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Macroeconomic Consequences of Remittances

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The following conventions are used in this publication:

- In tables, a blank cell indicates "not applicable," ellipsis points (. . .) indicate "not available," and 0 or 0.0 indicates "zero" or "negligible." Minor discrepancies between sums of constituent figures and totals are due to rounding.

- An en dash (–) between years or months (for example, 2005–06 or January–June) indicates the years or months covered, including the beginning and ending years or months; a slash or virgule (/) between years or months (for example, 2005/06) indicates a fiscal or financial year, as does the abbreviation FY (for example, FY2006).

- "Billion" means a thousand million; "trillion" means a thousand billion.

- "Basis points" refer to hundredths of 1 percentage point (for example, 25 basis points are equivalent to ¼ of 1 percentage point).

As used in this publication, the term "country" does not in all cases refer to a territorial entity that is a state as understood by international law and practice. As used here, the term also covers some territorial entities that are not states but for which statistical data are maintained on a separate and independent basis.

Preface

This Occasional Paper should not be reported as representing the views of the IMF. The opinions expressed in this paper are solely those of the authors and do not necessarily reflect the views of the International Monetary Fund or its Executive Directors or IMF policy.

1 Introduction

Immigrant remittances are truly a force to be reckoned with in the global economy. These private, unrequited transfers of money from migrants to the family members they leave behind, often sent a few hundred dollars at a time, nonetheless add up to billions of dollars annually: US$114 billion in 2003, the last year for which complete data are available. This figure includes only remittances sent through official, measurable channels, and much more is believed to flow through informal channels. Consequently, remittances represent one of the largest international flows of financial resources.

Moreover, because remittances naturally flow from high-income countries to developing countries, the total quantity of remittances reported in the previous paragraph still tends to understate their relative importance to the economies that receive them. For many remittance-receiving developing economies, remittance flows exceed foreign direct investment, portfolio flows from financial markets, and official development assistance. Some countries' total remittance receipts amount to a substantial portion of their imports and a nontrivial fraction of GDP.

Given the large size of aggregate remittance flows, they should be expected to have significant macroeconomic effects on the economies that receive them. In addition, remittances have been identified as a potential source of funding for economic development. Thus, two main issues are of interest to policymakers with regard to remittances:

- how to manage their macroeconomic effects; and
- how to harness their development potential.

This paper directly addresses these two questions by reporting the results of the first global study of the comprehensive macroeconomic effects of remittances on the economies that receive them. The ultimate purpose of this endeavor is to draw summary policy implications for countries that receive significant flows of remittances.

In broad terms, the findings of this paper tend to confirm the main benefit cited in the microeconomic literature: remittances improve households' welfare by lifting families out of poverty and insuring them against income shocks. However, the systematic macroeconomic analysis of remittances developed over the following seven chapters also yields a number of important caveats and policy considerations that have largely been overlooked:

- *Measurement.* The category *workers' remittances* in the balance of payments best represents what economists have in mind when modeling remittances. The properties of this series differ significantly from those of *employee compensation* and *migrants' transfers*, so combining these three items into a single measure of remittances, as is common practice in the literature, can lead to invalid conclusions about the properties of remittances and, in turn, suboptimal policy decisions.

- *Fiscal policy.* Remittances should not be taxed directly. Consumption-based taxation provides the optimal incentive structure for maximizing the benefits of remittances, whereas labor income taxation exacerbates the labor-leisure incentives of remittances and encourages the use of inflation as an indirect tax. Remittance-receiving countries should be advised to shift toward consumption-based tax systems to mitigate possible negative effects on economic growth, minimize the level of distortion generated by fiscal and monetary policy, and benefit from any tax-induced increase in investment resulting from remittances.

- *Debt sustainability.* Remittances can lead to reduced country risk and improve the sustainability of government debt. In addition to increasing household saving, significant inflows of remittances can directly or indirectly increase the government's revenue base, thereby reducing the marginal cost of raising revenue.

- *Fiscal discipline.* Remittances may reduce the government's incentive to maintain fiscal policy discipline. The empirical evidence suggests that governments take advantage of the fiscal space afforded by remittances by consuming and borrowing more.

- *Economic growth.* Remittances are not necessarily associated with an increase in domestic investment or a more efficient allocation of domestic investment. Remittance recipients rationally substitute unearned remittance income for labor income and, since labor and capital are complementary goods in production,

this negatively affects the rate of capital accumulation. Analysis reveals that remittances have no statistically significant effect on GDP growth.

- *Dutch disease effects.* Although remittances may constitute a source of financing in the balance of payments, empirical evidence suggests that remittances are positively correlated with real exchange rate appreciation. Hence, there is some evidence of Dutch disease effects in remittance-receiving countries. Policymakers must find ways to mitigate this real exchange rate effect or address any loss of competitiveness arising from equilibrium real exchange rate appreciation.

- *Governance and incentives.* Remittances pose a moral hazard problem by reducing the political will to enact policy reform. Compensatory remittances that insure the public against adverse economic shocks and insulate them from government policy reduce households' incentives to pressure the government to implement reforms to facilitate economic growth. Remittances can therefore delay needed upgrades to the public infrastructure both by reducing public demand for such upgrades and by decreasing the likelihood of a crisis that would make such upgrades necessary.

- *Role of international financial institutions.* Outside engagement may be required to prompt governments to undertake needed reforms in the presence of remittances. In particular, international institutions have an important role to play in encouraging remittance-receiving countries to undertake or accelerate necessary reforms. A one-size-fits-all reform strategy is likely to be counterproductive. Instead, an approach that differentiates among countries based on their remittance-driven characteristics will be more helpful in achieving its targets.

The main challenge for policymakers, stated in general terms, is to design policies that promote remittances and increase their benefits while mitigating adverse side effects. Getting these policy prescriptions correct early on is imperative. Globalization and the aging of developed economy populations will ensure that demand for migrant workers remains robust for years to come. Hence, the volume of remittances likely will continue to grow, and with it, the challenge of unlocking the maximum societal benefit from these transfers.

II   Remittances: Measurement Matters

Why Study the Macro Effects of Remittances?

The unique characteristics of remittances and their potential economic impact have attracted the attention of policymakers and researchers in recent years, as evidenced by a growing literature aimed at analyzing remittances and their consequences for individual countries. Three main features of remittances provide the impetus for embarking on a study of their macroeconomic impacts: the size of these flows relative to the size of the recipient economies, the likelihood that these flows will continue unabated into the future through continued globalization trends, and the fact that these flows are quite distinct from those of official aid or private capital, which are much better understood in the literature. These features suggest that remittances' macroeconomic effects are likely to be substantial and sustained over time and may have unique implications for policymakers in recipient countries.

First, regarding the size of remittance flows, the literature offers ample documentation on how large they have become in recent years. We present our own findings using the most recent data available on remittance flows in Chapter 3. The level of remittances, using the item *workers' remittances* from the World Development Indicators (WDI) database (World Bank, 2006), rose from US$48 billion in 1994 to US$114 billion in 2003.[1] Efforts to examine both official and unofficial remittance flows (World Bank, 2005) suggest that this level could be substantially higher. For many developing countries, the level of remittances received is equal to or exceeds the amount of foreign direct investment, portfolio flows from financial markets, and official development assistance. Since remittance flows are large in size and permeate a significant number of households in the recipient economies, they undoubtedly have effects at the macro level, influencing market prices and the interactions among households, firms, financial intermediaries, and the government.

Second, the forces behind the substantial growth of remittance flows do not appear to be subsiding. As part of an effort to improve growth prospects, many countries have, over the past several decades, initiated a series of policies to liberalize their economic systems. During this time policymakers have primarily focused on understanding the effects of globalization, trade openness, and capital account liberalization on the direction and magnitude of private capital flows, foreign direct investment, and economic growth. However, the trend toward deeper economic integration through regional arrangements such as the Association of Southeast Asian Nations (ASEAN) and the European Union (EU), along with the proliferation of trade agreements like the North American Free Trade Agreement (NAFTA), has also continued to underpin increased flexibility in labor migration. Consequently, the growth and permanence of remittance flows can be viewed as an additional implication of globalization, an implication that has yet to receive as much scrutiny as the economic impacts of trade and capital account liberalization.

Third, there are key distinctions between remittances and other international flows, and while it may be convenient to view remittance flows through the same lens as official aid and private capital flows, there are good reasons to believe that remittances behave differently and, in turn, have different economic impacts. The widely accepted definition that prevails in the literature is that remittances are unrequited, nonmarket personal transfers between households across countries. Remittances differ significantly from official aid flows, since the latter are government-to-government transfers, whereas remittances are composed of numerous small transfers between private individuals. Furthermore, one crucial element sets remittances apart from both official aid and private capital flows: the presence of familial relationships. This element introduces well-known economic issues concerning interactions among family members and fuels the uniqueness of remittance behavior. As Chapter 4 discusses in greater depth, the appropriate foundation for understanding remittances originates with Becker's (1974) economics of the family, which, indeed, underlies much of the research on the microeconomic implications of remittances found

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[1]The WDI database includes data through 2005, but because of various reporting lags, 2003 is the most recent year for which a full data set on this series is available.

in the literature today. The relationship between the remitter and his or her family can generally be characterized in two ways: as altruism, in which remittances may compensate for poor economic performance at home, or as exchange, in which the family secures nonpecuniary services on behalf of the remitter. Either motivation, as well as the unique relationships among family members, implies that the characteristics of remittance flows will differ from those of profit-driven private capital flows, and the impact of these two types of flows on recipient households' economic behavior and the macroeconomy at large will differ as well. Policymakers and researchers should therefore not ignore the distinction between nonmarket remittance flows, private capital flows, and official aid flows, since their respective effects on the macroeconomy will differ. These macro effects, in particular, are examined in depth through formal economic modeling in Chapters 5 and 6, and empirically in Chapter 7, and summary policy conclusions are presented in Chapter 8.

Measuring Remittances

Given the magnitude of remittances in the aggregate and the likelihood that their uniqueness implies different macroeconomic effects, researchers must take care to define remittances properly from a measurement point of view and to compile the appropriate data when conducting analysis. The literature has highlighted three components of the balance of payments in regard to compiling statistics on remittances. The first component, *workers' remittances,* records current transfers by migrants who are employed in, and considered a resident of, the countries that host them. A migrant in this case is a person who stays or is expected to stay in his or her host country for a year or more. Workers' remittances normally involve persons related to one another and are recorded under current transfers, according to the fifth edition of the *Balance of Payments Manual* (IMF, 1993; hereafter *BPM5*). The second component, *employee compensation,* is composed of wages, salaries, and other benefits earned by individuals in countries other than those in which they are residents for work performed for and paid for by residents of those countries (typical examples include earnings of seasonal workers and embassy employees). According to *BPM5*, compensation of employees is included under income in the current account. Finally, the third component, *migrants' transfers*, are contra-entries to the flow of goods and changes in financial items that arise from individuals' change of residence from one country to another. In *BPM5*, migrants' transfers are recorded in the capital account of the balance of payments under capital transfers of nongovernment sectors.

Of these three categories, *workers' remittances* most closely conforms to the notion that researchers and policymakers have in mind when discussing remittance flows: periodic, unrequited, nonmarket transfers between residents of different countries. A common practice in the literature, however, has been to sum the three categories when compiling statistics on remittances. Recent examples can be found in the World Bank's *Global Economic Prospects* (World Bank, 2005), the *World Economic Outlook* of the International Monetary Fund (IMF, 2005), and recent working papers, including those by Aggarwal, Demirgüç-Kunt, and Martinez Peria (2006) and Giuliano and Ruiz-Arranz (2005), among others. The inclusion of migrants' transfers and employee compensation in remittance statistics is likely to pose problems, however, since these series are not conceptually representative of remittance behavior.

Inclusion of migrants' transfers is perhaps the more egregious misspecification. Migrants' transfers generally include two types of transactions. First, a migrant who has spent time as a resident employed in a host and later decides to return to his or her home country may transfer accumulated assets in the process. Although his or her stay in the host country may have resulted in small, periodic transfers to family members in his or her home country (i.e., remittances), the final transfer of accumulated assets is conceptually equivalent to a capital transfer and not a remittance and is likely to have different behavioral characteristics. As such, the *BPM5* records this item as a capital transfer. The second type of migrant transfer is related to an individual's change of residence from one country to another and may not involve any real financial flows. Consider, for example, a case in which Bill Gates, the chairman of Microsoft Corporation and a resident of the United States, was allowed to change his residency to Barbados. Viewing the reclassification of his significant wealth, estimated by *Forbes* recently at $56 billion (Kroll and Fass, 2007), as a remittance flow would necessarily lead to the conclusion that actual transfers to Barbados had risen dramatically, when in fact no such transfers had taken place. Given that the GDP of Barbados in 2005 was estimated at just under US$3 billion, such a reclassification would also incorrectly suggest that Gates's change in residency would result in improved standards of living and substantially higher income per capita in Barbados. Both of these transactions, the transfer of accumulated assets by migrant residents and the reclassification of assets as a result of a change in residency status, are fundamentally different from remittances and may not involve actual flows. Finally, unlike what has taken place with remittance flows, which have steadily grown over time as a result of past outward migration from the developing world, there appears to be no corresponding wave of reverse migration supporting a worldwide increase in migrant transfers. Thus, there is little conceptual justification for including migrant transfers in the measure to be studied.

Researchers and data users should also be wary of viewing employee compensation as equivalent to a remittance transfer. Employee compensation records the remuneration for work earned by nonresident individuals and paid by resident companies, and the remuneration received by residents from nonresident employers. For example, the wages, salaries, and benefits of IMF and World Bank staff are classified as employee compensation, since balance of payments accounting attributes these income flows to the staff members' official countries of residence. There is little economic reasoning to justify including compensation of this form as a remittance, since it represents earned income, not a formal transfer, and in particular, not a transfer between residents and nonresidents of different countries.

Although researchers may have the seasonal agricultural worker in mind in deciding to include employee compensation as part of remittances, the evidence suggests that the income of more traditional nonresident employees dominates that of border or seasonal workers. This is especially the case when the recent trends in outsourcing and migration of highly skilled workers in information technology industries are considered. In 2004, for example, half of the top 10 recipients of the item *workers' remittances and employee compensation* in the WDI database were developed countries in Europe: France (US$12.7 billion), Spain (US$6.9 billion), Belgium (US$6.8 billion), Germany (US$6.5 billion), and the United Kingdom (US$6.4 billion). Employee compensation accounts for the majority of these flows. Simply excluding developed countries from the sample, however, does not eliminate the problem. Lesotho, for example, is one of the largest recipients of employee compensation because of its economic relationship with South Africa, taking in approximately US$341 million in employee compensation in 2004 against workers' remittances of only US$14 million.[2] The country received on average around 70 percent of its GDP in the form of employee compensation between 1970 and 2005. Even if there was a compelling reason to warrant inclusion of employee compensation in remittance statistics, researchers would need to compile a net compensation figure by subtracting from employee compensation that portion of earnings that are spent in the host country and do not accrue to the home country. The *BPM5* presently nets out such expenditures in the aggregate balance of payments by recording them under travel. Separating this line item from the remaining categories in travel (i.e., expenditures by business and personal travelers) in order to derive all the offsetting items required to compute net compensation of employees,

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[2]Of course, the sheer size of employee compensation in Lesotho suggests that it is worthy of economic study, but one should be careful not to simply lump these flows together as a measure of remittances in the process.

however, is not practicable, since the data are not available at the level of detail required to do this.

In sum, there is no clear economic justification for treating migrants' transfers and employee compensation as equivalent to workers' remittances. The flows assigned to these three categories are capturing different economic effects, or in the case of migrants' transfers and employee compensation, may be capturing something other than actual transfers. Consequently, researchers lumping the three together may sufficiently pollute the database with nonremittance behavioral characteristics to render any conclusions from such an exercise suspect. In the next section, we attempt to ascertain whether the behavioral characteristics of the data in these three categories are indeed different.

Examining the Data: Measurement Matters

Countries in the WDI database provide data on an aggregate category of *workers' remittances and employee compensation,* and the individual components of *workers' remittances, employee compensation,* and *migrants' transfers.* Not all countries, however, provide data on all categories. Many provide data only on the aggregate category of workers' remittances and employee compensation, and others report only workers' remittances. A smaller subset of countries report both workers' remittances and employee compensation as separate items; the least-reported item is migrants' transfers. In 2003, for example, the most recent year for which a full data set on each variable is available given various reporting lags, 154 countries provided data on workers' remittances and employee compensation (totaling US$199 billion), 104 provided data on workers' remittances (totaling US$114 billion), 107 reported data on employee compensation (US$14 billion), and only 49 reported data on migrants' transfers (worth US$4 billion). Each of the four series was extracted from the WDI data set for all available countries between the years 1970 and 2005 for the analysis in this section.

