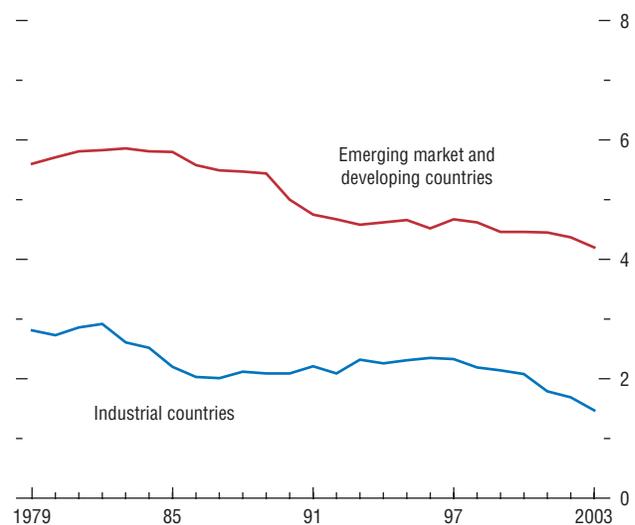
- To what extent has volatility declined across emerging market and developing country regions?
- To what extent are output fluctuations in emerging market and developing countries driven by global and regional economic events or by factors that are more specific to an individual country? Have the relative contributions of global and regional events become more important (for instance, as a result of increased trade and financial linkages between countries) and have these components of output volatility become more stable? Or have individual country factors become more stable, possibly as a result of stronger domestic economic policies and institutions?
- What policy and institutional variables are most important for explaining output volatility in emerging market and developing countries?

The essay uses a variety of new techniques to address the questions above. In addition,

**Figure 2.6. Volatility of Output Growth**

*(Rolling 10-year standard deviations of per capita real output growth rates; mean for each group)<sup>1</sup>*

The volatility of output growth in emerging market and developing countries, and industrial countries has declined markedly over the past decades, but it remains considerably higher in emerging market and developing countries.



Sources: Penn World Tables Version 6.1; and IMF staff calculations.

<sup>1</sup>Data for 1979 refers to the standard deviation of per capita growth rates for the period 1970–79. Data for 1980 does the same for the period 1971–80, etc.

### Box 2.3. Why Is Volatility Harmful?

Understanding the complex relationship between output volatility and long-term economic performance has been a challenge for economists. During the 1980s, the impact of volatility on economic growth and welfare was generally believed to be minor at most, and therefore not a major concern. Research in the 1990s reached a strikingly different conclusion—that output volatility may actually reduce long-term growth and could result in large welfare costs.<sup>1</sup> Moreover, the financial crises experienced by a number of emerging market and developing countries over the past two decades have highlighted the adverse impact of episodes of high volatility on income inequality and poverty. This box reviews some recent studies on the effects of output volatility on economic growth, welfare, and poverty.

#### Impact on Growth

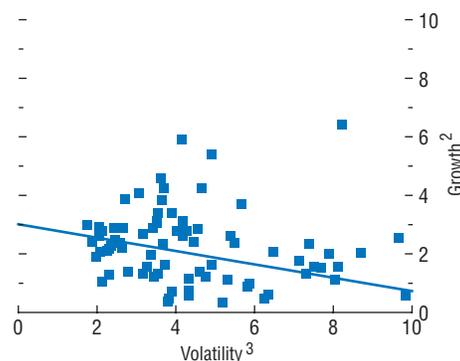
Output volatility could have negative effects on economic growth through several channels.<sup>2</sup> One of the key channels linking volatility to growth is investment. For example, increased uncertainty about future returns associated with output volatility could reduce growth by lowering investment. Market imperfections associated with credit constraints and/or imperfect access to world financial markets could also magnify the negative impact of short-term volatility on long-term growth in emerging market and developing countries because these types of market imperfections severely limit the scope of financing options for long-term investment projects (Aghion and others, 2004).

Note: The main author of this box is Ayhan Kose.

<sup>1</sup>For recent surveys of the literature, see Kose, Prasad, and Terrones (2005) and Aizenman and Pinto (2005).

<sup>2</sup>Economic theory does not provide clear guidance on the impact of volatility on growth. Indeed, some theoretical studies argue that volatility could have beneficial effects on economic growth (Blackburn, 1999; Imbs, 2004; and Tornell, Westermann, and Martinez, 2004). For example, some of these theories emphasize that since potential profits associated with highly volatile and riskier investment projects could be larger than less volatile ones, they could translate into higher growth rates.

#### Output Growth and Volatility, 1960–2000<sup>1</sup> (Percent)



Source: Kose, Prasad, and Terrones (2005).

<sup>1</sup>Figure includes 85 countries, of which 22 are industrial countries.

<sup>2</sup>Average annual growth rate of real per capita GDP over the period 1960–2000.

<sup>3</sup>Standard deviation of real per capita GDP growth over the period 1960–2000.

Several empirical studies, using different methodologies and data sets, find a negative relationship between output volatility and economic growth (see the figure).<sup>3</sup> Kose, Prasad, and Terrones (2005) document that countries subject to higher output volatility show worse growth performance on average than more stable ones. Moreover, the negative relationship between volatility and growth is significant in terms of economic magnitudes: a 1 percentage point increase in the standard deviation of output growth is associated with a 0.16 percentage point decline in the average growth rate of a developing country.

The empirical relationship between volatility and growth is affected by several factors, including a country's structural characteristics, and the nature and origin of volatility.

<sup>3</sup>See Ramey and Ramey (1995), IDB (1995), Martin and Rogers (2000), Fatás (2002), Hnatkovska and Loayza (2005), and Kose, Prasad, and Terrones (2005).

- Developing countries with weaker institutions and less developed financial markets suffer more from the adverse impact of volatility on growth. The degree of trade integration with the global economy also affects the nature of the relationship between volatility and growth. Economies that are more open to trade flows with a diversified export base have the ability to withstand higher levels of volatility with less adverse effects on growth.<sup>4</sup>
- The source of volatility also matters. For example, volatility associated with discretionary fiscal policy could distort savings and investment decisions with particularly adverse effects on economic growth (Fatás and Mihov, 2003).

#### *Impact on Welfare*

Output volatility could result in large welfare costs through its impact on the dynamics of consumption since an important determinant of economic welfare is the stability of people's consumption patterns (Wolf, 2005). Output volatility could lead to an increase in the amplitude of consumption fluctuations, which in turn reduces economic welfare. Recent research shows that the volatility of consumption over the business cycle is indeed associated with large welfare costs, up to 8 percent of lifetime consumption, in developed countries (Barlevy, 2004). Moreover, the welfare costs of output volatility are much larger in developing countries, where volatility of consumption is on average two to three times higher than that in developed countries. Pallage and Robe (2003) report that the welfare cost of volatility in low-income countries could be 10–30 times larger than the estimates for a typical developed economy. In addition to being subject to a variety of highly volatile exter-

<sup>4</sup>It should be noted, however, that trade openness that leads to more product specialization could increase volatility and hurt growth.

nal and domestic shocks, the lack of developed financial markets coupled with developing countries' limited access to international financial markets magnify the welfare costs of consumption volatility in these countries.

#### *Impact on Poverty*

Output volatility could have a negative impact on poverty because the poor have the least access to financial markets, making it difficult for them to diversify the risk associated with their income, which is often based on a narrow set of sources, that is, mainly labor earnings and government transfers. Moreover, since the poor rely heavily on various public services, including education and health, they are directly affected by changes in government spending. Given that fiscal policy is procyclical in most developing countries, this magnifies the negative impact of volatility on poverty especially during crises. In addition, the poor often lack necessary education and skills, limiting their ability to move across sectors to adjust to changes in economic conditions.

Recent empirical research finds that volatility has a significantly negative and causal impact on poverty (Laursen and Mahajan, 2005). The adverse effect of volatility appears to be more pronounced in low-income developing countries in the Middle East and North Africa and sub-Saharan Africa. In addition, there has been an increase in poverty, with a concomitant worsening of the income distribution, in emerging market countries during the periods of extreme volatility associated with financial crises.

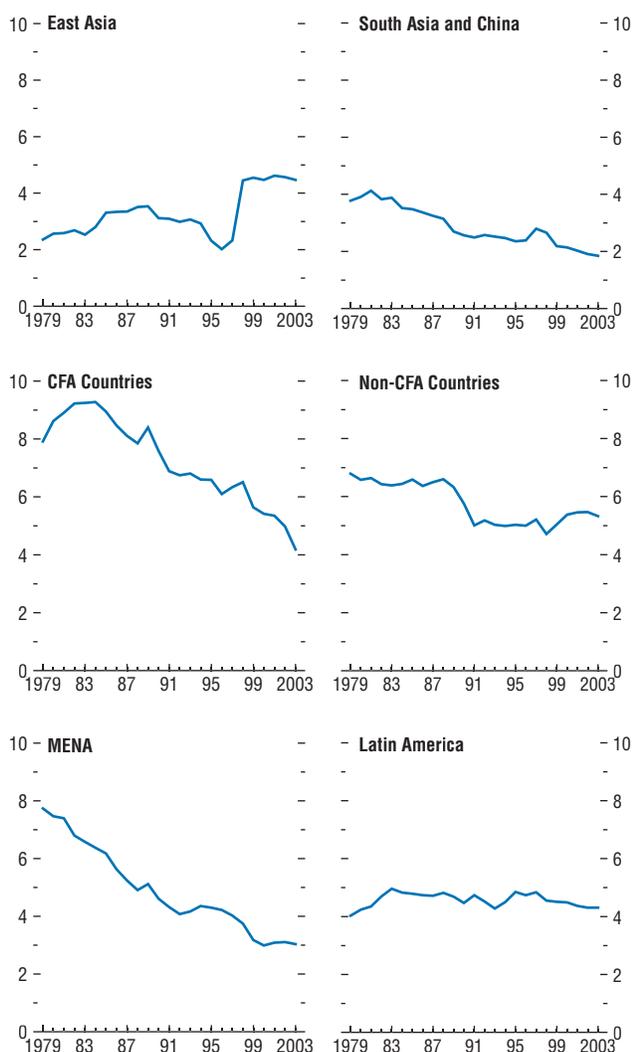
In sum, recent research demonstrates the harmful effects of volatility on economic growth, welfare, and poverty. These findings imply that stabilization policies aiming at reducing output volatility could have significant benefits in terms of improving long-term growth, increasing welfare, and reducing poverty in emerging market and developing countries.

the essay brings to the fore differences among emerging market and developing country regions in terms of both the factors

driving output volatility and the impact of improvements in policies and institutions on volatility.

**Figure 2.7. Volatility of Output Growth by Region**  
*(Rolling 10-year standard deviations of per capita real output growth rates; mean for each group)*

The volatility of output growth has declined in all regions, except for east Asia and Latin America.



Sources: Penn World Tables Version 6.1; and IMF staff calculations.

### Volatility: The Stylized Facts Across Emerging Market and Developing Country Regions

The volatility of output growth in emerging market and developing countries has declined over the past three decades. However, it remains considerably higher than in industrial countries. Moreover, the decline in volatility for all emerging market and developing countries taken together masks different trends among regions.<sup>22</sup> In particular, in south Asia and China, the Middle East and north Africa (MENA), and the CFA franc zone countries in sub-Saharan Africa, volatility has shown a sustained decline (Figure 2.7). In Latin America it has remained constant at a relatively high level, and in east Asia it has increased since 1997. Countries in Asia have, on average, had the lowest and countries in sub-Saharan Africa, the highest volatility of the various emerging market and developing country regions over the 1970–2003 period.

What explains these regional differences? To address this question, a dynamic factor model is estimated to decompose fluctuations in real per capita output growth. This technique identifies and estimates common movements or underlying forces (known as factors) that may be driving output fluctuations across countries (see Appendix 2.2 for further the details on the dynamic factor model). In particular, the dynamic factor model used in this essay decomposes output fluctuations into three factors:

<sup>22</sup>The essay groups emerging market and developing countries into regions primarily according to their geographic location: east Asia, south Asia and China, the Middle East and North Africa, Latin America, and sub-Saharan Africa. The latter region is further divided into CFA franc zone countries and non-CFA countries (see Appendix 2.2 for the countries included in each region). China is grouped with south Asia because its cycle moves more with south Asia than with east Asia. The results reported in the essay are, however, not sensitive to China's classification. Alternative country groupings were explored, including groupings based on the level of development and structure of production (e.g., emerging market economies, oil- and primary commodity-exporting countries) but these did not reveal regional cycles as pronounced as those captured here.

- an overall *global factor*, which captures events that affect real per capita output growth in all countries;
- a *regional factor*, which captures events that affect real per capita output growth in all countries in a particular region; and
- a *country-specific factor*, which captures events that specifically affect real per capita output growth in an individual country.

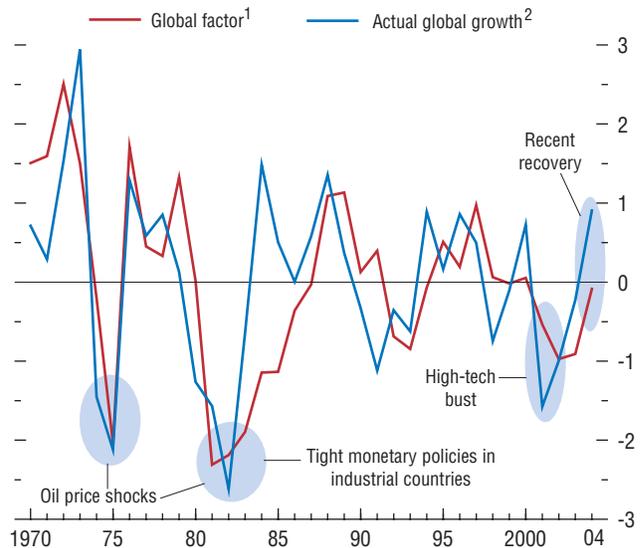
These factors capture movements in the underlying forces driving these economies (i.e., monetary and fiscal policy shocks, oil price shocks, productivity shocks, etc.), the relative importance of which changes over time and can vary across countries. For example, the co-movement across countries of variables affecting output growth, such as key international interest rates and oil prices, would be captured by the global factor. A shock that spills over from one country in a region to another owing to similarities in the quality of economic and political institutions or the stage of economic development would be captured by the regional factor. Changes in macroeconomic policy implementation or structural changes affecting output growth in a particular country would be captured by the country-specific factor.<sup>23</sup>

The estimate of the global factor picks up the key peaks and troughs in global GDP growth over the past 34 years, including the oil price shocks in the 1970s, the recessions in the early 1980s and 1990s, the high-tech investment bust in the early 2000s, and the recent global recovery (Figure 2.8). As is the case with actual global growth, the global factor is less volatile during the second half of the sample period.

The estimates of the regional factors also capture well-known cyclical fluctuations (Figure

**Figure 2.8. Global Factor and Actual Global Growth**  
(Annual percentage change; de-meaned)

The estimate of the global factor picks up the key peaks and troughs in global GDP growth over the past 34 years, including the oil price shocks in the 1970s, the recessions in the early 1980s, the high-tech investment bust, and the recent global recovery.



Sources: Penn World Tables Version 6.1; and IMF staff calculations.

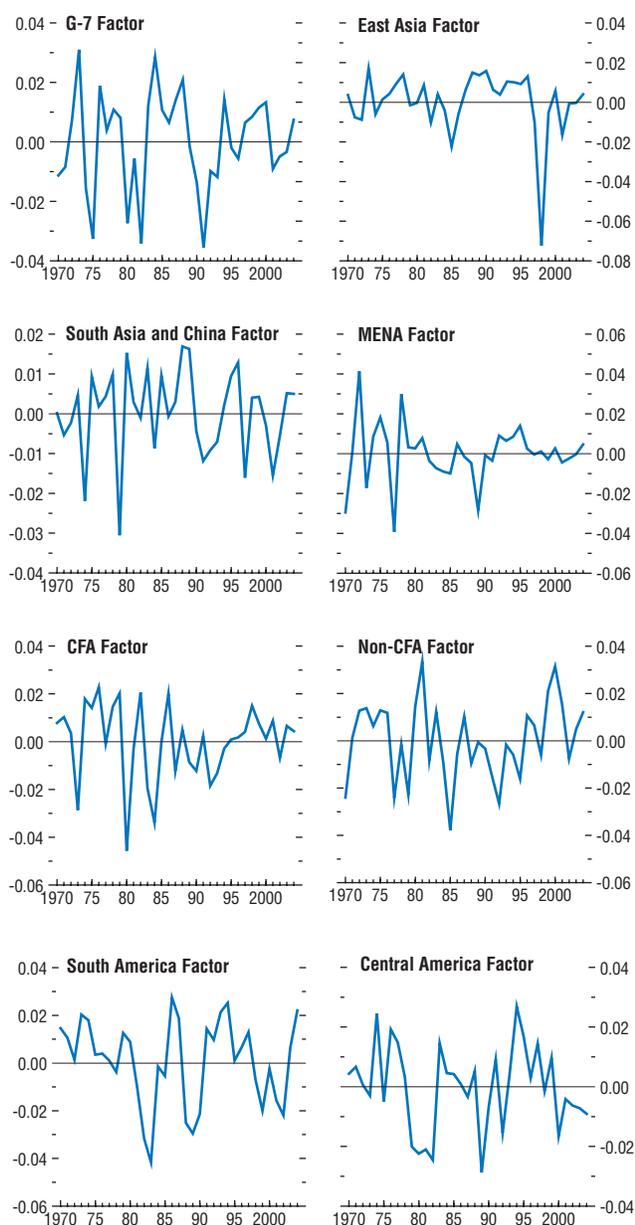
<sup>1</sup>See Appendix 2.2 for further details on the estimation of the global factor. The global factor has been rescaled to have the same variance as the actual global growth.