Table 2.1 reports the summary business cycle correlations between real GDP per capita and the series on workers' remittances, that on workers' remittances and employee compensation, and a third series that sums all three measures. In accordance with standard practice in the business cycle literature (Stock and Watson, 1999), the variables are first transformed by taking logarithms of their ratio to GDP, and their correlation with real GDP per capita is computed from the filtered values using the procedure of Hodrick and Prescott (1997). Applying the Hodrick-Prescott filter reduces the number of usable country observations, because a minimum number of time periods must be present to apply the filtering technique. The average correlation

Table 2.1. Summary Business Cycle Correlations

	Workers' Remittances	Workers' Remittances and Employee Compensation	Workers' Remittances, Employee Compensation, and Migrants' Transfers
All countries			
Mean correlation with real GDP per capita	−0.080	−0.026	0.029
Standard deviation	0.299	0.319	0.392
Minimum	−0.786	−0.804	−0.792
Maximum	0.715	0.665	0.922
Number of countries			
Total observations	88	134	49
With positive correlation	38	62	25
With negative correlation	50	72	24
Emerging economies			
Mean correlation with real GDP per capita	−0.084	−0.031	0.024
Standard deviation	0.360	0.311	0.405
Number of countries			
Total observations	77	113	38
With positive correlation	33	50	20
With negative correlation	44	63	18

Note: The statistics are computed by taking the log of each series in percent of GDP and the log of real GDP per capita, detrending each using the Hodrick-Prescott (1997) filter, and then computing relevant correlations for each country in the sample.

between workers' remittances and real GDP per capita in Table 2.1 is –0.080 for the full country sample and –0.084 when only emerging economy[3] observations are included. The negative correlation—that is, countercyclicality on average—supports the altruistic motivation of remittance behavior, whereby declines (increases) in a recipient country's economic activity are associated with increases (declines) in remittance flows to that country. This result is consistent with the recent empirical support in the literature (e.g., World Bank, 2005; Chami, Fullenkamp, and Jahjah, 2003; IMF, 2005; and Mishra, forthcoming) and our own findings, which we present in Chapter 6.

If employee compensation and migrants' transfers were capturing remittance behavior, then one would expect to see similar behavioral characteristics in the data for the three categories. However, the series on workers' remittances and employee compensation has an average correlation with real GDP per capita of only –0.026, or less than half the countercyclicality of the workers' remittances series alone, for the full country sample. A similar result is obtained when only emerging economy data are examined. Finally, inclusion of migrants' transfers yields a positive correlation of 0.029 under the full country sample and 0.024 for emerg-

ing economies. This exercise reveals that employee compensation and migrants' transfers are procyclical on average, a finding that is more consistent with the behavior of private capital flows than remittances as compensatory income transfers.

As a further test of the data, we isolated those countries that report workers' remittances and employee compensation as separate categories to examine the hypothesis that these flows incorporate the same behavior. This could also be viewed as a test of whether country data compilers are able to distinguish adequately between these flows in the data-reporting process. If the two flows are similar, or if data compilers categorize them in a haphazard fashion, then the correlation between the logged, filtered value of each variable's ratio to GDP will be near unity. Table 2.2 reports the correlations for the 34 countries in this subsample. Though it contains a much smaller number of countries than the aggregate samples included in Table 2.1, the subsample in Table 2.2 accounts for 51 percent of total reported workers' remittances and 17 percent of total reported employee compensation in 2003. The subsample also includes large remittance-receiving economies: Colombia, India, Brazil, Mexico, and the Philippines, among others. When the countries in this subsample that report the items separately are examined, the average correlation between workers' remittances and employee compensation is only 0.034, and the median correlation is –0.004. Figure 2.1 presents a histogram

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[3]The emerging economy sample was obtained by excluding Western European countries, Japan, Canada, the United States, New Zealand, and Australia.

Table 2.2. Business Cycle Correlations: Subsample

	Countries Reporting Both Workers' Remittances and Employee Compensation
Number of countries in subsample	34
Percentage of total workers' remittances in 2003	51.2
Percentage of total employee compensation in 2003	17.2
Correlation between workers' remittances and	
Employee compensation, mean	0.034
Employee compensation, median	−0.004
Standard deviation	0.300
Minimum	−0.623
Maximum	0.652
Number of countries	
With positive correlation	17
With negative correlation	17

Note: The countries included in this sample are those that report both workers' remittances and employee compensation data between 1980 and 2005. The statistics are computed by taking the log of each series in percent of GDP, detrending each using the Hodrick-Prescott (1997) filter, and then computing the relevant correlation for each country in the sample. Countries without a sufficient amount of data to implement the filter have been removed.

Figure 2.1. Correlation of Workers' Remittances and Employee Compensation

Sources: World Bank (2006) and authors' calculations.

of individual country correlations. The vast majority of the 34 observations are clustered around zero, with only five observations at 0.5 or greater. Rather than showing a positive correlation near unity, the data indicate that the series are uncorrelated.

The results of this exercise show that data in the categories of *workers' remittances, employee compensation,* and *migrants' transfers* capture different behavioral characteristics and that data compilers are more proficient at separating these flows in the balance of payments framework than researchers give them credit for. In particular, workers' remittances have a negative average correlation with real GDP per capita in the home country, a finding consistent with the microeconomic underpinnings of remittances as unrequited person-to-person transfers. In contrast, both employee compensation and migrants' transfers on average display a procyclical relationship with output in the recipient economy. This procyclical behavior is more consistent with private capital flows and generally inconsistent with the micro foundations from Becker's (1974) economics of the family. Researchers who use all three series when compiling a cross-country panel

of remittance data may be making a serious error, because the inclusion of employee compensation and migrants' transfers in data on remittances incorporates different behavioral relationships with respect to economic variables of interest and behavior that appears to be uncorrelated with remittance behavior. In turn, statistical analysis of remittance behavior with such a data set may lead to erroneous results. In the chapters that follow, we use the data series *workers' remittances* when conducting any econometric or statistical analysis and drawing conclusions regarding remittance behavior. Our omission of employee compensation and migrants' transfers from our measure of remittances is, therefore, intentional, with the view that the category *workers' remittances* in the WDI database best reflects the behavioral aspects we are trying to capture.

New Balance of Payments Methodology

The lack of an official definition of remittances and the lack of clarity surrounding statistical compilation of a corresponding data series in the balance of payments has been noted for some time and led to a call by the G-8, during their 2004 meetings on Sea Island, to clarify the meaning of remittances and improve the accuracy of measuring remittance flows. This in turn led to the creation of a working group composed of the World Bank, IMF, and other international financial institutions that was tasked with clarifying the definition of remittances, offering guidance on how to collect and estimate remittance statistics, and providing

assistance on how to develop an inflow-outflow matrix for tracking remittance flows. A technical subgroup of the United Nations reported its findings to the IMF Committee on Balance of Payments Statistics and the Advisory Expert Group on National Accounts. According to Reinke (2007), the results of this process will be included in the revision of the *BPM5* and the update of *System of National Accounts, 1993*, both of which are scheduled for completion in 2008.

The proposed changes will include the introduction of four new categories related to remittances, conceptual changes to the use of migration and residence status, and the elimination of the use of migrants' transfers in the reporting of balance of payments flows. As discussed in Reinke (2007), the changes include several items of importance:[4]

- Personal transfers *to replace* workers' remittances. The item *personal transfers* will include all current transfers in cash or in kind between resident households and nonresident households, independent of employment and migration status.
- *Creation of a new item,* personal remittances. This category will include personal transfers plus net compensation of employees. This category, however, is designated as a supplementary item, meaning that the new balance of payments manual provides a definition and guidance on compilation, but the line item will not be part of official databases of the IMF or World Bank.
- *Removal of* migrants' transfers *from the balance of payments framework*. Changes in assets and liabilities resulting from individuals' moving their residence from one country to another will be recorded under *other changes of assets and liabilities.*
- *Elimination of the concept of* migrant *in the balance of payments*. Since the concept of *personal transfers* is based on residency rather than migration status, the concept of *migrant* is no longer relevant. This change makes this part of the framework consistent with criteria elsewhere in the balance of payments and national accounts frameworks.

The proposed changes to the balance of payments and system of national accounts frameworks are welcome and are consistent with the arguments put forth in this and subsequent chapters regarding the true specification of remittances. The new category *personal transfers* will capture periodic, recurring, unrequited current transfers between residents of different countries. Any prior confusion arising from the distinction between transfers out of wage income and those out of other income, or from the concept of migrant status, which led to grey areas between the previous definitions of workers' remittances and employee compensation, will be eliminated. The main focus from a balance of payments perspective will be to capture and record transfers between persons in different countries, which coincides with the generally accepted definition of remittances. The elimination of the concept of migrants' transfers and the inclusion of employee compensation in a supplementary item are also welcome. As evidenced by the data, migrants' transfers and employee compensation have characteristics more closely akin to those of private capital flows than to those of personal transfers and as such should be classified as items separate from workers' remittances.

Conclusion

The unique characteristics of remittance flows have attracted the interest of researchers and policymakers, and the magnitude of these flows requires that we understand their characteristics and influence on the macroeconomy. Although there has generally been consensus surrounding the concept of remittances, the accepted practice of aggregating the current categories *workers' remittances, employee compensation,* and *migrants' transfers* into one series is problematic at best and could result, at worst, in serious misspecification and faulty conclusions. A preliminary examination of the data on and definitions of employee compensation and migrants' transfers reveals that these flows are conceptually different from and behave differently than workers' remittances. In short, measurement matters. Researchers and policymakers who have previously relied on such an aggregated series of data to draw conclusions and make inferences about the nature of remittances and their impact on economic activity and the decisions of households should reexamine their positions using the more precisely defined category *workers' remittances* alone. This classification most closely captures the generally accepted definition of remittances and matches what the official community has stated will be the accepted classification. We welcome the proposed changes that the IMF Committee on Balance of Payments Statistics and the Advisory Expert Group on National Accounts have proposed regarding the classification of remittances as personal transfers, and we hope that the changes do indeed result in much-needed clarity in this regard.

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[4]The changes also include introduction of two additional categories, *total remittances* and *total remittances and transfers to nonprofit institutions serving households*. The former includes the new category *personal remittances* plus social benefits. The latter is based on the new category *total remittances* plus current and capital transfers to nonprofit institutions serving households. Both items will also be regarded as supplementary items. See Reinke (2007) for additional discussion.

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III   Remittances: Stylized Facts

Given the findings of the previous chapter, the next logical step is to establish a new set of stylized facts about remittances derived from properly measured data. Because stylized facts identify the basic set of questions and issues to be explained, it is essential to begin with an accurate data set. Therefore, the chapter first undertakes a complete examination of the empirical characteristics of workers' remittances,[1] beginning with evidence on the growth of workers' remittances over the past three decades and followed by regional and cross-country comparisons of remittance receipts. Then the chapter presents comparisons of workers' remittances with other international balance of payments flows, with special emphasis on the volatilities of the various flows. Finally, the chapter examines evidence on the correlation of workers' remittances with the most important macroeconomic variables. Wherever appropriate, the behavior of remittance flows to developing countries is emphasized.

The chapter uses cross-country data as well as aggregate data to maximize the descriptive power of the stylized facts developed. Because the data aggregation process masks some important underlying heterogeneity of individual country data and variation across countries, a thorough examination of stylized facts using a cross-country database is necessary. For example, one of the chapter's key findings is that macroeconomic performance varies broadly across countries with different levels of exposure to remittance flows. The chapter's first section, which presents stylized facts regarding growth of remittances and their comparison with other balance of payments flows, predominantly employs aggregate data, whereas the second section predominantly uses cross-country data.

Stylized Facts Using Aggregate Data on Workers' Remittances

Global measured flows of workers' remittances have increased rapidly for more than three decades, from

about US$6 billion in the early 1970s, to US$50 billion in the mid-1990s, to US$114 billion in 2003 (Figure 3.1). The majority of remittance flows, as expected, go to developing countries. In 2003, for example, developing countries received US$104 billion in remittance flows, a sum that equates to 91 percent of global workers' remittances in that year and 1.4 percent of total developing country GDP.

The increase over time in measured remittance flows is due, to a certain extent, to an expansion in the set of countries reporting remittances, which grew from an initial group of 4 countries to more than 70 by the mid-1990s and to 104 countries reporting in 2003. For this reason, it is also informative in terms of capturing an overall trend to look at the evolution of flows per reporting country. Viewing the data in this way does not change the broad conclusion that remittance flows have been increasing rapidly in importance over time, because average remittances per country have shown a similarly impressive upward trend, increasing roughly by a factor of eight (from US$150 million to US$1.2 billion) over the study period and almost doubling between 1994 and 2003. Data availability for remittances for 2004 and beyond is subject to reporting lags, which reduces the set of countries with available data to 92 in 2004 and 40 in 2005. However, the available data in these years suggest that the upward trend in remittance flows has continued, as the per country figures increased from US$1.1 billion in 2003 to US$1.3 billion in 2005. Extrapolating this average to the 104 countries that reported in 2003 would result in estimated global remittance flows of US$135 billion for 2005.

In terms of regional flows to developing countries, developing Asia and the western hemisphere receive the largest amounts of workers' remittances, though the Middle East has seen recent strong growth, with a doubling of remittance flows between 2000 and 2003 (Figure 3.2). Mexico was the largest developing country recipient of workers' remittances in 2004 with US$16.6 billion, followed by the Philippines, Lebanon, China, and Morocco (Figure 3.3). Taking a longer-term perspective, the five largest developing country recipients of workers' remittances over the period 1990–2004 were, in order, India, Mexico,

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[1]Based on the findings in the previous chapter, this term is taken to refer specifically to data in the category *workers' remittances* from the World Bank (2006) WDI database. Data in the categories of *employee compensation* and *migrants' transfers* are not included.

Figure 3.1. Worldwide Workers' Remittances, 1970–2003
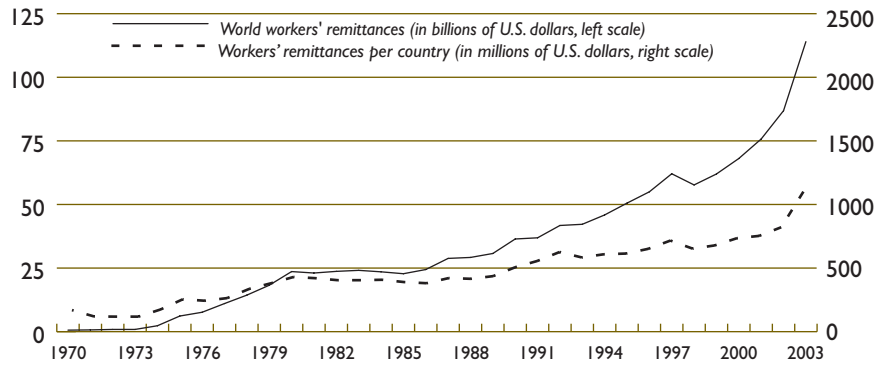
Source: World Bank (2006).

Note: World workers' remittances is the sum of the category *workers' remittances* across all countries for which data are available for the year specified. Per country figures divide this amount by the number of countries reporting data in that year.

Figure 3.2. Workers' Remittances by Region: Developing Countries, 1980–2003
(In billions of U.S. dollars)
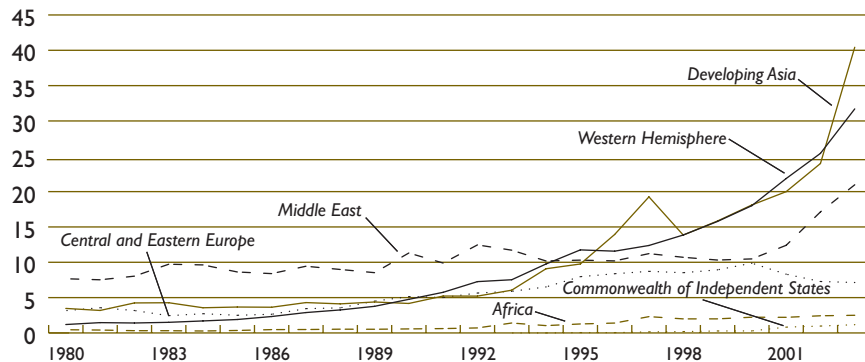
Source: World Bank (2006).

Note: Regions and countries are categorized according to IMF WEO country groupings. Statistics reflect the sum of workers' remittances across all countries for which data are available in the respective regional classification.

Lebanon, Egypt, and Turkey (Figure 3.4). For policy purposes, however, what matters is not the absolute level of remittance flows, but their magnitude as a percentage of recipient countries' GDP. By this measure, the top 20 developing country recipients of workers' remittances for 2004 received flows of between 9 and 24 percent of GDP (Figure 3.5), with the five largest recipients—Haiti, Lebanon, Guyana, Jordan, and Jamaica—receiving remittances equaling 17 percent of GDP or more. Figure 3.6 presents the largest recipients of workers' remittances relative to GDP over the 1990–2004 period, with Samoa, Tonga, Bosnia and Herzegovina, the Republic of Yemen, and Jordan emerging as the top five.