<sup>2</sup>Actual global growth represents the purchasing-power-parity-weighted real per capita GDP growth rates for all countries in the study.

<sup>23</sup>It should be noted that if a country is heavily dependent on a commodity, either as an exporter or an importer, an externally driven change in the price of that commodity could be captured by the country-specific factor if this commodity does not have a significant impact on the global or regional economies.

**Figure 2.9. Regional Factors<sup>1</sup>**  
(Annual percentage change; de-meanned)

The regional factors pick up well-known cyclical fluctuations, such as the 1997–98 crisis in east Asia, the debt crisis in the early 1980s in South America, and the recurrence of droughts and terms of trade shocks in the 1970s and early 1980s in CFA countries.



Sources: Penn World Tables Version 6.1; and IMF staff calculations.

<sup>1</sup>See Appendix 2.2 for further details on the estimation of the regional factors. An “other industrial countries factor” is also estimated but is not shown here.

2.9).<sup>24</sup> For example, the east Asia factor shows that the crisis in 1997–98 dominates the cycle in the region; the South America factor captures the debt crisis in the early 1980s and the problems of the late 1990s; and the CFA factor exhibits sharp swings in the 1970s and early 1980s, reflecting the recurrence of droughts and terms-of-trade shocks, but has been less volatile recently. Some of the other factors, on the other hand, exhibit no distinguishable regional cycles.

To investigate the importance of each of the three factors for explaining output volatility in each country, the share of the variance of real per capita output growth that is due to each is calculated. The results suggest that output fluctuations in emerging market and developing countries are driven more by country-specific factors than those in industrial countries (Figure 2.10). For example, the country-specific factor explains more than 60 percent of output volatility in about 90 percent of emerging market and developing countries, compared with only 40 percent of industrial countries. The global factor explains less than 10 percent of output fluctuations for more than 60 percent of the emerging market and developing countries, but between 10 and 20 percent of the output variation in nearly half the industrial countries.

An examination of the contributions of the factors to output volatility shows that in all the emerging market and developing country regions, except east Asia, at least 60 percent of output volatility is attributable to country-specific factors (Table 2.3). Also, unlike in industrial countries, in all emerging market and developing country regions the regional factor explains a greater fraction of volatility than the global factor. The contribution of the country-specific factor for explaining output fluctuations

<sup>24</sup>In addition to the regional groupings outlined earlier in the essay, for the purpose of estimation of the dynamic factor model Latin America is subdivided into Central America and the Caribbean, and South America, and the industrial countries are subdivided into G-7 and other industrial countries to capture differences in their regional cycles. Industrial countries were included in the sample to estimate the global factor properly.

**Table 2.3. Contributors to Volatility in Real per Capita Output Growth<sup>1</sup>**

(Averages for each group; percent)

	Global	Regional	Country
Sub-Saharan Africa			
CFA countries	5.7	18.2	76.1
Non-CFA countries	6.8	10.2	82.1
Middle East and North Africa	3.8	15.9	80.3
Latin America	12.6	13.7	73.7
South Asia and China	15.6	20.6	63.8
East Asia	11.0	41.8	47.2
East Asia (1970–96)	18.0	15.8	66.3
Emerging market and developing countries	9.3	16.9	73.8
Industrial countries	24.3	21.7	54.0

Source: IMF staff calculations.

<sup>1</sup>The table shows the fraction of the variance of output growth attributable to each factor.

in east Asia is about the same as for industrial countries, while the contribution of the regional factor is very large, largely reflecting the east Asian financial crisis, which resulted in large output losses simultaneously across the region. Indeed, estimating the model over the 1970–96 period suggests a more prominent role for the global factor and a less prominent role for the regional factor, making east Asia appear to share more of the attributes of industrial countries.

What accounts for the trend decline in output volatility in most of the emerging market and developing country regions? To address this question, the dynamic factor model is estimated over two periods: 1970–86 and 1987–2004.<sup>25</sup> The results suggest that the declines in output volatility in emerging market and developing country regions are mainly due to less volatile country-specific factors (Table 2.4).<sup>26</sup> In all regions except Latin America, at least 70 percent of the decline in the variance of output growth is

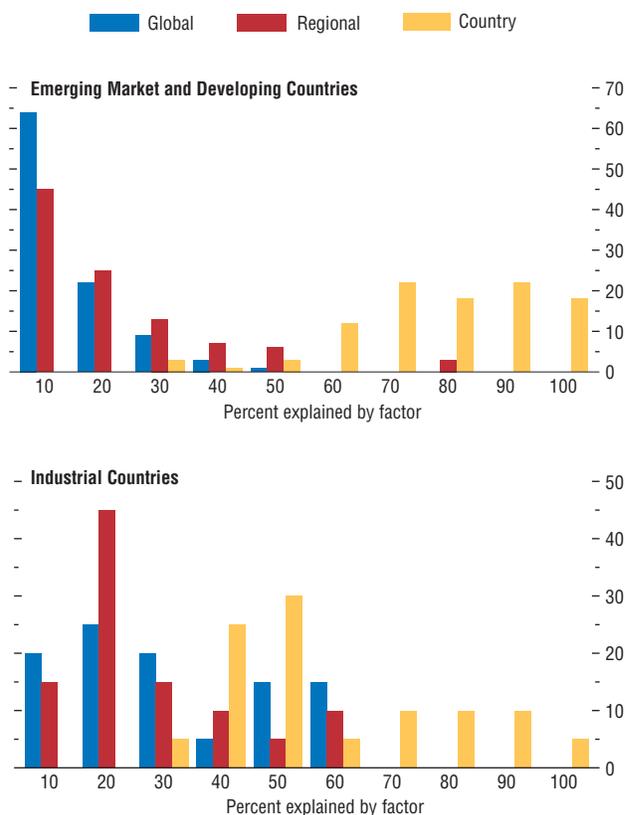
<sup>25</sup>These subperiods capture a break in output volatility (see Kose, Otrok, and Prasad, 2005).

<sup>26</sup>This table looks at countries where volatility has declined. It therefore differs from Figure 2.7, which shows average volatility for all countries in a region. This difference is particularly important for non-CFA countries, a number of which experienced large increases in volatility during the 1987–2004 period.

**Figure 2.10. Contributors to Volatility in Real per Capita Output Growth, 1970–2004<sup>1</sup>**

(Percent of countries on y-axis; x-axis as stated)

Output fluctuations in emerging market and developing countries are driven more by country-specific factors than in industrial countries. For example, the figure shows that the country-specific factor explains more than 60 percent of output volatility in about 90 percent of emerging market and developing countries, compared with only 40 percent of industrial countries.



Sources: Penn World Tables Version 6.1; and IMF staff calculations.

<sup>1</sup>Twenty percent explained by a factor refers to countries for which between 10 and 20 percent of variations in output are explained by the factor; 30 percent refers to countries for which between 20 and 30 percent of variations are explained by the factor, and so on.

**Table 2.4. What Explains the Declines in Output Volatility Between 1970–86 and 1987–2004?<sup>1</sup>***(Averages for each group; percentage change)*

	Decline in Variance of Output Growth	Contribution of Factor to the Decline		
		Global	Regional	Country
Sub-Saharan Africa				
CFA countries	-40.0	-2.1	-5.8	-32.1
Non-CFA countries	-53.2	-6.9	-8.3	-38.0
Middle East and north Africa	-60.7	-0.5	-17.4	-42.7
Latin America	-12.1	-3.4	-2.8	-5.9
South Asia and China	-12.0	-0.9	-2.9	-8.2
Emerging market and developing countries	-34.2	-3.2	-6.8	-24.2
Industrial countries	-4.1	-1.1	-0.8	-2.3

Source: IMF staff calculations.