In terms of their importance in the balance of payments, workers' remittances exceed both official

Figure 3.3. Top 20 Recipient Countries: Workers' Remittances, 2004
(In billions of U.S. dollars)

Source: World Bank (2006).
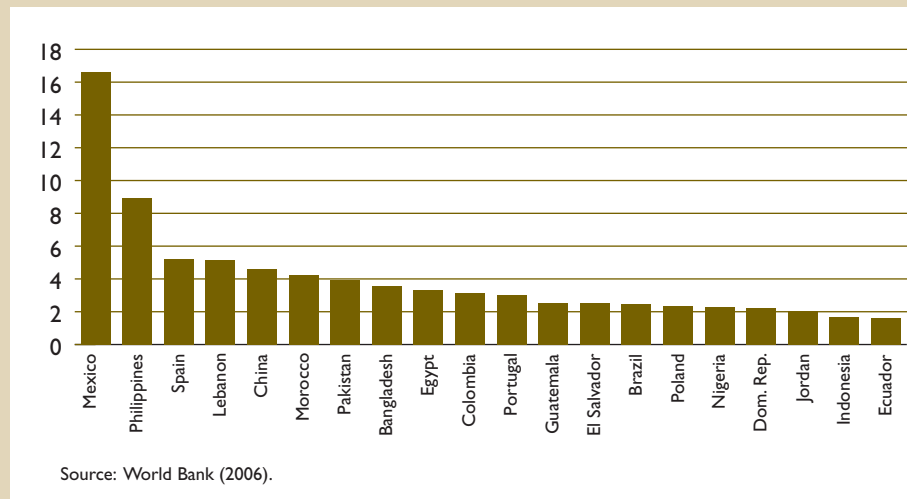
Figure 3.4. Top 20 Recipient Countries: Average Workers' Remittances, 1990–2004
(In billions of U.S. dollars)

Source: World Bank (2006).
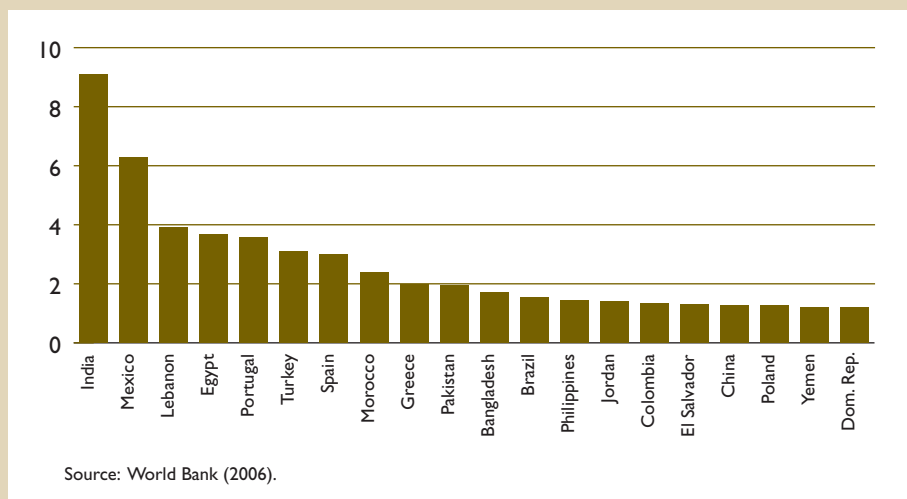
aid and non-FDI private capital inflows to developing countries and have generally done so consistently since 1998 (Figure 3.7). Moreover, workers' remittances have displayed much less variability than other balance of payments flows. Using data from 1980–2003, Figure 3.8 displays the volatility of each category of flows based on the standard deviation of the detrended ratio of the corresponding variable to

GDP.[2] According to the data, official aid, normally considered a stable source of financing for develop-

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[2]Detrending before computing standard deviation and correlations is the accepted practice in the real business cycle literature. Ratios were detrended using the filter from Hodrick and Prescott (1997). Computing the standard deviation of the nondetrended ratio of the variable to GDP, however, results in a similar ordering.

Figure 3.5. Top 20 Recipient Countries: Ratio of Workers' Remittances to GDP, 2004
(In percent of GDP)

Source: World Bank (2006).
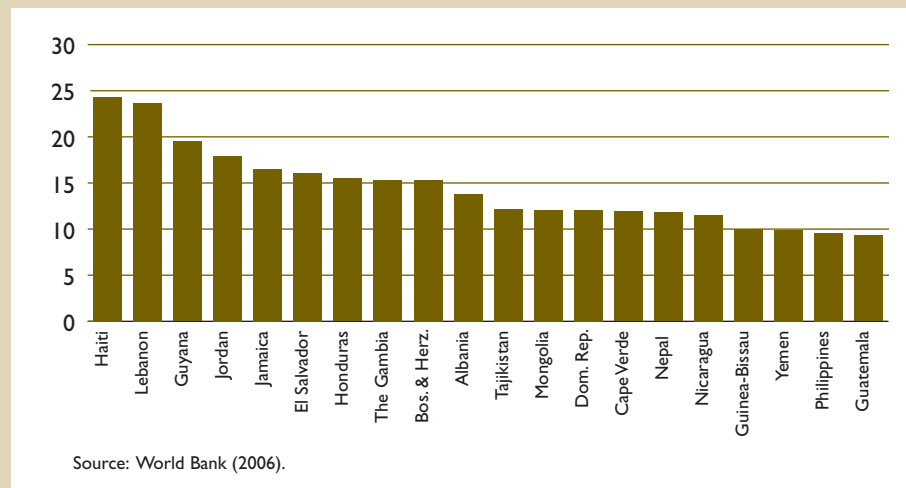
Figure 3.6. Top 20 Recipient Countries: Average Ratio of Workers' Remittances to GDP, 1990–2004
(In percent of GDP)

Source: World Bank (2006).
Note: Combined statistics are reported for Serbia and Montenegro, reflecting the union of the two countries during the period covered by the figure.
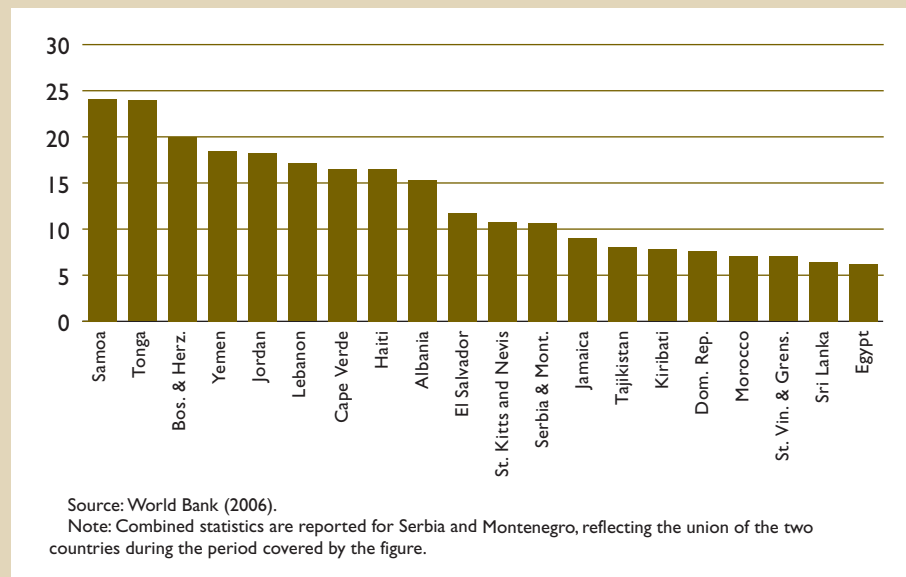
ing countries, was three times as volatile as workers' remittances over the time period covered in the figure. FDI, non-FDI private capital inflows, and exports were 17, 22, and 74 times as volatile, respectively, as workers' remittances over that time period.

Overall, examination of the stylized facts based on the aggregate quantity of workers' remittances reveals remittances' relative global macroeconomic importance. Flows of workers' remittances have been growing consistently over time and now represent the second-largest

Figure 3.7. Workers' Remittances and Other Inflows to Developing Countries
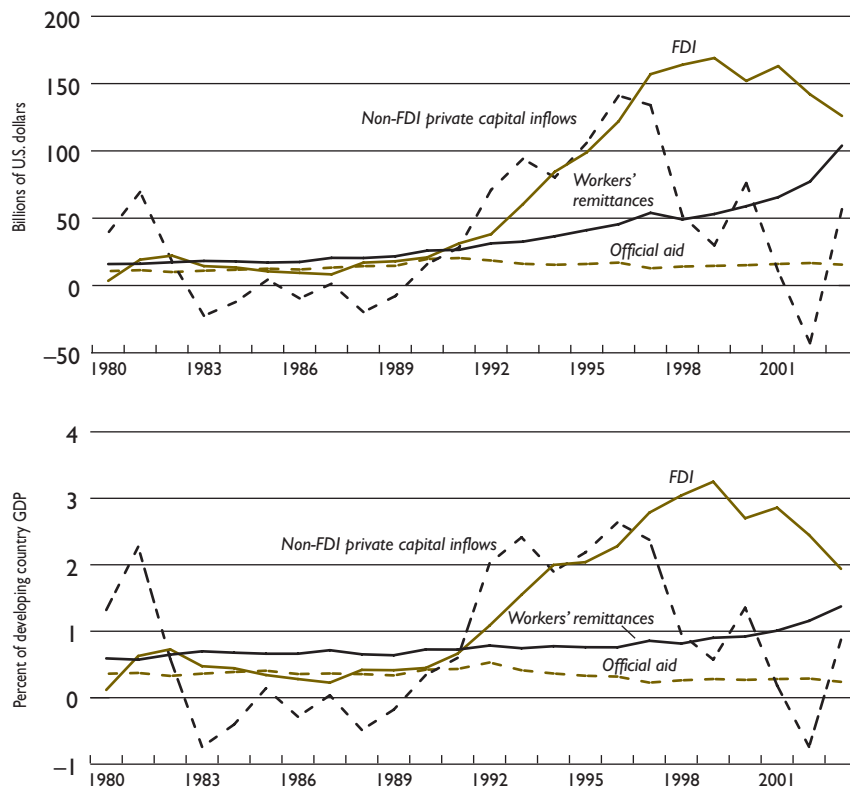
Sources: IMF (2005, 2006b).
  Note: Countries are grouped as in the *World Economic Outlook*. Upper panel reflects aggregate flows to developing countries, and lower panel reflects each series as a percentage of developing country GDP.

balance of payments inflow to developing countries. Their relative stability versus that of other inflows to developing countries may provide additional macroeconomic benefits in terms of reduced volatility of output and consumption, two issues that subsequent chapters examine. The next section examines whether these stylized facts hold when cross-country remittance data are used instead of an aggregate series.

Stylized Facts Using a Cross-Country Database of Workers' Remittances

Measures of worldwide or regional remittance flows in relation to aggregate measures of GDP, though useful in identifying major trends over time, likely underestimate the impact these flows have on individual countries. For example, the ratio of workers' remittances to

aggregate GDP in developing countries stabilized in the 1990s at around 1 percent, before rising in recent years, to 1.4 percent in 2003 (see Figure 3.7). Aggregating workers' remittances in this manner assigns greater weight to larger economies that may not be receiving a significant amount of remittances and may underestimate the impact that remittances have on the macroeconomy in many countries.

An alternative approach to using aggregate figures is to construct an average ratio of workers' remittances to GDP over a particular time period for each developing country in the sample and then compute the cross-country average. Table 3.1 reports the results of such a cross-country procedure based on two time periods, 1970–2005 and 1995–2004, as well as for 2004. The average ratio of workers' remittances to GDP from this cross-country sample was indeed noticeably larger than the GDP-weighted measure previously reported,

Figure 3.8. Volatility of Inflows to Developing Countries, 1980–2003
(Standard deviation in percent)

Sources: World Bank (2006) and IMF (2005).
Note: Volatility is defined as the standard deviation of the detrended ratio of each variable to GDP, with detrending accomplished using the Hodrick-Prescott (1997) filter.
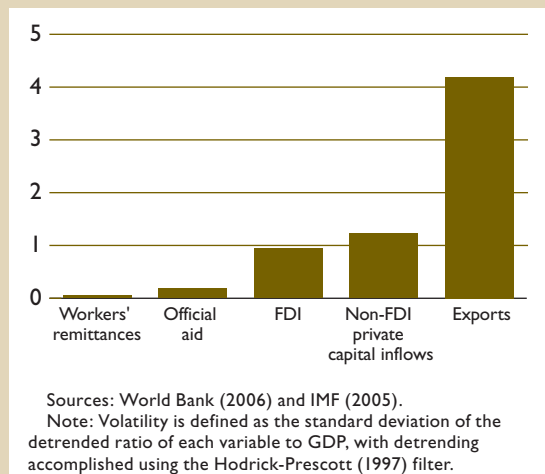
registering 3.7 percent for the entire 1970–2005 study period and 3.6 percent for the more recent 1995–2004 period. The average ratio of workers' remittances to GDP across countries increased to 4.2 percent in 2004, reflecting the upward trend that was observed in the GDP-weighted average figures. Adjusting the procedure to eliminate countries that report only periodically does not alter these results.[3] Thus, aggregation of the data

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[3]To examine the effects that changes in the country sample may have over time, the statistics were recomputed for unchanging samples of emerging countries that reported remittances for all years within the following subperiods: 1980–2004 (20 countries), 1990–2004 (33 countries), and 1995–2004 (53 countries). Analysis

appears to lead to an underestimation of the importance of workers' remittances in many countries.

The country-specific figures also reveal considerable variation across countries. For the entire study period from 1970 to 2005, the cross-country standard deviation of average remittances was equal to 4.9 percentage points of GDP, and 5.8 percentage points during 1995 through 2004. Closer examination of the distribution across countries during this 10-year period reveals a clustering of countries. First, 48 countries (44 percent of the observations) received an average of 1 percent of GDP or less per year in workers' remittances (Figure 3.9). In other words, nearly half of the observations record little in the way of workers' remittances. A second cluster of 25 countries (23 percent of the observations) recorded an average ratio of workers' remittances to GDP in the 2–5 percent range, and 7 countries (6 percent of the observations) received average annual flows of 15 percent of GDP or more.

Although the aggregate figures conclusively point to a large and growing presence of remittance flows in the developing world over the past decade or so, the heterogeneity of different countries' exposure to this phenomenon is also a critical feature of the data. This heterogeneity proves beneficial in the empirical work presented in subsequent chapters, as it provides the variability needed to test whether remittances indeed affect macroeconomic performance. Furthermore, the

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of these stable samples results in the same conclusion regarding the evolution of the ratio of workers' remittances to GDP over time: a slight downward trend from the mid-1980s to the mid-1990s, followed by a prolonged upward trend that reaches its peak in 2002–2003. However, the average ratio of workers' remittances to GDP is even higher when computed for the stable subgroups of countries. Countries in the group reporting remittances for at least 25 years (i.e., 1980–2004) received an average of 6 percent of GDP in workers' remittances in the last two years of the sample period, compared to just over 4 percent 10 years ago.

Table 3.1. Emerging Economies: Workers' Remittances
(In percent of GDP)

	1970–2005	1995–2004	2004
Mean workers' remittances–to–GDP ratio across countries and time	3.7	3.6	4.2
Maximum workers' remittances–to–GDP ratio across countries and time	64.0	40.8	17.9
Number of countries	145	108	77
Number of observations	1,906	839	77
Cross-country standard deviation	4.9	5.8	5.2

Note: The average ratio of workers' remittances to GDP was computed for each country in the sample across the time period indicated. A cross-country average was then obtained and is reported as the mean ratio in the table.

**Figure 3.9. Emerging Economies:
Workers' Remittances, 1995–2004**
(In percent of country GDP, period average)

Source: World Bank (2006).
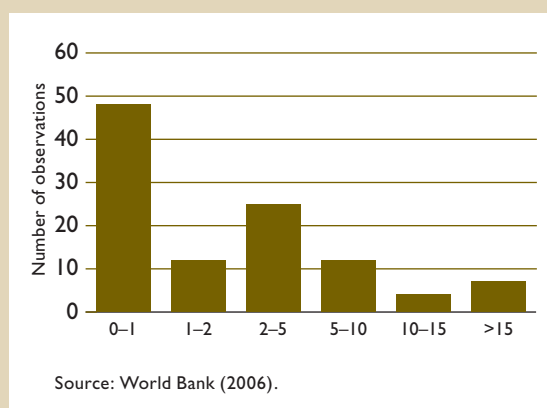
clustering of countries at the low end of the distribution of remittance flows provides the sample with a group of control countries—those relatively unaffected by remittances—against which to compare the performance of recipient countries.

Workers' Remittances and Other Foreign Exchange Inflows

This subsection compares remittance inflows in emerging economies with export earnings, official transfers, official capital flows, and private capital flows received by those economies.[4] The importance of remittances to recipient countries' balance of payments becomes apparent immediately. On average over the 10-year period from 1995 to 2004, remittances equaled about one-third of export earnings, more than twice private capital flows, almost 10 times official capital flows, and more than 12 times official transfers (Table 3.2). As in the previous subsection, there is considerable heterogeneity across countries. At the maximum, remittances can equal up to 4 times export earnings, almost 40 times the level of private capital flows, 371 times official capital flows, and 217 times official transfers. For a representative recipient country such as Senegal, workers' remittances averaged 3.7 percent of GDP during this period, equal to about one-fifth of exports, 1.5 times private capital flows, more than three times official capital flows, and almost twice official transfers.

Thus, although workers' remittances have not been uniformly important for all emerging economies, for the very large group of countries where they are important, they have been increasing rapidly since the early 1990s. Moreover, they have grown so much that remittance flows are now far larger than many other types of foreign exchange inflows that have traditionally received much more attention.

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[4]Note that the year 2005 is largely excluded from the discussion in this subsection because of the relatively small country coverage of the data for that year.

Table 3.2. Developing Countries: Workers' Remittances in Relation to Selected Balance of Payments Inflows

	Ratio of Workers' Remittances to			
	Official Transfers	Official Capital Flows	Private Capital Flows	Exports
Recent period: 1995–2004				
Mean across countries and time	12.2	9.6	2.4	0.3
Maximum country average	217.1	371.5	39.7	4.0
Cross-country standard deviation	34.2	47.9	6.0	0.7
Country with average ratio of workers' remittances to GDP	1.9	3.4	1.5	0.2
Recent observation: 2004				
Mean	41.8	12.7	2.6	0.2
Maximum	1,648.7	145.6	39.7	3.2
Cross-country standard deviation	212.5	32.6	6.0	0.5
Country with average ratio of workers' remittances to GDP	…	4.5	1.3	0.3

Sources: World Bank (2006), IMF (2006a, 2006b), and authors' calculations.

Table 3.3. Emerging Economies: Volatility of Workers' Remittances in Comparison to Selected Balance of Payments Inflows
(Standard deviation in ratio to GDP, average across countries)

	Official Transfers	Official Capital Flows	Private Capital Flows	Workers' Remittances
Sample periods				
1970–2005	2.9	3.5	6.6	1.8
1980–2005	2.9	3.5	6.5	1.8
1995–2005	2.0	2.7	5.5	1.3
Country with average ratio of workers' remittances to GDP	0.7	0.6	2.1	2.0

Sources: World Bank (2006), IMF (2006a, 2006b), and authors' calculations.

The Stability of Workers' Remittances in Comparison to Other Foreign Exchange Inflows

In addition to highlighting the sheer magnitude of remittance flows in relation to other international flows studied extensively in the literature, Chapter 2 also discussed the hypothesis that remittances, because they are conceptually distinct from official flows and from purely profit-seeking private flows, also exhibit visibly different behavior from these other flows. If they do, then given the magnitude of these flows, it becomes even more important to understand their macroeconomic role.

A first pass using nondetrended data provides support for this hypothesis. Flows of workers' remittances (scaled by GDP) appear to have been less volatile than other flows over the period 1970–2005: slightly less so than official transfers, but considerably less so than capital flows, both official and private (Table 3.3). The average annual standard deviation of workers' remittances was 1.8 percentage points of GDP throughout the study period, in comparison to 2.9 for official transfers, 3.5 for official capital flows, and 6.6 for private capital flows. In the more recent 1995–2005 period, although the volatility of all flows analyzed fell considerably compared to the entire study period, the standard deviation of remittances (1.3 percentage points) remained below that of official transfers, just below half that of official capital flows, and under a quarter that of private capital flows.

As might be expected given the conceptual differences outlined in Chapter 2, remittance flows have also proven to be uncorrelated with other international flows (Table 3.4). The average coefficient of the correlation between remittances and official transfers was slightly positive over the full study period (0.13) and for 1995–2005 (0.06) and slightly negative with respect to both types of capital flows over the full study period (–0.07 for private flows, –0.11 for official capital

flows). Furthermore, for more than half of the countries in the sample, remittances were negatively correlated with both types of capital flows throughout the entire study period, as well as during the more recent 10-year period.

Supporting the view that remittances merit unique attention, the evidence shows that remittances' magnitudes are considerable, even dwarfing other international flows in some cases; that remittance flows are relatively stable over time; and that they tend to be uncorrelated or even negatively correlated with other international flows. Furthermore, whereas some studies[5] have argued that remittances may behave similarly to investment-driven capital flows, the preliminary findings in this chapter should serve as a caution to researchers in this regard, particularly as among the flows examined here, private capital flows tended to be those with which the behavior of remittances over time had the least in common.

Workers' Remittances and Macroeconomic Performance: A Preliminary Look

Econometric studies examining possible impacts of remittance inflows on recipient countries' economic performance have proliferated in recent years. Most have addressed individual countries, but a few have focused on the implications for economic growth, using large sets of cross-country data.[6] Among the other key issues being explored in the literature are whether remittances enhance money demand or financial development more generally, whether they affect the long-

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[5]For example, Giuliano and Ruiz-Arranz (2005) and Lueth and Ruiz-Arranz (2006) argued that an investment rather than an altruistic motive pervades much of the behavior of remittances, in much the same way as it does foreign direct investment or portfolio flows.

[6]Most notably, Chami, Fullenkamp, and Jahjah (2003), Giuliano and Ruiz-Arranz (2005), and Catrinescu and others (2006).

**Table 3.4. Emerging Economies: Correlations Between Workers'
Remittances and Other Selected Balance of Payments Inflows**

	Correlation Coefficients Between Ratios to GDP of Workers' Remittances and		
	Official Transfers	Official Capital Flows	Private Capital Flows
Full sample period: 1970–2005			
Correlation over time—country averages	0.13	−0.11	−0.07
Percentage of countries with negative correlations	41	64	58
Number of countries	76	75	88
Recent period: 1995–2005			
Correlation over time—country averages	0.06	−0.07	−0.03
Percentage of countries with negative correlations	38	56	57
Number of countries	64	63	79

Sources: World Bank (2006), IMF (2006a, 2006b), and authors' calculations.

run equilibrium exchange rate, whether they smooth macroeconomic fluctuations and reduce the probability of current account reversals, and whether they affect the level of investment in general and expenditure on education more specifically. Chapters 5 and 6 present several theoretical models that show how remittances may have serious implications for short-term fluctuations and policies aimed at stabilizing them.

This subsection takes a preliminary look at these issues on an aggregate and purely descriptive level, leaving more rigorous analysis for subsequent chapters. The descriptive statistics in this subsection were developed based on a group of 100 countries during the 1995–2004 period.[7] The countries are ranked according to their ratio of remittances to GDP, then compared in terms of several macroeconomic variables: real GDP growth rate, inflation, percentage change in the real exchange rate, liquid liabilities and the fiscal balance (both expressed as a percentage of GDP), and the level of per capita GDP. Table 3.5 summarizes the data, dividing the sample into quintiles and examining the averages of macroeconomic variables and remittances for each. The table also compares the average values of these macroeconomic variables for the bottom and top deciles, as well as for the 50th percentile, and shows the correlation between remittances (scaled by GDP) and the variables.

As expected, poorer countries have been receiving relatively larger remittance flows. The data show a visible negative association between workers' remittances and the countries' level of income. Average per capita GDP in 1995–2004 descends from $6,907 among countries in the lowest quintile of remittance receipts to

$2,620 among countries in the highest quintile, and average workers' remittances increase from 0.1 to 11.1 percent of GDP, respectively. The coefficient of the cross-country correlation between the two is −0.24. However, there appears to be little correlation between a country's average real GDP growth and the level of remittances in that country. The small positive correlation shown in the table is due largely to an outlier, Bosnia and Herzegovina, which generated a high rate of growth and was the top remittance recipient in the sample during the years studied. If this country is excluded, average real GDP growth for countries in the highest quintile of remittance receipts drops from 4.4 percent to 3.9 percent, more comparable to those of the third and fourth quintiles (3.7 percent), and the overall correlation across countries becomes negative. Like GDP growth, inflation shows little discernible relation to remittances, with a correlation coefficient very close to zero.

Liquid liabilities, a proxy for the size of a country's domestic financial system, displays a positive correlation with the level of remittances. These liabilities tend to be much higher among countries in the first quintile (high income, low remittances) than among those in the second and third. This perhaps reflects the fact that higher-income countries, in the lowest remittance-receiving quintiles, also tend to have larger financial systems. Beyond the third quintile, however, liquid liabilities appear to increase once again, rising to 53 and 47 percent of GDP in the fourth and fifth quintiles, respectively.

Although countries' average fiscal balance does not fall smoothly as one moves from lower toward higher levels of remittances, there appears to be a certain negative relationship between the two; countries receiving remittances that amount to 1 percent of GDP or more

[7]To be included in the data set, countries needed to have at least three years of data during the period.

Table 3.5. Emerging Economies: Selected Macroeconomic Variables Across Percentiles of Workers' Remittances, 1995–2004

Average workers' remittances in percent of GDP	Quintiles	Period Averages					Per Capita GDP in (PPP) $US in 1995
		Real GDP Growth	Inflation	Percentage Change in REER[1]	Liquid Liabilities in Percent of GDP	Fiscal Balance in Percent of GDP	
0.1	1	4.1	10.8	0.7	50.1	−2.6	6,907
0.4	2	4.3	19.5	1.0	33.4	−1.3	3,572
1.7	3	3.7	11.2	−0.3	34.7	−3.6	3,402
3.8	4	3.7	8.8	−1.1	52.5	−3.0	2,827
11.1	5	4.4	14.4	−1.4	47.4	−3.2	2,620
Correlation with workers' remittances		0.15	−0.05	−0.20	0.12	−0.11	−0.24
0.0	Lowest decile	4.2	11.4	0.0	42.9	−1.6	5,908
1.7	50th percentile	1.4	9.3	−2.0	34.7	−1.1	4,450
15.5	Highest decile	4.7	11.6	0.7	52.4	−3.6	2,744

Sources: World Bank (2006), IMF (2006a, 2006b), and authors' calculations.
[1]Real effective exchange rate, defined as a multilateral exchange rate deflated by the CPI of weighted trading partners.

exhibited noticeably weaker fiscal outcomes over the study period. Finally, with the exception of the second quintile, countries receiving larger remittance flows tended to exhibit less currency appreciation, on average, than those receiving less. This result should be viewed with caution, however, as the country coverage for this variable in the sample was limited. Whereas nearly all 100 countries in the sample were represented in each of the other variables, only 48 countries had sufficient real exchange rate series during the period analyzed to be included in the data set for this variable. In particular, a real exchange rate series was not available for several countries among the highest remittance recipients, those for which a positive correlation between remittance flows and currency appreciation would be most likely.

Conclusion

By all measures, workers' remittances have been growing rapidly worldwide—particularly since the early 1990s—and today represent a very sizable component of the balance of payments of recipient countries. According to comparisons to other types of international flows—foreign direct investment, official aid, and private capital flows—presented in this chapter, remittances are second only to FDI in size, but are several times larger in magnitude than remaining official and private flows. The evidence presented in this chapter also shows that remittances tend to be significantly more stable over time than other balance of payments flows, especially private capital flows and exports. Finally, remittances are found to be largely

uncorrelated with other foreign exchange inflows, thus supporting the expectation that, given their nature as unrequited private transfers among family members, remittances should behave differently from other foreign exchange flows.

In addition to these overall trends, the examination of the data in this chapter also reveals considerable heterogeneity in remittance inflows among the different emerging economies. Nearly half of developing countries receive remittances of less than 1 percent of GDP, whereas for others, remittances have surpassed 15 percent of GDP and exceed the country's total export earnings. The degree of heterogeneity in the data provides the variability and control groups necessary to test the effects of remittances on macroeconomic performance. Taking into consideration this cross-country heterogeneity, results of the chapter's analysis of the relationship between remittances and macroeconomic variables of interest (level of income, real GDP growth, inflation, the fiscal balance, and the level of the real exchange rate) suggest that relationships between remittances and macroeconomic performance are likely to be complex, with many other conditioning variables at play, and perhaps nonlinearities as well. Subsequent chapters explore these interactions and econometric issues in more detail.

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IV   What Drives Remittance Flows?

Understanding the motivations for remitting is necessary for analyzing the wider economic consequences of remittances, for at least two reasons. First, the amount that a migrant transfers to family members remaining at home at any given time depends, among other things, on the migrant's underlying motivations to go abroad and to remit funds in the first place. The size and timing of remittance flows in turn determine their effects on economic activity in the receiving country. Second, the intended purpose of remittances affects the end uses of these funds, and the uses to which recipients put them is also an important determinant of their economic impact on the recipient economy.

Ideally, the literature on the causes of remittances would provide a list of the main variables that drive remittances and predict the expected relationship between these causal factors and the size and timing of remittance flows. In addition, this literature would also provide a set of stylized facts about the economic activities that remittances fund, including evidence on whether the uses of remittances change in response to changes in the factors driving the remittances. This information could be incorporated into theoretical and ultimately empirical models and hence improve our ability to discern the impacts of remittances on recipient economies.

Unfortunately, the existing literature on the causes and uses of remittances falls far short of these ideals, though not for lack of effort. The proliferation of studies on these issues has tended to increase confusion about the causes of remitting behavior and the uses of remittances, rather than improve our understanding of these activities. In part, this confusion has resulted because remitting is a deceptively simple activity whose true complexity research has gradually revealed. Part of the confusion also stems from limitations in the data, which place severe constraints on the types of questions that can be asked and the conclusions that can be drawn from statistical analyses. Several of the key limitations of the existing aggregate data on remittances are by now well known, and Chapter 3 adds further important cautions about these aggregate data. In addition, the microeconomic data sets in existence have not necessarily been constructed for the purpose of studying remittances and typically do not ask the questions of

greatest interest to researchers studying remittances. Finally, the data sets are not comparable across samples in terms of content or methods of measurement, so the results from studies on remittances cannot be compared easily. In short, the lack of cross-country longitudinal data on the behavior of individual remittance-sending and remittance-receiving households is keenly felt.

Much of the confusion, however, stems from the lack of a universally accepted framework for characterizing and interpreting the research on remittance determination. In particular, it has become difficult to distinguish, either theoretically or empirically, among several of the theories of remittance determination that have recently appeared in the literature. This prevents scholars in the area of remittances from reaching consensus regarding the phenomenon's causes. Thus, this chapter's immediate goal is to establish a useful basis for classifying and distinguishing among theories of remittance determination. Doing so will clarify the implications, for the economic impacts of remittances, of the factors driving these flows. In the analysis that follows, we specify our framework for analyzing remittance determination, use the framework to resolve the confusion present in the literature, and discuss the implications of the literature on the causes of remittances for the phenomenon's economic impact.

Factors Driving Remittances

Theory

The remittance-determination process has three aspects that jointly influence whether a migrant remits, and if he or she does so, the timing and quantity of the remittances he or she makes. Although all three aspects are present, at least implicitly, in the literature, the analysis presented in this chapter is the first that recognizes them explicitly and clarifies their relationship to each other.

To identify these aspects, consider remittance determination on the most basic level. When migrants remit funds to their families, they do so because they believe they can increase their own utility by doing so. Let us use the term *motivation for remitting* to denote the

aspect of the remitter's utility function that generates utility from remitting. The literature identifies only two basic motivations, under this definition, for remitting: *altruism* and self-interested exchange, which we'll simply call the *exchange* motivation. Altruism motivates remittances because the recipient's utility (or consumption) is an argument in the remitter's utility function, so the remitter derives utility from the recipient's consumption, which is funded in part by the remittances sent. Exchange, on the other hand, motivates remittances because remittances are a resource belonging to the remitter that may be exchanged for goods and services that provide utility to him or her.

The desired increase in utility that motivates the migrant to remit needs to be fulfilled through some concrete means. The remitter, perhaps in cooperation with the remittance recipients, formulates a plan for using the remittances, which we call the *intended use* of the remittances. Although the remitter's intended uses of remittance funds may be quite specific (that is, the remitter may want the recipient to purchase particular goods, services, and assets), they may also be quite general. But whether these intended uses are narrowly or broadly specified, they fulfill one of only a few basic economic functions. Therefore, we classify the intended uses of remittances by their economic purpose. According to this view, remittances have two main (intended) uses: risk sharing (insuring) and altering the intertemporal path of consumption (consuming, saving, and investing). In addition, some (and perhaps many) households use a portion of the remittances received from the migrant to purchase services to replace the migrant's labor contributions to the household. These transfers enable migration to take place, so they are "overhead" costs of migration that must be paid and hence are derived from the original decision to migrate (and remit).

Remittance recipients are the ones who have responsibility for implementing the remitter's plan, once they receive the transfer. They make specific purchases or investments, which we call the *end uses* of the remittances. Money sent by the remitter ends up being spent on the purchase of final goods and services (for consumption), of financial assets (including being held as cash), or of real assets (including human capital). There is, in short, a *remittances accounting identity* that describes the end uses. Because of asymmetric information, the remitter cannot dictate the end uses of remittance funds to the recipient. Therefore, the end uses lie along a continuum ranging from completely congruent with the remitter's intended uses to completely contrary to them. The remitter understands this and adjusts his or her remitting behavior accordingly. Therefore, the end uses of remittances play an important role in remittance determination.