<sup>1</sup>Only countries that experienced a decline in volatility from the 1970–86 period to the 1987–2004 period are included in the calculations. For this reason, countries in east Asia are not included. The table shows the contribution of each factor to the decline in the variance of output growth from the 1970–86 period to the 1987–2004 period.

explained by the country-specific factor.<sup>27</sup> By contrast, for industrial countries, the corresponding share is about 50 percent.

### Cross-Section Analysis of Output Volatility

This section examines the determinants of output volatility for a cross-section of 51 emerging market and developing countries. Unlike earlier studies of output volatility, the dependent variable in the regression is the standard deviation of the country-specific component of real per capita GDP growth for the 1970–2003 period

as derived from the estimates of the dynamic factor model. This abstracts from the effects of global and regional shocks and permits a better understanding of the importance of various domestic policies and institutions for explaining output volatility.

The determinants of output volatility that are considered can be broadly grouped into four categories.<sup>28</sup>

- *Stability of macroeconomic policies.* Higher volatility of fiscal policy—measured as the standard deviation of cyclically adjusted government spending—increases output volatility (Fatás and Mihov, 2003).<sup>29</sup> Similarly, a loose monetary policy that results in high inflation creates uncertainty, adversely affects investment, and contributes to volatility (Acemoglu and others, 2003). The results from the regression estimation—reported in Table 2.5—suggest that a more volatile fiscal policy and higher inflation are associated with increases in volatility, but only the fiscal effect is found to be significant.<sup>30</sup>
- *Trade and financial integration.* Theory does not provide a clear guide as to the effects of trade and financial integration on output volatility. While trade openness can contribute to lower volatility if it leads to more intra-industry specialization across countries and a larger volume of trade in intermediate inputs, it can also make countries vulnerable to external shocks if it leads to greater product specialization or if the country has weak

<sup>27</sup>Notwithstanding the overall relatively small contribution of the global factor, it should be noted that for some countries the global factor loading has risen. In fact, the changes in the factor loadings suggest that sensitivity to the global factor increased on average for CFA, MENA, and industrial countries. For Latin America, however, the contribution of the global factor has declined. This most likely reflects the large role the global factor played in explaining Latin American output volatility in the 1970–86 period; because the Latin American debt crisis coincided with the recession in the G-7 countries, the model identifies it as being part of the global factor.

<sup>28</sup>Depending on data availability, commonly used proxies for these explanatory variables were used in the empirical analysis. Appendix 2.2 provides further details. An instrumental variables estimation technique was used to account for possible endogeneity of some of the explanatory variables.

<sup>29</sup>A number of studies have found fiscal policy to be procyclical in many emerging market and developing countries, with government spending increasing in upturns and commodity price booms and falling with weakening economic growth, declining revenues, and a tightening of financing conditions (Chapter III, *World Economic Outlook*, September 2003, and Kaminsky, Reinhart, and Végh, 2004). The measure of fiscal policy volatility here adjusts for changes in macroeconomic conditions, past government spending and a time trend.

<sup>30</sup>Aid inflows, which have been found to be more volatile than fiscal revenue and to be procyclical (Bulíř and Hamann, 2001) can also be a source of country-specific output volatility. The effect of the volatility of aid inflows may be captured by the fiscal variable; to the extent that swings in government spending reflect the timing of aid disbursements, donors could help by reducing the volatility of their development assistance.

institutions or a nondiversified structure of production (Kose, Prasad, and Terrones, 2003). Trade openness is found to be positively and significantly associated with country-specific volatility in the regression analysis, although increased openness between 1970–86 and 1987–2003 only had a limited impact on volatility for the majority of emerging market and developing countries. Moreover, trade openness has been found to have important growth-enhancing effects (Berg and Krueger, 2003), and recent work shows that countries that are more open to trade can tolerate higher volatility without hurting their long-term growth (Kose, Prasad, and Terrones, 2005). The impact of current and capital account restrictions on output volatility were also investigated, but no significant relationship was found.

- *Financial sector development.* The results indicate that countries with more developed financial sectors, measured here as a higher initial ratio of private sector credit to GDP, have significantly lower output volatility.<sup>31</sup> This is consistent with better-developed financial systems contributing to an easing of financing constraints on firms particularly during downturns, thereby smoothing output volatility (see, for example, Easterly, Islam, and Stiglitz, 2000, and Raddatz, 2003).
- *Quality of institutions.* Poor-quality institutions conspire to weaken policies and undercut economies’ resilience to exogenous shocks, thus increasing volatility and the risk of crises. In the analysis here, the institutional quality variable has the expected sign, but is not significant. This, however, does not mean that the quality of institutions is immaterial to volatility in emerging market and developing countries. Instrumental variables regressions

**Table 2.5. Volatility Regression Results<sup>1</sup>**

Explanatory Variables	
Volatility of fiscal policy <sup>2</sup>	<b>1.67</b>
Inflation rate <sup>3</sup>	0.002
Institutional quality <sup>4</sup>	-0.26
Trade to GDP	<b>0.04</b>
Current and capital account restrictions	2.64
Initial level of financial sector development <sup>5</sup>	<b>-9.05</b>
Terms-of-trade volatility	<b>0.62</b>
Terms-of-trade volatility interacted with	
exchange regime flexibility <sup>6</sup>	<b>-0.29</b>
Exchange regime flexibility <sup>6</sup>	2.25
Initial relative income <sup>7</sup>	-2.25
Tropical climate	-1.53
<i>R</i> <sup>2</sup>	0.44
Sargan test ( <i>p</i> -value) <sup>8</sup>	0.93
Number of observations	51

Source: IMF staff calculations.

<sup>1</sup>The dependent variable is the standard deviation of the country component of real per capita GDP growth for the 1970–2003 period. The regression is estimated using an instrumental variables estimation technique in which the endogenous variables in the regression are the institutional quality and trade openness variables. Following the April 2003 *World Economic Outlook*, the fraction of the population speaking one of the major languages of western Europe, the fraction of the population speaking English, and ethnolinguistic fractionalization are used to instrument for the institutional quality variable. The predicted trade shares computed as for Frankel and Romer (1999) are used to instrument for trade openness. Bold values signify statistical significance at the 5 percent level and bold italics signify significance at the 10 percent level.

<sup>2</sup>Volatility of fiscal policy is measured as the standard deviation of the cyclically adjusted government spending, following Fatás and Mihov (2003).

<sup>3</sup>Inflation is the average annual inflation rate over 1970–2003.

<sup>4</sup>The institutional quality variable is measured as the average of three indices reported in the *International Country Risk Guide*.

<sup>5</sup>Financial sector development is measured as the ratio of private sector credit to GDP in 1970.

<sup>6</sup>Exchange regime flexibility is measured by an index which takes higher values the longer the period of time a country has been under a more flexible regime over the 1970–2001 period.

<sup>7</sup>Initial relative income is the level of real per capita GDP relative to that in the United States in 1970.

<sup>8</sup>This is the *p*-value from a Sargan test of the validity of the instruments used in the regression.

show that better-quality institutions are associated with more advanced financial sector development and lower fiscal volatility, suggesting that it is through these variables that institutional quality affects volatility.<sup>32</sup> Further,

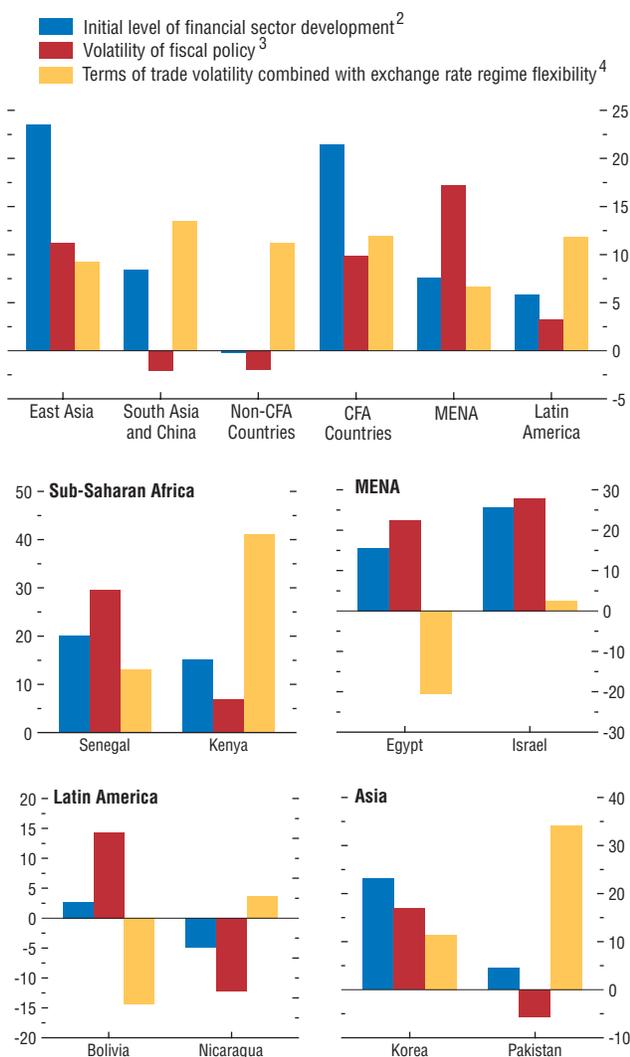
<sup>31</sup>The private credit to GDP series are all stationary around a linear trend, and therefore, the initial period values can be taken as exogenous. In addition, the results reported in the essay are robust to using the ratio of average private credit to GDP over 1970–2003 as the explanatory variable (instrumented using indicators for French or English legal origin and life expectancy).