The framework described in the foregoing implies that each theory of remittance determination pairs an underlying motivation for remittances with an intended function and may also specify one or more end uses of the remittances that are consistent with (or even specifically implied by) the motivation and intended function. Thus, we fully characterize remitting behavior by describing its motivation, its intended function, and its end use. For example, one migrant may be altruistically motivated to insure her family, so she remits funds that are spent on consumption goods. On the other hand, another migrant may have an exchange motivation to smooth consumption and hence remits money to his family in part to purchase assets for him and in part to pay the family member(s) a fee for their agency in making the investment on his behalf (in real property, for example). The family members, in turn, may consume or invest the payments received for these services. Of course, it is possible (if not likely) for a particular remittance transaction to have both altruistic and exchange motivation, both risk sharing and consumption smoothing as intended functions, and multiple end uses as well.

This view of the remittances process leads to two important realizations about theories of remittance determination. First, such theories cannot be distinguished from one another solely on the basis of end uses or even intended functions. The intertemporal time path of both consumption and risk sharing can be altered through adjusting all three of the end uses of remittances described previously. And each intended function of remittances is consistent with both motivations for remittances. Theories can be distinguished from one another only by specifying the complete path from motivation to end use. In short, the "insurance" or "inheritance" theories of remittance determination that appear in the literature are not complete theories but only parts (in this case, dealing with the intended function) of complete theories.

The second realization is that it does not make sense to compare the three aspects of remittance determination to one another. For example, it does not make sense to compare altruism (motivation) to insurance (intended use) as separate "theories" of remittance determination, because they do not describe the same aspect of the remittances phenomenon. In addition, as we argued earlier, they are not even mutually exclusive concepts. Indeed, a critical reading of the literature on the theory of remittance determination finds ample support for the idea that multiple motivations and intended uses for remittances can coexist.

Early approaches to the theory of remittances identified and described various costs and benefits to remitting, which tend to fall under the rubric of exchange motivation. Russell (1986) summarizes these costs and benefits. Stark and Bloom (1985) realized that the appropriate unit of analysis in attempting to answer questions about migration and remittances is the family, because the entire family is sharing—and trading

off—the costs and benefits of remitting. This approach leaves the door open for both altruistic and exchange motivations to remit, as we show later in the chapter.

Many economists, especially before the advent of the new economics of labor migration, acknowledged that family ties in the form of mutual caring are probably a prime motivation for remitting. The earliest studies on remittances, such as Johnson and Whitelaw (1974), mention altruistic motivations for remittances. Lucas and Stark (1985, p. 902) write that "certainly the most obvious motive for remitting is pure altruism—the care of a migrant for those left behind. Indeed, this appears to be the single notion underlying much of the remittance literature." They go on to specify an altruistic utility function in which the migrant's utility includes the consumptions of the other members of the migrant's household. This, however, is the maximum extent of formalization of the altruistic model of remittances.

More recent theories have focused on the idea that there can be self-interested reasons for remitting as well, which nevertheless center on the family. These self-interested theories of remittances are still based on the family because they view the family as a business or as a nexus of contracts that enables the members to enter into Pareto-improving arrangements. Several different types of businesses or contracts are possible within these theories, which has led to various self-interested models of remittances. In the initial paper involving this sort of theory, Lucas and Stark (1985) suggest that migrants may have investments that need to be tended while they are away, so they use other family members as their agents. The remittances the migrant sends are employed to care for the migrant's interests, but they also provide some compensation for the agents. Hoddinott (1994) emphasizes that the family left behind exercises leverage over the remitter. In Hoddinott's paper, families reward high levels of remittances by increasing the remitter's share in the inheritance of family lands. In both cases, remittances are at least partially motivated by exchange considerations, and the intended use of the remittances is to smooth consumption.

Another potential role for the family is that of a service provider. Stark (1991), as well as Aggarwal and Horowitz (2002) and Gubert (2002), suggests that the family can function as an insurance company that provides members with protection against income shocks by diversifying the sources of income. Yang and Choi (2007) show that agricultural families in the Philippines use remittances to compensate for income shocks, which are proxied by lack of rainfall. In these papers, remitters tend to provide insurance for other family members, whereas in Amuedo-Dorantes and Pozo (2006), the family provides insurance to the remitter, and the remittances function as the insurance premiums. On the other hand, Poirine (1997), as well as Ilahi and Jafarey (1999), models the family as a bank that finances migration for some members. The borrowers remit funds to repay the loans that financed their migration, which are used for additional loans to further the interests of other individual family members. Finally, Secondi (1997) makes explicit the idea that remittances are used to purchase services to replace the migrant's contributions to household production—in the case of Secondi's study, remittances purchase child care services from the migrants' family or in-laws.

One of the main messages of the theoretical literature on the causes of remittances is that there exist plausible exchange motivations as well as altruistic motivations for remittances. But one point that the recent literature does not sufficiently acknowledge is that altruistic and exchange motivations can coexist. For example, the exchange motivation's implicit contracts require enforcement mechanisms to function properly, and these enforcement mechanisms are likely to be based on altruism. Chami and Fischer (1996) show that altruism is a mechanism by which independent agents find partners with whom to enter into risk-sharing arrangements, which implies that altruism makes contracting possible in the first place. Altruism is also a potent enforcement mechanism for exchange-motivated remittances: migrants live up to their obligations because they care about the family members who are the counterparties to the agreement. This idea is explored in Stark and Lucas (1988).

But the role of altruism in remittance determination implied by the literature is too fundamental to be limited to serving only as an enforcement mechanism for implicit contracts. The more likely possibility is that both altruistic and exchange motivations for remittances are operative at the same time. A theoretical framework that allows for this possibility is provided in the work of Becker (1991) on merit goods (see also Chami, 1998, and Mulligan and Philipson, 2000). Merit goods are the most general expression of what a remitter "purchases" from a recipient. In addition to services that could be purchased on the market, they also include any nonmarket services the recipient renders to the benefactor, as in Bernheim, Shleifer, and Summers (1985) and Cox (1987), among others. Therefore, merit goods include all of the within-family exchanges previously described. But merit goods also include actions the recipient takes that directly enhance the recipient's income and welfare without necessarily providing goods or services to other members of the family, including the remitter. For example, the altruistic remitter may expect a recipient to expend effort in finding a job or in choosing an investment project, or to excel in his or her job or investment. In this case, the merit good consists of the effort the recipient expends.

In a model in which both exchange (merit goods) and altruism motivate remittances, the remitter's utility not only would encompass a concern for the recipient's welfare, but also would involve certain expectations

regarding the recipient's behavior. More generally, the remitter's utility function is given by U_E (c_E, a, U_H), where c_E is the emigrant's consumption, a is action the recipient takes, and U_H is the recipient's utility.

This generalized exchange view of the motivation to remit has profound implications for empirical tests of remittance determination, following results first shown by Chami (1998). Chami extends Becker's merit good model to include an outside labor market whose outcome depends in large part on the actions taken by the recipient of remittance transfers. In this model, Chami explores the impact of familial transfers on recipients' actions under perfect and complete information as well as in the presence of asymmetric information regarding the actions taken by the recipient of such transfers. One key finding is that it is not simple or straightforward to ascertain ex post which motivation for transfers is operative. In particular, analyzing the relationship between market outcomes and transfers does not reveal whether the altruistic or exchange motive is at work. In other words, Chami shows that the simple test used in earlier studies—such as Bernheim, Shleifer, and Summers (1985) and Cox (1987)—to ascertain which motive for transfers is at work fails when one allows for the case of more general merit goods and when one introduces outside market and informational problems into the analysis. These findings suggest that it is extremely difficult to distinguish between the altruistic and exchange motivations for remittances using data on market outcomes.

Evidence

The empirical literature on remittance determination is even larger than the theoretical literature. In empirical studies of remittance determination, data on the amount and timing of remittances are correlated with data on the end uses of remittances, various measures of remitter and recipient characteristics, and economic indicators, with the intention of inferring the intended functions of and underlying motivations for remittances. Broadly speaking, three types of data are used to estimate remittance-determination equations. One type describes the economic conditions for the migrant and for the migrant's family, including variables such as migrant income and family income. Another type involves demographic variables, some of which (such as education variables) proxy for income, and others of which proxy for the strength of the connection between the migrant and his or her family, as well as for any contracts or agreements that may exist between migrant and family. For example, the migrant's length of stay in the host country, the size of the family left behind, and the number of other migrants in the family are frequently used in remittance-determination equations that employ microeconomic data, and the stock of migrants in the host country is commonly used in macro-data studies. Finally, the third type of data describes the

quality of the opportunities available for different end uses of the remittances. For example, many studies of remittance determination have included financial variables such as interest rates and black market exchange premiums, as well as proxies for political risk.

In general, most empirical analyses of remittance determination include some demographic variables such as the stock of migrants in the host country (or family characteristics, in the case of micro data), economic variables such as wages or income, and financial variables such as interest rates.[1] The demographic and income variables tend to be significant in nearly all estimations, whereas the quality of opportunity variables' significance varies, depending on the sample and specification. This is probably the most reliable stylized fact to emerge from the empirical literature on the causes of remittances. Variables that proxy for the migrant's capacity to remit, such as income, as well as demographic variables that capture strength of family ties, seem to have consistently significant explanatory power for the amount and timing of remittances. Some studies have produced interesting comparisons of the remitting behaviors of different groups,[2] but these comparisons do not necessarily help distinguish among different theories of remittance determination.

Despite the number and variety of empirical studies on remittance determination, one cannot use their results to distinguish among theories of remittance determination with much confidence.[3] Various studies have claimed to find evidence of exchange or altruistic motivations for remittances, manifested in the various intended uses (insurance, inheritance, and so on) described previously, and many find evidence of both motivations. But given our theoretical framework, and the problems it reveals in the existing theoretical literature, many of these claims need to be reevaluated. Correlations observed in the data are consistent with multiple theories of remittance causation, so that there are very few (if any) conclusive ways to nest hypotheses and conduct tests among different theories. As the discussion of our theoretical framework in the previous section shows, nearly any end use of remittances is consistent with each of the intended functions and motivations for remittances, making the theories quite difficult to distinguish from one another empirically, using end-use data. Using data on remitter and recipient characteristics to distinguish among theories encounters similar difficulties. A positive or negative coefficient

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[1]See, for example, Swamy (1981), Banerjee (1984), Glytsos (1988), El-Sakka and McNabb (1999), Buch, Kuckulenz, and Le Manchec (2002), Aydas, Metin-Özcan, and Neyapti (2005), and Gupta (2005).

[2]See, for example, Merkle and Zimmerman (1992), Funkhouser (1995), de la Brière and others (2002), and Vanwey (2004).

[3]Recall that in our framework, each theory of remittances pairs a particular motivation with a particular intended use for the remittances (and possibly a particular end use as well).

on a particular explanatory variable, in other words, may be consistent with multiple theories, rendering interpretation of empirical results difficult. In addition, as mentioned previously, the generalized exchange or merit good motivation for remittances is very difficult to distinguish from altruistic motivation ex post. And finally, a single remittance flow may have several components, each corresponding to a completely different theoretical chain of causation. This may introduce variability into the estimations, via errors in variables, that reduces statistical significance.

This identification problem features prominently in Docquier and Rapoport (2006), which attempts to organize the literature on remittances to find ways to distinguish theoretically and empirically among remittance-determination theories. Docquier and Rapoport find relatively few testable differences among the various models they examine. In view of the analysis presented in the previous paragraph, it is not surprising that these authors encounter this problem. In addition, Docquier and Rapoport's paper confounds the three links in the remittance chain, leading the authors to improperly multiply and attempt to compare partial theories of remittance determination. In particular, the paper acknowledges "altruism," "exchange," "inheritance," "strategic motive," "insurance," and "investment" theories of remittance determination. These concepts actually describe partial theories of remittances that are not necessarily mutually exclusive or even directly comparable. And even the tests that Docquier and Rapoport suggest may not necessarily be conclusive, given our argument earlier in the chapter that each of the motivations can be matched with any of the intended functions and end uses of remittances to form distinct (though not necessarily empirically distinguishable) theories of remittance causation.

The unfortunate conclusion that emerges from an assessment of the literature on remittance determination, therefore, is that neither the theoretical nor the empirical findings have clear implications for the economic impacts of remittances. But two alternative ways to use the ideas and findings from this literature may yet yield some insights. One possibility is to reconsider the literature on remittance determination and recharacterize it in a way that renders it more useful for thinking about remittances' economic impacts. A second possibility, reexamining the literature in regard to microeconomic data on remittances' end uses, is discussed in the chapter's final section.

Rather than attempt to find the most accurate or realistic theory of remittance determination, we can instead focus on the most important distinction among theories from the perspective of economic impact: whether remittances are predominantly compensatory or opportunistic in nature. That is, are remittances primarily sent to compensate their recipients for unfavorable economic conditions such as poor endowments or temporary income shortfalls, or are they sent primarily to take advantage of high returns or other favorable economic conditions? Note that compensatory transfers may be motivated by either altruism or exchange and may take the form of altering the expected consumption path or providing insurance. Similarly, opportunistic transfers are also consistent with multiple motivations and intended uses of remittances. But the economic impact of remittances changes dramatically, depending on how they respond to (changes in) economic conditions in both the home and host countries. This point is best made by emphasizing that if remittances are predominantly opportunistic transfers that are sent to take advantage of (relatively) favorable economic conditions in the home country, then they are similar to capital flows and thus can be analyzed as another type of capital inflow. But if remittances are primarily compensatory, then they are very different from capital flows, and their economic impacts will also be different.

Because the theory of remittance determination provides very little guidance, the compensatory-versus-opportunistic issue has become a largely empirical question. Some researchers find evidence that remittances respond positively to interest rate differentials or other indicators of favorable investment conditions in the home country. On the other hand, others find that remittances function like insurance, which is a compensatory transfer. Similarly, a recent paper by Yang (2007) employs a global data set on hurricanes to show that remittances increase to countries that experience these natural disasters.

The best evidence to date on the compensatory-versus-opportunistic question is found in Chami, Fullenkamp, and Jahjah (2005). In this paper, the authors estimate a panel regression in which the dependent variable is a country's remittances-to-GDP ratio. The explanatory variables are the difference between the country's per capita GDP and U.S. per capita GDP, and the interest rate differential between the country and the United States. A negative coefficient on the income gap variable would indicate a compensatory nature for remittances, whereas a positive coefficient on the income gap variable or on the interest rate differential would indicate opportunistic remittances. The results of the estimations reveal that the coefficients on the income gap variable are negative and highly significant, whereas those on the interest rate differential are positive but small and insignificant. These results provide strong cross-country evidence that remittances are better described as compensatory transfers than as opportunistic ones.[4]

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[4]The World Bank (2006) finds evidence for both compensatory and opportunistic remittances in a sample of Latin American countries, but unfortunately all the empirical exercises in this work use a measure of remittances that sums workers' remittances with migrant transfers and employee compensation. See Chapter 2 for a discussion of why this makes the interpretation of the study's results problematic.

Table 4.1. Determinants of Workers' Remittances, 1970–2005

Dependent variable: log (workers' remittances/GDP)	Specification								
	Population Average	Fixed Effects	Random Effects	Population Average	Fixed Effects	Random Effects	Population Average	Fixed Effects	Random Effects
Constant	−5.127*** (30.28)	−4.972*** (205.29)	−5.144*** (25.43)	−6.990*** (26.57)	−6.748*** (37.60)	−7.015*** (25.82)	−6.968*** (26.49)	−6.723*** (37.44)	−6.991*** (25.76)
$(r_i - r_{US})$	0.418** (2.13)	0.419** (2.52)	0.418** (2.52)	0.141 (0.72)	0.138 (0.85)	0.140 (0.86)	0.114 (0.58)	0.112 (0.69)	0.114 (0.70)
$(y_{US} - y_i)$				0.0001*** (9.04)	0.0001*** (10.36)	0.0001*** (10.41)	0.0001*** (8.94)	0.0001*** (9.91)	0.0001*** (10.29)
dE							−0.177* (1.95)	−0.017** (2.25)	−0.172** (2.30)
Observations	1,869	1,869	1,869	1,816	1,816	1,816	1,816	1,816	1,816
R-squared within		0.004	0.004		0.059	0.059		0.062	0.062
R-squared between		0.000	0.000		0.054	0.054		0.055	0.055
R-squared overall		0.000	0.000		0.120	0.120		0.123	0.123

Note: $(r_i - r_{US})$ is the interest rate differential between country *i* and the United States, $(y_{US} - y_i)$ is the income differential between the United States and country *i* adjusted for purchasing power parity, and *dE* is the change in the nominal exchange rate. The absolute value of the relevant test statistic is given in parentheses.

*significant at 10 percent level; **significant at 5 percent level; ***significant at 1 percent level;.