<sup>32</sup>See Acemoglu and Johnson (2003) on the importance of property rights institutions for financial development, investment, and long-run economic growth, and Satyanath and Subramanian (2004) on the effects of democratic institutions on monetary policy and macroeconomic stability.

**Figure 2.11. Decompositions of Declines in Output Volatility Between 1970–86 and 1987–2003<sup>1</sup>**

(Percent of change in volatility explained; a positive percentage indicates a reduction in volatility)

Improvements in financial sector development, volatility of fiscal policy, terms of trade volatility, and flexibility of the exchange rate regime have been the main contributors to the trend declines in volatility in emerging market and developing countries, although the relative importance of these factors varies across countries and regions.



Sources: Beck, Demirgüç-Kunt, and Levine (1999); Fatás and Mihov (2003); Reinhart and Rogoff (2002); and IMF staff calculations.

<sup>1</sup>This figure shows the contribution of key variables to changes in the overall volatility of the country-specific components of output growth between the 1970–86 and 1987–2003 periods that can be explained by the cross-sectional regression estimates.

<sup>2</sup>Initial level of financial development is measured as the ratio of private sector credit to GDP in 1970 and 1987, respectively.

<sup>3</sup>Measured as the standard deviation of the cyclically adjusted government spending estimated for the 1960–86 and 1987–2000 periods, respectively (see Fatás and Mihov, 2003).

<sup>4</sup>Sum of the effects of changes in the terms of trade volatility and the interaction of the terms of trade volatility with exchange regime flexibility.

the April 2003 *World Economic Outlook* illustrates that sound macroeconomic policies, the quality of institutions, and output volatility are highly correlated.<sup>33</sup>

- *Other structural characteristics.* Terms-of-trade volatility is found to be associated with higher output volatility, although flexible exchange rates were found to have a dampening effect. While the exchange rate regime itself is not significant, the interaction of terms-of-trade volatility with a variable capturing the flexibility of the exchange rate regime during the sample period is negative and significant, confirming that the association between terms-of-trade shocks and output volatility is more pronounced under fixed than flexible exchange rate regimes (although, of course, fixed exchange rates may provide other benefits, including by fostering greater monetary and fiscal discipline).<sup>34</sup>

Improvements in key explanatory variables—financial sector development, volatility of fiscal policy, terms-of-trade volatility, and the flexibility of exchange rate regimes—have made an important contribution to the decline in volatility in many emerging market and developing countries. For the MENA countries, less volatile fiscal policy stands out as the key contributor to the decline in their output volatility between 1970–86 and 1987–2003, accounting for 17 percent of the overall decline in volatility (Figure

<sup>33</sup>Other studies, such as “Growth and Institutions,” Chapter III, *World Economic Outlook*, April 2003, which have found better-quality institutions to be associated with lower volatility in a cross-section regression, have typically included industrial countries in the sample.

<sup>34</sup>Other variables in the regression include the level of real per capita income relative to the United States—which controls for the possibility that richer countries have less volatility because they have been able to diversify their economic base—and a dummy variable for countries in tropical climates to capture their tendency to have lower and more volatile per capita output. These variables are, however, not found to be statistically significant. In addition, indicators of political stability and conflict as well as the share of agricultural output in GDP were included but were insignificant—possibly because they are highly correlated with other variables in the regression such as the quality of institutions—and were dropped from the final regression reported here.

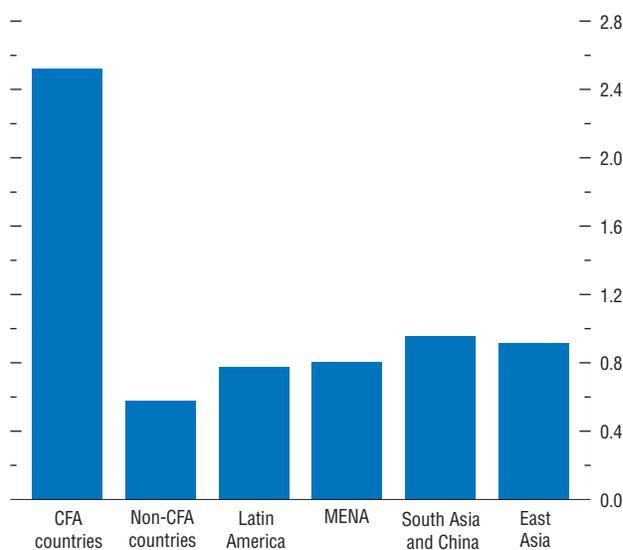
2.11).<sup>35</sup> For the CFA countries, the deepening of the financial sector accounts for as much as 21 percent of the overall decline in volatility. For south Asia and China and the non-CFA countries in sub-Saharan Africa, the main stabilizing factor appears to have been the reduction in the volatility of the terms of trade in combination with an increase in exchange rate flexibility. However, despite these improvements, terms-of-trade volatility remains a significant factor in the volatility of many countries in sub-Saharan Africa (Figure 2.12).

The key contributors to the decline in volatility in individual countries in each region are broadly consistent with those for the region as a whole. For example, in the case of Senegal, a reduction in the volatility of fiscal policy accounts for 30 percent of the decline in volatility, and financial sector development accounts for 20 percent of the decline. The findings are similar for Egypt and Israel, where reductions in the volatility of fiscal policy and developments in the financial sector account for between 40 and 50 percent of the changes in their volatility. For Kenya, on the other hand, the reduction in its terms-of-trade volatility combined with the increased flexibility of its exchange rate was the main factor contributing to lower volatility.

Many emerging market and developing country regions have made important progress in recent years in reducing economic volatility, yet much more can still be done. While efforts across a broad range of policy reforms will be necessary, the following stand out from the analysis as being particularly important. A more stable fiscal policy could play a significant role in reducing volatility in sub-Saharan Africa—a reduction in the volatility of cyclically adjusted government spending to the level in east Asia would reduce output volatility by 1.1 percentage points for countries in the CFA franc zone and by 0.9 percentage point for the non-CFA countries (Figure 2.13). This is equivalent to about 15 percent of the country-

**Figure 2.12. Response of the Volatility of Output Growth to a One-Standard-Deviation Increase in Terms-of-Trade Volatility**  
(Percent)

In part because of the inflexibility of their exchange rate regime, terms-of-trade shocks over the 1970–2003 period had the largest impact on output volatility in CFA franc zone countries.

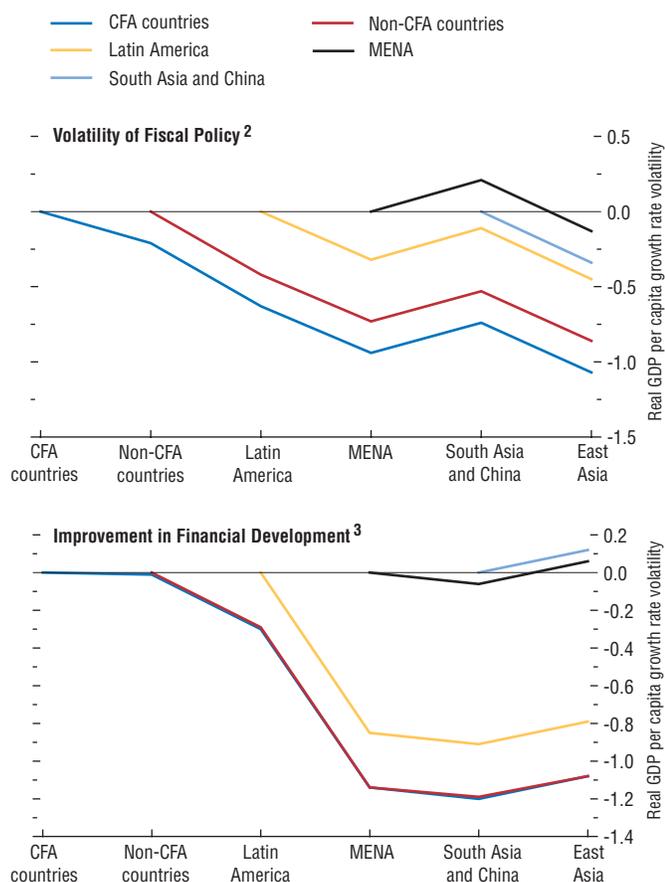


Source: IMF staff calculations.