In the current study, examination of the correlations among workers' remittances, interest rate differentials, income differentials, and changes in nominal exchange rates using the latest and most complete data available confirmed the results of Chami, Fullenkamp, and Jahjah (2005). In particular, data on workers' remittances were constructed as described in Chapter 2 and the following remittance-determination equation was estimated:

$$wr_{it} = b_0 + b_1(r_i - r_{US})_t + b_2(y_{US} - y_i)_t + b_3 \Delta E_{it} + \varepsilon_t,$$

where *wr* is the log of the ratio of workers' remittances to GDP, *r* is a real deposit or money market interest rate, *y* is real GDP per capita adjusted for purchasing power parity, and ΔE is the change in the nominal exchange rate, where an increase represents a depreciation of the currency in country *i* relative to the U.S. dollar.

The interest rate differential is a proxy for the investment opportunities in the remittance-receiving country. A positive coefficient on the real interest rate differential implies that remittances behave like other opportunistic capital flows. On the other hand, a positive coefficient on the income differential indicates that remittances are countercyclical, since they increase when the income gap between country *i* and the United States widens and decrease when the income gap narrows.[5] A countercy-

clical result, if significant, has been interpreted as an indicator of compensatory remittance behavior.

The inclusion of the change in the nominal exchange rate is useful for examining whether migrants tend to remit more or less in response to exchange rate depreciations. Some researchers suggest that exchange rate movements may induce (opportunistic) portfolio-rebalancing effects, whereas others suggest that exchange rate changes can be a mechanism for smoothing remittance flows in terms of purchasing power in local currency. The latter hypothesis would argue that a remitter who sends $100 home to country *i* every month might choose to remit less in response to a depreciation of the country's currency, since the lower amount in dollar terms might still represent an equivalent or greater purchasing power when converted into local currency (equivalent or greater, that is, to the purchasing power of $100 under the previous exchange rate). The remitter could then save the difference between the remitted amount and the $100 norm for a later period of currency appreciation, when each dollar remitted would not be worth as much in the home country as it is currently.[6]

Regressions were conducted over three time periods, 1970–2005, 1985–2005, and 2001–2005, with

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[5]The use of the term *countercyclical* is intended to imply a negative relationship only between the income gap, which exhibits cyclical variation, and remittances.

[6]It may also be true that remittances cause the currency of country *i* to appreciate in value relative to the dollar. In this case, a higher remittances-to-GDP ratio would be negatively correlated with exchange rate changes.

Table 4.2. Determinants of Workers' Remittances, 1985–2005

Dependent variable: log (workers' remittances/GDP)	Specification								
	Population Average	Fixed Effects	Random Effects	Population Average	Fixed Effects	Random Effects	Population Average	Fixed Effects	Random Effects
Constant	−5.117*** (29.03)	−4.978*** (184.2)	−5.130*** (25.05)	−7.678*** (23.47)	−7.647*** (27.75)	−7.775*** (23.58)	−7.631*** (23.29)	−7.585*** (27.43)	−7.720*** (23.39)
$(r_i - r_{US})$	0.167 (0.82)	0.164 (0.91)	0.166 (0.93)	0.041 (0.20)	0.027 (0.16)	0.034 (0.20)	0.008 (0.04)	−0.003 (0.02)	0.003 (0.02)
$(y_{US} - y_i)$				0.0001*** (9.08)	0.0001*** (9.78)	0.0001*** (10.23)	0.0001*** (8.91)	0.0001*** (9.54)	0.0001*** (10.02)
dE							−0.018** (1.97)	−0.017** (2.21)	−0.0173** (2.29)
Observations	1,515	1,515	1,515	1,481	1,481	1,481	1,481	1,481	1,481
R-squared within		0.001	0.001		0.066	0.066		0.069	0.069
R-squared between		0.000	0.000		0.073	0.073		0.073	0.074
R-squared overall		0.000	0.000		0.149	0.149		0.152	0.152

Note: $(r_i - r_{US})$ is the interest rate differential between country i and the United States, $(y_{US} - y_i)$ is the income differential between the United States and country i adjusted for purchasing power parity, and dE is the change in the nominal exchange rate. The absolute value of the relevant test statistic is given in parentheses.

*significant at 10 percent level; **significant at 5 percent level; ***significant at 1 percent level.

the latter two time periods selected to allow examination of globalization effects and post–September 11 effects, respectively. Tests were conducted using pooled estimation (i.e., population average), fixed effects, and random effects. The results are reported in Tables 4.1–4.3, and the main results are presented here.

First, workers' remittances decrease in response to currency depreciations. The regression results indicate that depreciations in the value of the recipient country's currency relative to the dollar result in a lower ratio of workers' remittances to GDP. Results are significant at the 5 or 10 percent level in most cases. This could be interpreted as compensatory behavior, with remitters smoothing the relative purchasing power of the remittance in domestic currency in response to changing nominal exchange rates.

Second, interest rate differentials are not a significant determinant of remittance flows until after 2001. In the full data set from 1970 to 2005, real interest rate differentials standing alone are a significant determinant of the remittances-to-GDP ratio, though their explanatory power in terms of R-squared is very low. Once income differentials are added to the regressions, real interest rate differentials lose their significance. After 2001, however, real interest rate differentials are not significant on their own but become significant after income differentials are included in the regressions. Furthermore, the coefficient on interest rate differentials is negative in the latter case, indicating that a widening of the real interest rate gap in favor of

country i actually leads to *less* remittances. We should interpret these results with caution, since real interest rate differentials may simply have been narrowing consistently during the four-year period from 2001 to 2005 while remittance flows were rising. In other words, we may not be capturing a full interest rate cycle, which would enable us to interpret the results with certainty.

Finally, income differentials are a highly significant determinant of remittances, with the results in favor of countercyclicality. In each of the three subperiods, widening income differentials lead to additional workers' remittances in terms of GDP. The coefficient varies little across the various tests and is significant at the 1 percent level in nearly all cases. This corroborates the Chami, Fullenkamp, and Jahjah (2005) findings that remittances are countercyclical; increases in the remitter's income (proxied by income in the United States) or decreases in income of the remitter's family (proxied by domestic income) lead to greater workers' remittances. Thus, the data provide a strong indication that remittances behave like compensatory transfers such as insurance, rather than like opportunistic transfers such as capital flows.

Uses of Remittances

The previous section discussed one way of reusing the ideas and findings from the existing literature on

Table 4.3. Determinants of Workers' Remittances, 2001–2005

Dependent variable: log (workers' remittances/GDP)	Specification								
	Population Average	Fixed Effects	Random Effects	Population Average	Fixed Effects	Random Effects	Population Average	Fixed Effects	Random Effects
Constant	−5.000*** (23.10)	−4.951*** (114.7)	−5.001*** (20.94)	−8.627*** (13.97)	−4.233*** (3.69)	−7.651*** (10.94)	−8.662*** (14.04)	−4.597*** (3.91)	−7.794*** (11.12)
$(r_i - r_{US})$	−1.302 (1.09)	−1.405 (1.40)	−1.348 (1.36)	−1.605 (1.26)	−1.927** (2.10)	−1.587* (1.75)	−1.683 (1.33)	−1.934** (2.11)	−1.646* (1.82)
$(y_{US} - y_i)$				0.0001*** (6.19)	0.0000 (0.60)	0.0001*** (4.02)	0.0001*** (6.24)	0.0000 (0.28)	0.0001*** (4.22)
dE							0.612* (1.67)	0.363 (1.37)	0.543** (2.10)
Observations	412	412	412	397	397	397	397	397	397
R-squared within		0.006	0.006		0.015	0.003		0.021	0.009
R-squared between		0.000	0.000		0.181	0.226		0.097	0.220
R-squared overall		0.000	0.000		0.235	0.315		0.103	0.315

Note: $(r_i - r_{US})$ is the interest rate differential between country i and the United States, $(y_{US} - y_i)$ is the income differential between the United States and country i adjusted for purchasing power parity, and dE is the change in the nominal exchange rate. The absolute value of the relevant test statistic is given in parentheses.

*significant at 10 percent level; **significant at 5 percent level; ***significant at 1 percent level.

remittances to yield insights into the remittances phenomenon: reconsidering the literature on remittance determination in a way that makes it yield more useful insights into remittances' economic impacts. Another way to use the existing literature on remittances is to examine the microeconomic data on the end uses of remittances carefully. Such data have been collected and analyzed in many studies of remittances, though they have not necessarily been used in remittance-determination studies.

As mentioned at the beginning of this chapter, remittances' economic impact depends to a great extent on their end uses: whether they fund current consumption or asset accumulation. Thus, the end uses of remittances are one of the main debates in the literature on remittances, and numerous papers and anecdotal reports have been written about the uses of remittance funds. In general, the anecdotal reports observe that recipients use remittances to increase family consumption rather than to invest in businesses or other productive assets. Academic papers have investigated the claims made in the anecdotal reports, generally using survey data. The picture that emerges on the uses of remittances is somewhat confusing, primarily because the studies consider one country at a time, and also because the sample sizes tend to be quite small. Thus, the results in this area are quite varied and seemingly contradictory. We believe, however, that three stylized facts emerge from the literature on this topic.

The first stylized fact is that a significant portion, and often the majority, of remitted funds are spent on consumption (e.g., Oberai and Singh, 1980, and Durand and others, 1996). Gilani, Khan, and Iqbal (1981) found that most of the remittances to their sample of households in Pakistan were spent on consumption, followed by residential investment. Glytsos (1993) identified a nearly identical spending pattern for remittances to Greece. The Inter-American Development Bank's Multilateral Investment Fund (2004) determined that consumption accounted for between 60 and 80 percent of the remittance use in a sample of five Latin American countries, and the World Bank (2006) also identified this pattern for a larger sample of Latin American countries. Some studies, however, do find a smaller propensity to consume out of remittances than out of other income. Adams (2005) obtains this result in a study on households in Guatemala, for example.

The second stylized fact is that a significant, though generally smaller, part of remittances does go into uses that we can classify as saving or investment. Alderman (1996) and Adams (1998), using survey data for Pakistan, found that remittances tend to be invested in land and buildings. Brown (1994), using survey data for Western Samoa and Tonga, determined that housing expenditures are the single largest expenditure out of remittance income. Adams (1991) found in a sample of 74 Egyptian households that the receipt of remittances increases the marginal propensity to invest, primarily in residences and land. Several of these studies also found that the main uses of those remittances not spent on consumption are expenditures on housing and financial assets (bank deposits).

The third and final stylized fact emerging from the literature on the end uses of remittances is that the household saving and investment that remittances fund is not necessarily productive in terms of the overall economy of the migrant's home country. Several researchers emphasize that expenditures on housing, land, and even jewelry constitute saving and investment, at least for the individual household that makes the expenditures. Although this is true, the effects of such saving on a country's overall economic activity should be considered carefully. When land and existing houses change hands, for example, this obviously does not represent a change in aggregate investment. Sofranko and Idris (1999) showed in the case of Pakistan that very little of the remittances received from Pakistani migrants to the Middle East is channeled into actual business investment. Lopez and Seligson (1991) surveyed small businesses in El Salvador to measure the impact of remittances on small business development and reported that 40 percent of business owners who receive remittances do not invest any of the remittance funds in their businesses.

Two papers[7] are often cited as exceptions to these stylized facts, but their results must be interpreted with great care. The first is Taylor (1992), which found in a sample of 55 farm families in Mexico that greater remittances are associated with increased holdings of cattle. The author noted, however, that cattle are the preferred store of wealth in this rural area, because most of the land owned by the farmers is "reform land" that is not allowed to be sold. Thus, it is not clear whether the acquisition of additional cattle in Taylor's study represented the creation of new productive assets or simply their transfer. The only other asset appearing in Taylor's econometric specification is human capital, in the form of education, which was not significantly affected by remittance receipts.

The second paper often cited in favor of remittance-funded investment is Woodruff and Zenteno (2001). This paper primarily investigated the correlation between migration and small business investment in Mexico, employing state-level data; remittances were used as an additional, alternative measure of the amount of migration from a particular state. The authors found a positive correlation between the amount of migration and business investment in a state. It is crucial to realize, however, that the migration these authors discuss includes migrants' return to their home country and starting new businesses. Moreover, the remittance data the authors used include migrant transfers, which are the monies brought home by returning migrants. Thus, this paper sheds relatively little light on the role that

workers' remittances, properly defined, play in funding small business investment.

A broad picture emerges from these stylized facts. Migrant remittances are used to increase the well-being of the migrant's family, primarily through enabling an increase in consumption, but also through enabling (possibly substantial) increases in the family's stock of wealth. But because of families' preference for certain assets like houses and land, the increase in household wealth does not necessarily imply a corresponding increase in the overall economy's stock of productive capital.

The findings on end uses of remittances complement the evidence presented previously that they are compensatory transfers. If the primary purpose of remittances is to compensate family members for bad economic conditions, it is reasonable to expect that the bad conditions are associated with depressed consumption levels, including a lack of consumer durables such as good-quality housing. Therefore, remittance recipients use the funds to bring the family closer to its desired standard of living through the purchase of consumption goods, services, and consumer durables. Of course, investments in productive capital can also help the family overcome bad economic conditions, so remittances may be used to fund these purchases as well, but only after the family's more-pressing consumption needs are satisfied. In addition, the allocation of remittance funds depends on the exact opportunity set available to the family.

Taken together, the theoretical and empirical literatures on remittance determination describe a complex interaction between migrant and family that does not fit neatly into any single theory. Nonetheless, the sum of the evidence suggests that remittances are motivated by factors much different from those that drive other international financial flows and hence that their economic impacts are quite different from those resulting from other financial flows. In particular, the important role altruism plays in the theoretical literature, the empirical evidence of transfers' compensatory nature, and the predominance of consumption in the end uses of remittance funds all indicate that remittances attempt to compensate the receiving economy for poor economic performance. The fact that remittances are non-market transfers serves to widen further the distinction between remittances and other international financial flows. The economic impact of remittances may therefore be more similar to the impacts of public, non-market compensatory transfers—in other words, public social insurance programs or aid flows—than to those of profit-driven capital flows.

The state of the literature on the causes of remittances does have one notable policy implication. It was mentioned early in this chapter, before any literature was reviewed, that cross-country longitudinal studies of remittance determination are needed. A review

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[7]The World Bank (2006) also found a positive connection between investment and remittances, but because its remittance data include migrant transfers and employee compensation, this finding is subject to question. See Chapter 2.

of the existing literature on remittance determination emphasizes the severity of this need. Because of the theoretical and empirical issues discussed in this chapter, it appears that the best way to resolve the lingering questions regarding the predominant motivations for and intended and end uses of remittances is to conduct a cross-country longitudinal study that follows a cohort of migrants and their families over time as they face migration, remittance, and repatriation issues. This study must ensure collection of accurate data on both the remittances themselves and their end uses as well. And it must involve conducting interviews of migrants and family members to determine, as closely as possible, how decisions about migration and remittances are actually made. Although further studies of the sort discussed within this chapter will doubtlessly continue to shed some light on remittance determination, they simply cannot provide answers of the sort that will give policymakers the understanding they need of the role that remittances actually play in a country's economic development.

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V   Macroeconomic Implications of Remittances: Theory

Previous chapters have documented the rising importance of workers' remittances as resource flows to developing countries. As with earlier surges in other types of resource flows to such countries, this change in circumstances dramatically alters the economic environment in which macroeconomic policy is formulated in countries receiving remittances. The challenge for policymakers is to understand the macroeconomic implications of these large new flows as well as the role that policy can play in maximizing the benefits that the recipient countries can derive from them.

Unfortunately, this challenge is complicated by the fact that economic theory gives us no reason to suppose that the macroeconomic effects of workers' remittances should necessarily be uniform from country to country or from time to time. In theory, the nature of these effects depends on a variety of characteristics of the receiving economy, as well as of the remittance flows themselves. This chapter explores how the characteristics of remittance flows and those of the recipient economy are likely to interact to determine the effects of those flows on the types of macroeconomic variables that tend to be of concern to policymakers. The chapter is divided into three parts, focusing respectively on the implications of workers' remittances for three aspects of macroeconomic performance: short-run macroeconomic equilibrium, the rate of growth of the economy's productive capacity, and the sustainability of the debt of its public sector. The last of these is treated separately because debt sustainability is cross-cutting in its macroeconomic implications: depending on how a government uses its capacity to borrow, it may be able to influence both short-run macroeconomic performance and long-run growth as well.

Workers' Remittances and Short-Run Macroeconomic Performance

We begin by considering the effect of flows of workers' remittances on the recipient economy's short-run macroeconomic performance. To be concrete, we assume at the outset that remittances are pure income transfers—that is, they represent the transfer of ownership of resources from a migrant household to a recipient household without constraints on how those resources are spent. This means that our initial assumptions are that remittances are *not* capital flows and that they do not have a merit good component. Later in the chapter we examine the effects of modifying these assumptions.

However, even if remittances are taken to represent pure income transfers, that leaves open the question of what motivates those transfers. In particular, a key issue is whether remittances should be considered to be exogenous or should be interpreted as responsive to developments in the receiving economy. If remittances are exogenous, then the question of their macroeconomic effects can be examined analytically by modeling their role in the receiving economy and then examining how a change in the level of remittances affects the endogenous macro variables of interest in that economy. If remittances are endogenous, however, then the analysis has to be approached differently. In this case, what matters is how the responses of the relevant macro variables to some *other* exogenous shock differ in the presence of remittances from what they would have been in their absence. These responses are likely to depend on how remittances themselves react to the shock, so the model adopted to explain the behavior of remittances is as important in this case as the way that the recipient economy is modeled.

Thus, the first step in analyzing the macroeconomic effects of remittances is to take a position about what drives remittance flows. As shown in Chapter 4, this turns out to be a nontrivial and controversial matter empirically, and competing perspectives remain on how best to think about the factors driving these flows. We begin with the simplest case of exogenous remittances, and then consider how the analysis needs to be modified if remittances are endogenous and driven by altruism on the part of the sender. A third possibility—that remittances are endogenous and arise as the result of a decision by the recipient household to invest in the form of sending household members abroad—is also considered in the second section of this chapter, where it has the potential of leading to results that differ from those of the first two cases.

Exogenous Remittances

Our strategy is to begin with the simplest analytical framework to describe the recipient economy in order to examine the effects of remittances on the macroeconomic variables of interest, and then to add complicating factors either one by one or in combination to examine their effects on the results.

Basic Framework

The reference economy is taken to contain two production sectors: a traded goods sector and a nontraded goods sector, with production in each sector determined as a function of some unspecified fixed factor as well as homogeneous labor, which is able to move freely between sectors. The economy is initially assumed to be perfectly open financially, so uncovered interest parity holds continuously. (We relax this assumption later.) For now, we focus on a strictly nonmonetary economy, and we assume that there are no frictions in domestic financial intermediation, so there is no "external finance premium" in the domestic economy: financial intermediation is costless.

The households in this economy optimize intertemporally by choosing the time path of consumption. Initially, we suppose that household utility depends only on the levels of consumption of traded and nontraded goods and not on the household's consumption of leisure; in this case the economy's aggregate labor supply is exogenous. (Later we allow utility to depend on leisure as well, making the aggregate supply of labor endogenous.) We also assume initially that if the household saves or dissaves, it does so by accumulating or decumulating an internationally traded bond.[1] In the reference framework we assume that the world real interest rate equals the representative household's rate of time preference, so that the optimal time profile of consumption is flat.

Finally, the government in our simplest framework does not optimize; it simply levies lump-sum taxes, which it either saves or uses to finance an exogenously given level of spending that has no effect on household utility or on sectoral production functions. In this case the government essentially represents a mechanism for wasting resources.

Exogenous Labor Supply

Suppose, then, that remittance receipts consist of exogenous external transfers received by domestic households, and consider the effects of an unantici-

pated permanent increase in the flow of remittances in the context of the economy just described. We look first at the case in which the domestic supply of labor is exogenous, and then examine how an endogenous labor supply response affects the analysis.

We assume initially that the government does not tax remittances. In that case, an exogenous increase in remittance receipts increases domestic household income permanently by the amount of the increase in remittances. Because the increase in the income flow is assumed to be permanent and the time profile of consumption is flat, domestic households spend the increased income fully, on consumption of both traded and nontraded goods.[2] Household utility must therefore increase, so the larger remittances are unambiguously welfare enhancing for the recipient economy.

The higher household demand for nontraded goods must be met by an increase in the production of such goods, which requires a reallocation of the fixed aggregate supply of labor from traded goods production to nontraded goods production. This reallocation is induced by an increase in the relative price of nontraded goods—that is, a real exchange rate appreciation—which permits the nontraded goods sector to attract labor away from the traded goods sector. The larger the share of household consumption devoted to nontraded goods, and the smaller the elasticity of substitution between traded and nontraded goods in production, the larger the real exchange rate appreciation must be.[3] Because the increase in household absorption must equal the increase in household income, the receiving country's current account balance must remain unchanged after the increase in remittances. This means that its trade balance must deteriorate by exactly the amount of the increase in remittances. The deterioration of the trade

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[1]In the second section of this chapter, which examines the effects of remittances on economic growth, the household whose behavior we are analyzing is assumed also to have the option to accumulate physical capital.

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[2]The analysis that follows would require modification if the increase in remittances were fully spent on traded goods at the margin. But it is hard to imagine why this would happen, even if remittances were received in kind in the form of traded goods.

[3]It has become conventional wisdom that an increase in remittances should result in an appreciation of the equilibrium real exchange rate and thereby cause the traded goods sector to contract, as in our reference analysis here. But it is useful to emphasize at this point that it is easy to imagine arguably realistic circumstances in which this need not be so or in which the negative effects on the traded goods sector could at least be muted. For example, if the supply of labor to the domestic economy is very elastic (e.g., because increases in the level of wage prevailing in the domestic economy induce migrants to return, foreigners to immigrate, or domestic workers to leave the informal sector), the cost of labor to the traded goods sector may not increase appreciably. Alternatively, in a more general model involving multiple traded goods sectors (say, a nontraditional export sector and an importable sector), even if the demand for a particular type of labor (say, unskilled labor) were to increase as the result of the increased spending associated with remittances, the effects on the production costs of a particular traded goods sector (say, the nontraditional export sector) might be insignificant if that sector uses a different type of labor (e.g., skilled labor) much more intensively. This is simply a reminder that even the most widely accepted macro effects of remittance flows are conditional on the characteristics of the receiving economy.

balance (equivalently, the creation of an excess domestic demand for traded goods) is brought about through a combination of lower output of traded goods, as a result of the real appreciation, and a larger demand as well for traded goods, resulting from the combination of a greater overall level of consumption and the reduction in the relative price of traded goods associated with the real appreciation.

The distribution among domestic households of the welfare gains associated with the increase in remittance flows depends both on the allocation of remittances among households and on household consumption patterns as well. Consumption patterns matter to the extent that the arrival of remittances causes a change in domestic relative prices—that is, a real exchange rate appreciation. When the real exchange rate appreciates, the households that benefit the most from the increase in remittances are those recipients of remittances that tend to orient their consumption toward traded rather than nontraded goods.

Now consider the effects of direct taxation of remittances. To take an extreme example, suppose the government taxes *all* of the increase in remittances away by increasing its level of lump-sum taxation at a rate equal to the increase in the size of remittance flows. In this case, the macroeconomic effects of the increase in remittances depend on how the government allocates the increase in its revenue.

We suppose first that the government simply saves the additional revenue it receives. In that case, since the conditions for Ricardian equivalence hold in our simple framework, domestic households behave exactly as they did when remittance flows were not taxed: they increase consumption expenditure by the amount of the increase in remittances. All the other previously described effects on the economy still occur, including the beneficial effects on household welfare.

On the other hand, if the government allocates the additional revenue to public spending on traded goods, and if, as assumed earlier, the government's consumption of traded goods has no effect on household utility functions or on firms' production functions, then the increase in remittance flows has no effects whatsoever on the domestic economy. In particular, household consumption and welfare are unchanged. The current account of the balance of payments is also unchanged, and the deterioration in the trade balance required to keep the current account in equilibrium in the face of increased remittance flows arises strictly as the result of the increase in government spending on traded goods.

Finally, if the government spends all of its increased income on nontraded goods, the effects on the domestic economy are equivalent to those of an exogenous decrease in the output of the nontraded goods sector: there is no change in household disposable income, but the supply of nontraded goods available for domestic households to consume decreases by the amount

of the increase in remittance flows, since the government increases its consumption of nontraded goods by exactly that amount. In equilibrium the real exchange rate must appreciate, causing production to switch from traded to nontraded goods and households' demand for traded goods to rise. Since both the household and government budgets remain balanced, the current account must remain in balance, and the combination of these effects must cause the trade balance to deteriorate by an amount that is exactly enough to offset the effects of the increased remittance receipts on the current account. Note that, precisely because the effect of increased remittance flows in this case is equivalent to that of an exogenous reduction in the economy's output of nontraded goods, greater remittance flows actually *reduce* the welfare of domestic households.

When remittances are taxed, therefore, the relevant issue is how the government disposes of its increased tax revenues—even if all government spending is equally (non)productive. Differences in macroeconomic outcomes in this case extend even to such core issues as whether an increase in remittance receipts increases or decreases the economic welfare of domestic households. For simplicity, and to focus on other characteristics of the economy that influence the macroeconomic effects of remittances, unless otherwise stated we assume in the rest of the chapter that remittances are *not* taxed directly.[4]

Endogenous Labor Supply

Now suppose that household utility depends on consumption not only of traded and nontraded goods, but also of leisure. Treating the consumption of leisure as a choice variable for households allows us to treat the domestic supply of labor as an endogenous variable. When the consumption of leisure becomes a choice variable, households respond to an increase in remittance flows both by increasing their consumption spending and by reducing their supply of labor as well, so they

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[4]This begs the question of whether there is in fact a case for taxing remittances in the simple economy considered in this subsection. One would expect that the answer must be no as long as the economy is initially undistorted and the government is simply a mechanism for creating waste. However, a second-best case for taxing remittances would exist under the assumptions of this subsection if Dutch disease effects are important (see "Remittances and Growth") and the government spends the proceeds on traded goods, since greater remittance flows could be welfare reducing in this case and the macroeconomic effects of a government policy of taxing remittances and spending the proceeds on traded goods are equivalent to a reduction in the size of remittance flows. More generally, a case for taxing remittances could be based on the productivity of government expenditures and/or the distortionary effects of other forms of taxation. Such a case would depend on the response of remittances to taxation (which depends in turn on the factors driving remittance flows), since this response determines the size of the distortions associated with remittance taxes.

can consume more leisure as well as more goods. As a result of the reduction in the aggregate supply of labor, the economy's real output must fall. Because of this reduction in household income from production, the intertemporal budget constraint implies that household consumption must rise by *less* than the increase in the flow of remittances. However, the increase in the resources available to households in the form of remittance flows means that household utility must rise, and therefore the increase in remittances remains welfare enhancing in the absence of distortions.

The increase in household consumption means that domestic demand for both traded and nontraded goods must increase. At the same time, the reduced supply of labor means that, at the original real exchange rate, the supply of both types of goods must *decrease*. The result is that to maintain equilibrium in the market for nontraded goods, the real exchange rate must appreciate.[5] As before, the household's intertemporal budget constraint implies that the current account must remain in balance, which means that the trade deficit must increase by the same amount as in the previous subsection, because the change in the flow of remittances is the same. The contraction in the aggregate labor supply and real appreciation both contribute to creating the excess demand for traded goods that yields this result.

Note that remittance flows are countercyclical in this case: an increase in remittances is associated with a reduction in domestic output. Causation runs from the change in remittances to the change in real output in the receiving economy, and the mechanism of transmission is the endogenous labor supply response of recipient households. As we show later in the chapter, however, the correlation between increased remittances and decreased domestic output can change, depending on the motivation for remitting and the type of shock affecting the domestic economy.

An Extension: Endogenous Country Risk Premium

In the preceding analysis, we assumed that the domestic interest rate in the country receiving workers' remittances was exogenous, determined by uncovered interest parity. This assumption is obviously unrealistic, because developing countries face borrowing spreads in international capital markets that reflect creditor perceptions of country creditworthiness. Since creditworthiness depends on the resources that the country has available to service debt, it is reasonable to suppose that country risk premiums in international capital markets are inversely related to the size of the remittance flows the country receives (this issue is discussed from the perspective of sovereign debt in "Remittances and Government Debt Sustainability"), a factor that can be expected to influence the macroeconomic effects of exogenous changes in the size of those flows. How would the preceding analysis be affected under these circumstances?

As before, an exogenous increase in remittances increases the real income of domestic households. However, when country risk premiums are endogenous and depend on the total resources available to domestic households, an exogenous increase in remittances also reduces the domestic interest rate. Assuming that the country is a net debtor, the welfare of domestic households now increases, for two reasons: because of the increase in resources associated with larger remittance flows, and also because the reduction in the interest rate that domestic households face reduces their debt-servicing costs.

Consider first the case of exogenous labor supply. As in "Exogenous Labor Supply," domestic consumption expenditure increases. But the short-run increase in consumption is larger now than previously, because in addition to the increase in the present value of consumption over the household's time horizon made possible by the larger amount of resources at its disposal, the household's consumption path now has a downward slant rather than being flat, as the reduction in the domestic real interest rate causes it to shift intertemporally toward present consumption and away from future consumption. In other words, the increase in consumption caused by the increase in remittances on impact is larger in this case than when the domestic real interest rate is exogenous, and thus on impact the increase in consumption is greater than the increase in the flow of remittances. This has two interesting implications:

- Because household consumption increases by more than the inflow of remittances on impact, the increase in remittances actually *increases* the current account deficit on impact, since households must borrow internationally to sustain their higher levels of consumption in the short run.

- Because the demand for nontraded goods sustains a larger increase than before, an exogenous increase in remittances causes greater real appreciation in this case than in "Exogenous Labor Supply."

If the supply of labor is endogenous, the reduction in the domestic interest rate causes households not only to substitute current for future consumption, but also to substitute current leisure for future consumption. Thus the contraction in domestic real output that follows the increase in remittance flows is larger when the risk premium is endogenous than when it is not. But note

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[5]However, despite the negative supply effect (not present in the preceding subsection), it is not possible to determine whether the appreciation of the real exchange rate in this case is greater or less than that in the previous subsection, because although the supply of nontraded goods at the original real exchange rate contracts in this case, the increase in the demand for nontraded goods is also smaller than in the previous subsection. The answer depends on factors such as the income elasticity of demand for leisure, the degree of substitutability between consumption and leisure in household utility, and the initial marginal product of labor.

that, although the reduction in domestic real output is magnified in this case, it remains true that household welfare must rise.

Endogenous Remittances

So far, we have been assuming that remittance flows are exogenous. That assumption has made it possible to examine the short-run macroeconomic effects of remittances simply by considering how the economy responds to a change in remittance flows. If remittance flows are endogenous, however, things become more complicated, because the macroeconomic implications of the presence of remittance flows then depends not just on characteristics of the economy such as those examined in the last subsection, but also on the factors that determine the size of remittance flows.

The first step in examining the macroeconomic effects of remittances in this case is therefore to take a position on the factors that influence remittance flows. We assume in this subsection that remittance flows are determined by altruistic motives on the part of migrants, in the sense that the utility of the recipients enters the remitters' utility function. To be concrete, let us suppose that migrants value the welfare of the recipients as much as they do their own.[6]

The Effects of Macroeconomic Shocks Under Altruistic Remittances

Since remittances are now endogenous, we can no longer take the shock we analyze to be an increase in the flow of remittances. Instead, a change in remittances must be caused by a change in some exogenous variable. The presence of altruistic remittance flows alters the way that the recipient economy responds to the array of macroeconomic shocks to which it may be subjected. To illustrate, in this section we analyze two such shocks: an exogenous productivity shock and a policy-induced real exchange rate depreciation. Chapter 7 analyzes in greater detail the effects of stochastic shocks under endogenous remittances in the context of a closed economy.

Suppose, then, that the economy is affected by an unexpected, permanent favorable productivity shock that is sectorally neutral (i.e., one that does not give rise to a Harrod-Balassa-Samuelson effect). For simplicity, we consider first the case of inelastic labor supply. Because the shock increases output in both sectors, it also increases the resources available to domestic households and thus their consumption and utility. Because the utility of the recipient affects the welfare of the migrant under altruism, the shock affects the

migrant's income positively, inducing him or her to increase his or her own consumption. But this can be achieved only by *reducing* his or her level of remittances. Thus a positive productivity shock in the recipient economy increases real output in that economy and increases welfare for both domestic and émigré households: the existence of remittances transfers some of the benefits of the domestic productivity shock to the émigré community.[7]

In general, the reduction in the level of remittances partly, but not completely, offsets the positive effects of the productivity shock on domestic household income. Suppose, however, that remittances are indeed reduced one for one with the increase in domestic household income, so that émigrés effectively seize all of the benefits of the productivity shock. In this case domestic consumption remains unchanged but, because of the favorable productivity shock, domestic output of both traded and nontraded goods rises. The current account of the domestic economy's balance of payments remains in balance with domestic absorption unchanged, which is possible because the level of domestic output rises and that of remittances falls by exactly offsetting amounts. Since the demand for nontraded goods does not rise at the original real exchange rate, whereas the output of nontraded goods increases as the result of the productivity shock, the relative price of nontraded goods must fall—that is, the real exchange rate has to *depreciate*. Note that the reduction in the level of remittances does not *cause* this depreciation—instead, both are caused by the favorable domestic productivity shock.