<sup>35</sup>Percentages reported here refer to the contribution of a variable to the change in overall volatility that can be explained by the cross-sectional regression.

**Figure 2.13. Output Volatility and Improvements in Policies<sup>1</sup>**

Stability-oriented fiscal policies and improvements in the level of financial sector development would help to reduce volatility, particularly in sub-Saharan Africa and Latin America.



Source: IMF staff calculations.

<sup>1</sup>Figures show change in standard deviation of average annual real GDP per capita growth rate if a particular region improved its policies to match the quality of other regions.

<sup>2</sup>Measured as the standard deviation of the cyclically adjusted government spending estimated for the 1960–2000 period (see Fatás and Mihov, 2003).

<sup>3</sup>Measured by initial total private credit as a ratio of GDP (see Beck, Demirgüç-Kunt, and Levine, 1999).

specific output volatility. Countries in other regions (most notably in Latin America) also stand to gain from a more stable fiscal policy. Sub-Saharan African countries also would gain from further financial deepening. If they were able to raise the ratio of private sector credit to GDP to the average for the south Asia and China region, which has the highest initial level of financial sector development in the sample, output volatility in sub-Saharan Africa would fall by about 1.2 percentage points, or by about 20 percent of the country-specific output volatility.

### Conclusions and Policy Recommendations

Output volatility has negative effects on long-term economic growth, welfare, and income inequality, particularly in developing countries, and therefore reducing such volatility can make an important contribution to improving growth and welfare. Although output volatility has been on a downward trend in most emerging market and developing country regions over the past three decades, it remains higher than in industrial countries. The analysis in this essay has shown that much of the output volatility in emerging market and developing countries is driven by country-specific factors, underscoring the key role of domestic policies. Thus, while emerging market and developing countries have made important strides in strengthening macroeconomic and structural policies in recent years, further progress is still needed.

The present favorable global economic environment provides an opportune time to address the sources of output volatility in emerging market and developing countries. While reforms across a broad range of areas will be needed to reduce volatility and improve growth performance, the following stand out from the analysis in this essay as being particularly important.

- Fiscal policies have tended to reinforce output fluctuations and hence increase volatility, particularly in sub-Saharan Africa and Latin America. To contain the volatility of fiscal policies, greater expenditure restraint is needed during cyclical upturns to raise budgetary surpluses and reduce

debt. The strengthening of budgetary institutions would be helpful in this regard (see Chapter III, *World Economic Outlook*, September 2003, and Kaminsky, Reinhart, and Végh, 2004).

- The emerging market and developing country regions with the least developed financial sectors (sub-Saharan Africa and Latin America) have on average had higher output volatility. Progress in developing the financial sector, and ensuring that it is appropriately regulated and supervised, would help alleviate financing constraints, particularly during downturns, and thereby provide countries with additional scope to absorb shocks.
- Terms-of-trade volatility is associated with higher volatility of output growth. One way to reduce the incidence of terms-of-trade shocks is through structural reforms that promote diversification of the productive base, though this may also require a longer-term policy commitment. The essay also illustrates that exchange rate flexibility may cushion the impact of terms-of-trade shocks on output volatility.

## Appendix 2.1. Workers' Remittances and Economic Development: Sample Composition, Data Sources, and Methods

*The main author of this appendix is Angela Cabugao.*

This appendix provides further details on the data used in the first essay, and in particular discusses the time series employed to construct a measure of workers' remittances.

The analysis of the impact of remittances uses a panel of up to 101 economies, both advanced and developing, during the period 1970–2003.<sup>36</sup> The analysis of the determinants of remittances uses a panel of up to 92 developing economies during the period 1980–2003. Throughout the essay, regional classifications follow the current WEO groupings.

<sup>36</sup>The growth, poverty, and volatility regressions use, respectively, 101, 90, and 58 countries.

<sup>37</sup>Paola Giuliano and Marta Ruiz Arranz were instrumental in constructing the time series for remittances.

<sup>38</sup>For most of these countries, BOPSY states explicitly that no information on border and seasonal workers is included in this category.

<sup>39</sup>The Caribbean region is defined in Box 2.1. The data are taken from Mishra (2005b).

Unless otherwise indicated, *total remittances* are constructed as the sum of three items in the IMF's *Balance of Payments Statistics Yearbook* (BOPSY): "Compensation of Employees," "Workers' Remittances," and "Migrants' Transfers."<sup>37</sup> Box 2.4 provides a fuller discussion of these three items and of the problems with the data. Following the country-specific notes in BOPSY, "Compensation of Employees" is excluded from total remittances for the following countries: Argentina, Australia, Azerbaijan, Barbados, Belize, Benin, Brazil, Cambodia, Cape Verde, China, Côte d'Ivoire, Dominican Republic, Ecuador, El Salvador, Guyana, Italy, Panama, Rwanda, Senegal, Seychelles, Turkey, and Venezuela.<sup>38</sup> In general, the "Other Current Transfers" item is not included in the definition of total remittances. However, BOPSY specifies explicitly that migrants' remittances are recorded under "Other Current Transfers" for Kenya, Malaysia, and the Syrian Arab Republic.

Additional adjustments or additions to the series for remittances were made on the basis of information received from IMF country desks and national authorities, as follows:

- |                            |   |
|----------------------------|---|
| 1. Bosnia and Herzegovina: | Desk provided data for 1998–2003.                           |
| 2. Bulgaria:               | Other current transfers are included in remittances.        |
| 3. Caribbean:              | Desk provided data for 1991–2002. <sup>39</sup>             |
| 4. I.R. of Iran:           | Other current transfers are used as figure for remittances. |
| 5. Lebanon:                | Desk provided data for 1997–2003.                           |
| 6. Lesotho:                | Desk provided data for 1982–2003.                           |
| 7. Macedonia, FYR:         | Desk provided data for 1993–97.                             |
| 8. Moldova:                | Desk provided data for 2000.                                |
| 9. Niger:                  | Desk provided data for 1995–2003.                           |
| 10. Romania:               | Desk provided data for 2000–2003.                           |
| 11. Slovak Republic:       | Desk provided data for 1999–2003.                           |
| 12. Tajikistan:            | Desk provided data for 1997–2001.                           |
| 13. Ukraine:               | Desk provided data for 2000.                                |
| 14. Venezuela:             | Desk provided data for 1997–2003.                           |

## Box 2.4. Balance of Payments Data on Workers' Remittances

### *Data Concepts and Sources*

There is no universally accepted definition of remittances. They are broadly thought of as unrequited transfers, sent by migrant workers back to relatives in their country of origin. In practice, data users and analysts have treated as remittances a variety of transactions that are initiated by individuals living or working outside their country of birth or origin (others have even mentioned donations sent by charitable organizations). Those components of balance of payments statistics most often specifically mentioned as constituting remittances are “Compensation of Employees” (part of the income component of the current account), “Workers’ Remittances” (part of current transfers in the current account), and “Migrants’ Transfers” (part of the capital account).<sup>1</sup>

According to the IMF’s *Balance of Payments Manual, Fifth Edition* (IMF, 1993; henceforth *BPM5*), “Workers’ Remittances” are current transfers made by migrants who are employed and *resident* in another economy. This typically includes those workers who move to an economy and stay, or are expected to stay, a year or longer. “Compensation of Employees” instead comprises wages, salaries, and other benefits (cash or in-kind) earned by *nonresident workers* for work performed for residents of other countries. Such workers typically include border and seasonal workers, together with some other categories, e.g., local embassy staff. Finally, “Migrants’ Transfers” include financial items that arise from the migration (change of residence) of individuals from one economy to another. Data on these items are compiled by

Note: The main author of this box is Jens Reinke.

This box is based on a paper (“Remittances in the Balance of Payments Framework”) presented at the International Technical Meeting on Measuring Migrant Remittances, January 24–25, 2005, in Washington, DC.

<sup>1</sup>Data users frequently report that the concept of “workers’ remittances” alone is too narrow. This box therefore considers transactions recorded under different headings and discusses the problems in using such data consistently.

relevant statistical authorities in IMF member countries. Using this source, the IMF’s Statistics Department constructs the tables found in the *Balance of Payments Statistics Yearbook (BOPSY)*.

### *Problems Faced by Data Users*

Data are subject to variations in compilation on a national basis. This is partially due to different interpretations of the definitions and classifications set out in *BPM5*. Information of sources and methods used by member countries, illustrating the diversity of approaches, is published in *BOPSY*, Part 3.<sup>2</sup> In most cases, however, data weaknesses and omissions are due to the difficulties in obtaining all necessary data. For compiling all remittance-related flows, a variety of data sources would have to be used, some of which are difficult to capture. Transactions between households, particularly when using informal channels (e.g., sending cash through the mail or through systems such as hawala) are extremely hard to account for and are often omitted from official data. As a result, data are neither perfectly comparable nor equally comprehensive and reliable across countries. In some cases, actual remittances may be significantly underrecorded.<sup>3</sup>

There are some instances where the manner in which data users wish to access data, and the concepts of the balance of payments framework, are not ideally aligned. For example, migrants’ accounts in their home country may be accessible by family members in the country of origin (e.g., through ATM cards). However, the migrants’ deposits in these accounts are not seen as remittances. The IMF’s *Balance of Payments Textbook* (IMF, 1996) states that “money

<sup>2</sup>For example, some countries still consider their nationals working abroad for a year and longer to be domestic residents—and their earnings therefore as compensation of employees—because these nationals maintain strong links with their home country. However, most countries follow the one-year rule in principle.

<sup>3</sup>Studies for many countries, summarized in Puri and Ritzema (1999) find that informal transfers amount to 10–55 percent of total remittances.

remitted by a migrant for the purpose of making a deposit in his or her own account with a bank located abroad represents a financial investment . . . rather than a transfer” (p. 90) and is therefore not a remittance (but is instead recorded as an investment asset of the sending economy). It involves a quid pro quo since the sending party acquires a claim against the deposit-taking bank abroad. Withdrawals from such an account may constitute a remittance, yet it seems very unlikely that such transactions are accurately recorded.<sup>4</sup>

Similar caveats apply to some physical movements of goods across borders. Migrants visiting their home countries are considered visitors there. When they take personal effects with them on home country visits, these are not classified as exports in their country of residence nor imports in their country of origin. However, personal effects given as gifts to relatives living in the country of origin constitute remittances. It is unlikely that such transactions are sufficiently covered by customs data. The same applies to cash carried on home visits.

Data users are sometimes interested in the net income a country earns from seasonal and border workers abroad. Balance of payment statistics show under “Compensation of Employees” the gross remuneration paid by resident companies to nonresident employees and remuneration received by residents from nonresident employers. However, a part of these earnings will likely be spent in the host economy and will therefore not accrue to the home economy as net income. “Personal expenditures made by nonresident seasonal and border workers in the economies in which they are employed . . . are recorded under *travel*” (*BPM5*, paragraph 271). However, data reported under travel also include the personal expenditures made by other business and personal travelers. It is there-

<sup>4</sup>For instance, in India, nonresident rupee deposits (whose stock currently exceeds US\$30 billion) are not currently recorded as remittances. Yet, since the rupee is not convertible, these deposits do not return to the nonresident depositor upon maturity.

fore difficult, at best, to identify the offset items needed to calculate the net income relating to seasonal and border workers.

Bilateral data on remittance flows are a key interest of some data users. Although classification of flows by partner country is possible, it is not a standard feature of the balance of payment framework and attempts to compile it may face practical limitations. Voluntary country classification as a supplemental item is outlined in *BPM5* and could be further encouraged, yet without widespread adoption this is unlikely to yield a global remittance matrix.

#### *Improvements in Compilation Practices and Conceptual Guidance*

Given the large size and steady growth in remittance flows, there is a need to improve data quality. Since many weaknesses in data on remittances are caused by the difficulties in identifying and using data sources, the improvement of data sourcing and compilation practices plays a key role in the effort to enhance data availability and quality. The IMF provides compilation guidance and technical assistance to member countries to support the continued improvement of balance of payments statistics.

Improving the conceptual basis for measuring remittances is equally important. *BPM5* did not define workers or migrants. According to the *Balance of Payments Textbook*, workers’ remittances are “transfers made by migrants who are employed by entities of economies in which the workers are considered residents,” whereas transfers made by self-employed migrants “are not classified as workers’ remittances but as current transfers” (pp. 90–91). The focus on employment and the failure to define a migrant raise two questions.

- With increasing international mobility and the breakdown of traditional employment models, the focus on workers may be difficult to maintain. Should the focus perhaps be on all migrants, regardless of status of employment and source of income?
- There is no clear guidance on migrants, since *BPM5* distinguishes only residents and

**Box 2.4 (concluded)**

nonresidents (visitors). Is a clear definition of migrants needed, as the originating unit of remittances? Alternatively, should all household-to-household transfers be considered remittances, regardless of residence status?

These and other questions are currently being addressed in the context of ongoing work on the *Balance of Payments Manual* in the IMF Committee on Balance of Payments Statistics and in coordination with other forums, such as the UN Technical Sub-Group on the Movement of Natural Persons. Updated conceptual guidance will be tabled later this year. However, data users and their needs are diverse. Even outside

the balance of payments framework, there is no accepted definition of remittances, making it difficult to address data users' needs since they often appear a moving target. The IMF's Statistics Department is involved in consultative efforts with data users to better identify a common understanding of remittances and specific data needs.<sup>5</sup>

<sup>5</sup>The Statistics Department recently cohosted with the World Bank an international meeting on remittances, bringing together compilers and data users from around the world. Details are available via the Internet at [www.worldbank.org/data/remittances.htm](http://www.worldbank.org/data/remittances.htm).

No data on remittances were available for the following countries, and they were therefore excluded from the analysis: I.S. of Afghanistan, Angola, the Bahamas, Bahrain, Bhutan, Brunei Darussalam, Burundi, Canada, Dem. Rep. of Congo, Iraq, Kuwait, Liberia, Libya, Qatar, Singapore, Taiwan Province of China, United Arab Emirates, Uzbekistan, Vietnam, and Zambia.

All regressions employ the ratio of remittances to GDP, except for the analyses of poverty and remittances, which employ logs of the ratio of remittances to GDP. Details of some other key variables are as follows.

- *Dual exchange rates.* This indicator specifies if a country has more than one exchange rate that may be used simultaneously for different purposes and/or by different entities. It comes from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions, 2003* (AREAER).
- *Restrictions on foreign-currency deposits held abroad.* This indicator, also from the AREAER, specifies whether resident accounts that are maintained in foreign currency and held abroad are allowed.

All regressions include additional control variables as follows.

- *Output growth equation:* log of initial income, education, log of life expectancy, investment, inflation, budget balance, trade openness, and financial development.
- *Education and investment equations:* log of initial income, log of life expectancy, trade openness, and financial development.
- *Poverty equations:* log of average income and of the Gini coefficient.
- *Volatility equations:* log of initial income, share of agriculture in GDP, trade openness, real exchange rate overvaluation, and institutional quality.
- *Determinants of remittances equation:* political risk, law and order, the U.S. 6-month LIBOR, world oil prices, country-specific fixed effects, and a time trend.

## Appendix 2.2. Output Volatility in Emerging Market and Developing Countries: Country Coverage, Methodology, and Data

*The main author of this appendix is Dalia Hakura, with support from Christopher Otrok.*

This appendix provides details on the regional groupings and country coverage, the dynamic

factor model, and variable definitions and data sources used in the second essay.

### Regional Groupings and Country Coverage

This section specifies the countries included in each regional grouping used in the essay. In addition to the regional groupings outlined in the essay, for the purpose of estimation of the dynamic factor model Latin America is divided into (1) Central America and the Caribbean and (2) South America, and the industrial countries are divided into (1) G-7 and (2) other industrial countries, to capture differences in their regional cycles. The grouping of the countries by region appears to be well-suited to identify a “regional factor” because countries that are geographically close to each other are likely to be affected by the same shocks, such as weather-related shocks or any given terms-of-trade shocks. In addition to the geographic aspect of the groupings, other factors such as trade and financial linkages or a degree of policy coordination (e.g., the longstanding peg of the CFA franc zone countries, initially to the French franc and now to the euro) can justify common regional cycles. The justification for grouping the industrial countries together is not based on geography but rather reflects the stage of economic development and the quality of institutions.

#### Industrial Countries

*G-7 countries.* Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

*Other industrial countries.* Australia, Austria, Belgium, Denmark, Finland, Greece, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, and Switzerland.

#### Latin America

*Central America and the Caribbean.* Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Mexico, Nicaragua, Panama, and Trinidad and Tobago.

*South America.* Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.

#### Middle East and North Africa

Algeria, Egypt, Iran, Israel, Jordan, Morocco, Syria, Tunisia, and Turkey.

#### Sub-Saharan Africa

*CFA franc zone countries.* Burkina Faso, Cameroon, Republic of Congo, Côte d’Ivoire, Gabon, Guinea-Bissau, Mali, Niger, Senegal, and Togo.

*Non-CFA countries.* Botswana, Burundi, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Malawi, Mozambique, Namibia, Nigeria, Sierra Leone, South Africa, Tanzania, Uganda, and Zambia.

#### South Asia and China

Bangladesh, China, India, Pakistan, and Sri Lanka.

#### East Asia

Korea, Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

### Dynamic Factor Model

Dynamic factor models are a generalization of the static factor models commonly used in psychology. The motivation underlying these models, which are gaining increasing popularity among economists, is that there are a few common factors that are driving fluctuations in large cross sections of macroeconomic time series. While these factors are unobservable and cannot be identified as clearly “productivity shocks” or “monetary shocks,” the rationalization for these models is that a few aggregate shocks are the underlying driving forces for the economy. The unobserved factors are then indexes of common activity. These factors can capture common activity across the entire data set (e.g., global activity) or across subsets of the data (e.g., a particular region).

One goal of this literature is to extract estimates of these unobserved factors and use these estimated factors to quantify both the extent and nature of co-movement in a set of time-series

data.<sup>40</sup> The dynamic factor model decomposes each observable variable—e.g., output growth in Nigeria—into components that are common across all observable variables or common across a subset of variables and idiosyncratic noise.

The model used in this essay has a block of equations for each region that is studied; each regional block contains an equation for output growth ( $Y$ ) in each country decomposing output growth into a global component, a regional component, and a country-specific or idiosyncratic component. For example, the block of equations for the first region (G-7) is

$$\begin{aligned} Y_{US,t} &= b_{US}^{Global} f_t^{Global} + b_{US}^{G-7} f_t^{G-7} + c_{US,t} \\ Y_{Japan,t} &= b_{Japan}^{Global} f_t^{Global} + b_{Japan}^{G-7} f_t^{G-7} + c_{Japan,t} \\ &\vdots \\ Y_{France,t} &= b_{France}^{Global} f_t^{Global} + b_{France}^{G-7} f_t^{G-7} + c_{France,t}. \end{aligned}$$

The same form is repeated for each of the nine regions in the system.

In this system, the global factor is the component common to all countries. The sensitivity of output growth in each country to the global factor depends on  $b$ , the factor loading. There is also a regional factor, which captures co-movement across the countries in a region.

The model captures dynamic co-movement by allowing the factors ( $f$ s) and country-specific terms ( $c$ ) to be (independent) autoregressive processes. That is, each factor or country-specific term depends on lags of itself and an independent and identically distributed innovation to the variable ( $u$ ):

$$f_t^{Global} = \phi(L) f_{t-1}^{Global} + u_t,$$

where  $\phi(L)$  is a lag polynomial and  $u_t$  is normally distributed. All of the factor loadings ( $b$ s), and lag polynomials are independent of each other. The model is estimated using Bayesian

techniques as described in Kose, Otrok, and Whiteman (2003) and Otrok, Silos, and Whiteman (2003).<sup>41</sup>

To measure the importance of each factor for explaining the volatility of output growth, variance decompositions are calculated that decompose the volatility of output growth into components due to each factor. The formula for the variance decomposition is derived by applying the variance operator to each equation in the system. For example, for the first equation:

$$\begin{aligned} \text{var}(Y_{US}) &= (b_{US}^{Global})^2 \text{var}(f^{Global}) \\ &\quad + (b_{US}^{G-7})^2 \text{var}(f^{G-7}) + \text{var}(c_{US}). \end{aligned}$$

There are no cross-product terms between the factors because they are orthogonal to each other. The variance in real per capita output growth attributable to the global factor is then

$$\frac{(b_{US}^{Global})^2 \text{var}(f^{Global})}{\text{var}(Y_{US})}.$$

To address the question of what accounts for the trend declines in output volatility, the dynamic factor model is estimated over two periods: 1970–86 and 1987–2004. Each factor’s contribution to the change in overall volatility is calculated. For instance, the contribution of the global factor to the decline in the variance of output growth,  $\text{var}(Y_{US,1987-04}) - \text{var}(Y_{US,1970-86})$ , is

$$\begin{aligned} &[(b_{US,1987-04}^{Global})^2 \text{var}(f_{1987-04}^{Global})] \\ &\quad - [(b_{US,1970-86}^{Global})^2 \text{var}(f_{1970-86}^{Global})]. \end{aligned}$$

### Data Definitions and Sources

This section describes the sources of the data on real per capita GDP used to estimate the dynamic factor model as well as the data used in

<sup>40</sup>The second major objective of this literature is using the information in the cross section of time series to forecast one time series.

<sup>41</sup>The innovation variance of the factors (error term in the factor autoregressive equation) is normalized. This normalization is based on the variance of the underlying series and determines the scale of the factor (i.e., 0.1 versus 0.01). This dependency on scaling is the reason for looking only at variance decompositions or appropriately scaled versions of the factors (factor times factor loading, as in the computation of the decline in variance shown below).

The model is estimated using de-measured output growth data allowing for a break in 1986.

the cross-sectional regression that is estimated. The dynamic factor analysis cover data that include projections for 2004. The latter projections are not included in the cross-sectional regression analysis. The coverage of emerging market and developing countries in the cross-sectional regression estimated in the essay is limited to 51 countries owing to data availability.

*Real per capita GDP growth* is measured using data on real per capita GDP in constant dollars (international prices, base year 1996) obtained from the Penn World Tables (PWT), Version 6.1. The PWT data cover the 1970–2000 period. Real per capita GDP growth rates calculated using data from the WEO database were used to extend the series to 2004.

*Volatility of country component of output growth* is measured as the standard deviation of the growth rate of the country-component of real per capita GDP growth for the 1970–2003 period as derived from the estimates of the dynamic factor model.

*Volatility of fiscal policy* is measured as the standard deviation of cyclically adjusted government spending over 1960–2000 as estimated by Fatás and Mihov (2003). This is obtained as the standard deviation of the residual from an instrumental variables regression of the growth of government spending on output growth, the one-period lag of the growth of government spending as well as various controls for government spending and a time trend.

*Inflation rate* is the average annual growth of the Consumer Price Index over 1970–2004 (reflecting the availability of reliable data). The source of the data is the World Bank's *World Development Indicators* (WDI).

*Institutional quality* is constructed as the average of three indices reported by the International Country Risk Guide (ICRG) over 1984–2003. The indices are (1) corruption—the degree of all forms of corruption such as patronage, nepotism, and suspiciously close ties between politics and business; (2) rule of law—the strength and impartiality of the legal system and the extent of popular observance of the law; and (3) bureaucracy quality—the strength and

expertise of the bureaucracy to govern without drastic changes in policy or interruptions in government services. The indices are rescaled from 1 to 12, where high values indicate good institutions.

*Trade openness* is defined as the sum of imports and exports of goods and services (from balance of payments statistics), divided by GDP. The source of the data is the WDI.

*Current and capital account restrictions* is constructed as the average of four indices reported in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* for the 1970–2003 period. The indices are (1) current account restrictions; (2) capital account restrictions; (3) restrictions on export proceeds; and (4) multiple exchange rate regimes. Each index takes a value of one if the country has a restriction, and a value of zero otherwise.

*Initial level of financial sector development* is measured as the ratio of private credit to GDP in 1970 or the first year for which the data are available prior to 1990. The source of the data is Beck, Demirgüç-Kunt, and Levine (1999; 2003 database).

*Terms-of-trade volatility* is measured as the standard deviation of the annual change in the terms of trade over 1970–2003. The source of the data is the WEO database.

*Exchange regime flexibility* is constructed as the average over the 1970–2001 period of an index that takes a value of 1 in years in which a country is classified as having a fixed regime, a value of 2 in years in which a country is classified as having an intermediate regime, and a value of 3 in years in which a country is classified as having a free float. The de facto “Natural classification” developed by Reinhart and Rogoff (2004) is used to classify exchange rate regimes. The instances where countries were classified as having a free fall were replaced with the secondary classification as reported in Reinhart and Rogoff (2004).

*Initial relative income* is the ratio of real per capita GDP relative to that in the United States in 1970. The data on real per capita GDP in constant 1996 prices is obtained from PWT.

*Tropical climate* is a dummy variable for countries that are in tropical climate zones. The source of the data is the World Bank's Global Development Network Growth Database.

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