Now let us go back to the general case in which the reduction in remittances only partly offsets the favorable income shock. In this case, the increase in domestic consumption caused by the favorable productivity shock remains smaller than it would have been if the same shock had occurred in the absence of remittances. The smaller the remittance offset, the greater the increase in domestic consumption the favorable productivity shock causes. In the limit, if the offset is zero, the increase in consumption is equal to the increase in domestic income. In this case, there is no reason for the real exchange rate to change, since the productivity shock causes the demand for nontraded goods to increase by the same amount as the supply of nontraded goods. It follows that, in the presence of altruistic remittances, a favorable sectorally neutral productivity shock leads to a real exchange rate depreciation that is larger the greater the extent to which remittances offset the effects of the productivity shock.

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[6]In other words, the intercohort discount factor applied to the utility of the recipients in the utility function of the remitters is unity.

[7]It is worth noting in passing that, to the extent that productivity "shocks" are not exogenous, but are produced by policy reform, the existence of altruistic remittances acts as a tax on reform, because part of the benefits of reform are reaped externally. This provides a *negative* link between remittances and growth that operates independently of the effects considered in "Remittances and Growth."

If we allow for an endogenous labor supply response by domestic households, then the effect of the favorable productivity shock on domestic labor supply depends on a trade-off between income and substitution effects: the favorable productivity shock increases the household's lifetime resources, inducing it to consume more leisure and thus reducing its supply of labor, but at the same time the higher productivity of labor increases the cost of leisure relative to that of consuming goods. Assuming that substitution effects dominate, domestic income increases, both because of the increase in productivity and because of the increase in the supply of labor as well. For the same reasons as before, remittance receipts fall, and the welfare of both domestic and émigré households increases. It is worth noting that remittance flows are once again countercyclical in this situation, as in the case of exogenous remittances analyzed previously. However, in this case causation is indirect: it runs from a third variable (the productivity shock) to both remittances and domestic real output, rather than directly from remittances to real output.

Countercyclicality is not a necessary characteristic under altruistic remittances, however. An illustration can be provided by simply assuming that the improvement in productivity considered in the foregoing discussion is anticipated before it arrives. The positive income effect associated with a productivity improvement arises at the instant the improvement becomes anticipated, whereas the substitution effect emerges only when the improvement actually materializes. Thus if domestic households come to expect a favorable future productivity shock, they immediately increase their consumption and reduce their supply of labor, thus causing domestic real income to fall on impact. The improvement in their welfare at the same time causes altruistic migrants to reduce their flow of remittances. Thus, when the shock that affects the economy is an anticipated future improvement in productivity, altruistic remittance flows move procyclically.

The case of a real exchange rate depreciation provides a further illustration of how the macroeconomic effects of remittance flows depend on the types of shocks to which an economy is subjected. In the "real" macroeconomic framework that we have been considering, a real depreciation must be brought about by a "real" policy change. Consider two ways in which such a depreciation can be achieved: through an increase in government spending on traded goods financed by an increase in lump-sum taxes, or through a reduction in government spending on nontraded goods offset by a reduction in lump-sum taxes.

In either case, there are two effects on remittance flows. First, no matter how the real exchange rate depreciation is brought about, it both increases migrants' real income (which is earned in the form of traded goods) and reduces the cost to migrants of purchasing an additional unit of consumption for the recipients through

remittances, since not all recipient consumption is in traded goods. The altruistic model predicts that these income and substitution effects will combine to induce migrants to attempt to increase remittance recipients' utility. But if migrants' own utility is a normal good, this should nevertheless be associated with a *reduction* in remittance flows (measured in units of the traded good): since migrants do not consume nontraded goods produced in the recipient economy, the increased real value of remittances can be shared between the remitter and the recipient only by migrants' retaining more of their earnings (see Faini, 1994).

The second effect depends on how the real exchange rate depreciation is brought about. If it results from a reduction in government spending on nontraded goods in the domestic economy, the associated tax cut causes recipient households' real income to increase, which under the altruistic model reinforces the tendency for remittance flows to fall. If instead it comes about through an increase in government spending on traded goods, then the associated tax increase causes recipient households' welfare to decrease, which under the altruistic model tends to induce an *increase* in remittance flows. The net effect on remittance flows in this case could be positive.

Altruistic Remittances and Structural Policies

The presence of altruistic remittances in a particular economy may have macroeconomic implications for that economy that extend beyond the influence of such remittances on the effects of specific shocks. Precisely because they influence how the economy responds to shocks, such remittances may affect the desirability of alternative macroeconomic policy regimes. In this subsection we illustrate this point for the cases of capital account liberalization and the exchange rate regime.

A standard argument in support of capital account liberalization goes as follows: when an economy is financially closed, projects with high expected returns but high risk, whose returns are highly correlated with the domestic economy's real capital portfolio, tend to face a high cost of capital. When the capital account is liberalized, however, the cost of capital for such projects can be expected to decrease, because their returns will not be as highly correlated with the world portfolio as they had been with the domestic portfolio under financial autarky. Consequently, capital account liberalization promotes growth by reducing the cost of capital for such projects, encouraging the undertaking of investment projects with high expected returns.

The presence of altruistic remittances in an economy, however, changes the stochastic properties of domestic economic activity. Under altruism, remittances are likely to be negatively correlated with shocks to the domestic economy that increase the well-being of domestic agents, such as favorable productivity shocks.

Since the effects of such shocks on domestic real income are dampened in the presence of altruistic remittances (because remittances fall when domestic productivity rises and rise when domestic productivity falls), and since fluctuations in foreign output are transmitted to the domestic economy via remittance flows as migrants share their own productivity gains or losses with remittance recipients, the correlation between domestic real income and the world business cycle increases and thus the effect is equivalent to that resulting from diversification of the country's real portfolio under financial autarky. Since this reduces the correlation between the "effective" domestic real autarkic portfolio and any single high-return/high-risk domestic investment, the cost of capital falls for such projects even under financial autarky. In this way, the existence of altruistic remittances in an economy tends to be progrowth. As shown in Chapter 7, however, if the domestic labor supply is endogenous, the labor supply effects of altruistic remittances may actually magnify domestic business cycles (see also Chami, Cosimano, and Gapen, 2006) and *reduce* the correlation of domestic economic activity with the world business cycle.

By the same token, however, the increased correlation between the "effective" real portfolio under autarky and the world portfolio that emerges under altruistic remittances weakens the case for capital account liberalization, since it reduces the force of the cost-of-capital perspective on financial liberalization's benefits. On the other hand, the case for capital account liberalization is strengthened to the extent that labor is endogenous.

A similar argument applies to the choice of optimal exchange rate regime. A familiar argument from the optimal currency area literature is that the presence of asymmetric real shocks favors the adoption of floating rather than fixed exchange rates in countries with limited international labor mobility and sticky nominal wages, since floating rates reduce the costs of adjustment to such shocks by facilitating real exchange rate changes. It has long been acknowledged that this argument is tempered if the domestic economy has access to external transfers that help to alleviate the effects of such asymmetric shocks. Altruistic remittances in effect play the role of such transfers, reducing the effects of real shocks on domestic households' real incomes. As such, they provide an alternative mechanism of adjustment to that provided by exchange rate flexibility and weaken the argument for floating exchange rates when asymmetric real shocks are important.

Remittances and Growth

The preceding section focused on the short-run macroeconomic effects of remittances, taking as given the domestic capital stock and level of total factor produc-

tivity (TFP) in the economy receiving remittances. But remittance flows can also affect the evolution of the capital stock and of TFP over time—that is, they can affect the rate of growth of productive capacity in the receiving economy. This section examines the channels through which remittance receipts may affect an economy's growth.

To do this, it is useful to examine separately the possible effects of remittance flows on the accumulation of productive capital and on TFP, as well as to decompose TFP growth into two components: the growth in the economy's technological capacity (which determines the position of its production possibilities frontier, given its stock of productive assets) and changes in the efficiency of its resource allocation (which determines where the economy operates on that frontier). With these distinctions in mind, remittance receipts can in principle affect growth through three channels:
- their effects on the growth of the economy's technological capacity;
- their effects on the rate of accumulation of productive assets (i.e., the level of domestic investment); and
- their effects on the efficiency of the allocation of new capital.

We consider each of these effects in turn.

Remittances and Growth of Technological Capacity

A familiar channel through which the arrival of workers' remittances can affect the rate of growth of an economy's technological capacity is through Dutch disease effects—that is, effects that operate through the influence of remittances on the real exchange rate. Suppose, for example, that the rate of growth of domestic technological capacity is at least partly a function of the share of domestic traded goods production in GDP. This could be the case if production in some component of the traded goods sector—for example, nontraditional manufactures intended for export—increases the technological capacity of other firms in the economy. This could come about as the result of training, learning by doing, demonstration effects, "self-discovery," or similar dynamic production externalities. Since these externalities are positive on firms outside the traded goods sector, in the absence of corrective policy intervention the presence of such externalities creates a distortion that renders the domestic traded goods sector suboptimally small.

The arrival of (or an increase in) workers' remittances can affect the severity of this distortion. To the extent that an increase in remittance receipts results in an appreciation of the economy's equilibrium real exchange rate, as analyzed in "Workers' Remittances and Short-Run Macroeconomic Performance," it causes a contraction in traded goods production. Since the traded goods sector would in any case have been sub-

optimally small even without remittance inflows, the addition of workers' remittances aggravates a preexisting distortion, reducing the rate of growth of the economy's technological capacity and thus of TFP. This is precisely the phenomenon that has come to be known as Dutch disease. However, it is important to emphasize that this outcome is not a necessary implication of the appreciation of the real exchange rate and contraction of the traded goods sector associated with the arrival of (or an increase in) remittances. There is no "disease" if there are no distortions, because the real exchange rate appreciation is optimal in that case.

Remittances and Investment

The presence of workers' remittances may affect the rate of investment in the recipient economy. Whether this happens depends on how remittance receipts are used. In turn, the disposition of remittance receipts depends on the motives driving remittance flows. Consider three cases:

- pure income transfers, as in previous sections;
- transfers with a merit good component; and
- remittance flows as disguised capital flows, representing investments by migrants in the receiving economy.

The "pure transfer" case subsumes both of the cases considered previously—that is, it applies both to remittances that are purely exogenous transfers and to those that are altruistically motivated as well. It also subsumes a third possibility not discussed up to this point: remittances that reflect a return on a migration investment made by the household in the migrant's country of origin. The reason that the same analysis applies in any of the three cases is that the disposition of an additional dollar of remittance receipts does not depend on whether remittances are exogenous, motivated by altruism, or generated as the result of an explicit investment by the source family. In each case, the remittance simply takes the form of an additional dollar of income, and no other aspects of the recipient household's optimization problem are affected.

Pure Transfer Remittances

This being the case, consider the growth effects of remittances that are pure exogenous transfers. It is useful to begin by examining the effects of remittances on investment spending in a frictionless world, and then analyze the implications of introducing specific frictions. As in "Workers' Remittances and Short-Run Macroeconomic Performance," we adopt a simple analytical framework to explore these effects. The framework differs from that in the earlier section in that it assumes a one-good production structure (so there are no real exchange rate effects) and allows the representative household not only to consume goods and leisure,

but also to accumulate capital. To keep matters simple, we suppose that current output can be costlessly converted into physical capital, so the economy's capital stock is always at its desired level.

In a frictionless world, whether the receiving household consumes or saves an additional dollar of remittances it receives depends on whether that additional dollar is perceived to be a temporary or permanent alteration. The more permanent the increase in the remittance flow is expected to be, the larger the share that will be consumed. Assumption of an endogenous labor supply does not affect this analysis. The only difference that such an assumption makes is that when leisure is included in the utility function, part of the additional consumption in each period takes the form of increased leisure.

But even if the remittance is perceived to be transitory, so that a share of it is saved, in a frictionless world the additional saving does not lead to an increase in domestic investment, since it does not affect the domestic cost of capital, which is determined by uncovered interest parity. This being so, the additional saving takes the form of an accumulation of foreign assets. The implication is that, whether permanent or transitory, in a frictionless world remittance receipts do not affect the level of domestic investment.

Now retain the assumption of no domestic external finance premium, but suppose that perfect capital controls impose a condition of financial autarky on the domestic economy. In this case, the domestic real interest rate is given by the marginal product of capital. As in the frictionless world, the share of remittances that households choose to consume depends on whether remittances are perceived as temporary or permanent. But now, to the extent that remittances are saved, the increased saving must be completely devoted to financing domestic real investment, since that is the only way that the domestic household sector as a whole can accumulate wealth. The amount of additional investment is an increasing function of the perceived permanence of the remittance flow. The shorter the expected duration of the remittance flow, the more of it will be saved, and thus the larger the effect on domestic investment.

In a more realistic setting, with multiple types of domestic productive assets (e.g., physical and human capital) available for the household to accumulate, the form that the saving takes (accumulation of physical or human capital) depends on the relative rates of return among the competing domestic investment opportunities. Since households allocate their investable resources among productive assets so as to equalize their rates of return at the margin, the allocation of investment across different types of assets depends on the strength of diminishing returns in the respective activities.

Now suppose that there are frictions in domestic financial intermediation, so the domestic economy is characterized by the presence of an external finance

premium. For now, assume that this premium is exogenous with respect to the level of remittances. The solution to the household's optimization problem in this case sets the marginal product of capital (MP_K) equal to the market interest rate the household faces, which now includes an external finance premium. The presence of the external finance premium causes the domestic market interest rate, r, to exceed the household's rate of time preference, ρ, which is the cost of internal finance. Thus the solution to the household's optimization problem yields $MP_K = r > \rho$, and the household therefore chooses an upward-sloping consumption path with slope equal to $(r - \rho)$ and present value equal to that of its resources.

In this context, the introduction of a permanent flow of remittances shifts the consumption path upward by the amount of the remittance flow without altering its slope. If the remittance flow introduced is perceived to be transitory, on the other hand, the consumption path shifts upward by a smaller amount, reflecting the smaller impact on the household's lifetime resources, again without altering the path's slope. So the foregoing analysis carries through: domestic investment is affected only when external capital mobility is less than perfect.

It has been claimed that, in contradiction to this result, a remittance-receiving country's state of financial development may cause remittance receipts to have an important influence on domestic investment. The argument is as follows: when a country's domestic financial system is poorly developed, a large number of households are rationed out of formal credit markets, because the cost of providing credit to them is prohibitively high. Such households are therefore unable to finance potentially highly productive investment projects. The arrival of remittances allows them to undertake these projects and thus increases the level of investment and boosts economic growth.

How general is this argument? For it to be valid, credit-constrained households must have access to productive investment opportunities, the credit-constrained households with good investment projects must be the ones receiving the remittances, their receipt of remittances must ease their credit constraints, and they must respond to this easing of their credit constraints by spending on investment rather than consumption. The last of these conditions may appear to be inconsistent with the previous analysis: since households have already achieved $MP_K = r$, they devote any additional income to consumption, rather than to investment. However, the argument here departs from the previous analysis by making the assumption that some households are credit rationed. One way of describing this situation is that for such households, $MP_K > r > \rho$ (it is hard to see what else credit rationing could mean in this context). But if this is the case, then the analysis suggests that any additional resources the household

receives would indeed be devoted to investment, since $MP_K > \rho$, implying that the household can increase its lifetime utility by postponing consumption. Unfortunately, as described in Chapter 4, the preponderance of the micro evidence seems to suggest that remittances finance consumption, rather than investment, though the verdict is not unanimous on this issue.

If the external finance premium is endogenous—for example, if it depends on the borrowing household's collateralizable net worth—then another channel through which remittances may affect investment is by lowering the interest rate r faced by a non-credit-constrained household (i.e., one with $MP_K = r > \rho$), or by shifting households from credit-constrained to non-credit-constrained status (i.e., by lowering MP_K so that the household moves from $MP_K > r > \rho$ to $MP_K = r > \rho$). The problem with this argument, however, is that remittance income does not represent collateralizable net worth. Thus, a positive effect of remittances on investment is unlikely to emerge through reductions in the external finance premium households face or through the provision of additional bank credit to credit-constrained households.

Remittances as Transfers with a Merit Good Component

While retaining the interpretation of remittances as transfers (rather than loans), suppose that the remitter cares about the specific use that the receiving household makes of the remittance transfer, implying that there is a merit good component to the transfer (sometimes referred to in the remittances literature as the "Filipino mother" phenomenon, reflecting the concerns of migrant mothers for the well-being of their children back home). This obviously could affect the allocation of remittances between consumption and investment and therefore the effect of remittance receipts on economic growth in the receiving economy. However, assessing the importance of this phenomenon for determining the growth effects of remittance flows is problematic. It depends not just on how important the merit good component of remittance flows is, but also on whether the merit good takes the form of consumption or investment, as well as on the migrant's effectiveness in enforcing his or her preferences on the receiving household. Resource fungibility and asymmetric information create problems for the enforcement of such preferences. In an extreme case, the migrant's preferences may be completely disregarded, causing the situation to devolve to that of a pure transfer.

Remittances as a Capital Flow

It is also possible that at least some part of what is recorded as an unrequited transfer in the recipient country's balance of payments accounts is instead a

disguised capital flow—that is, that the migrant retains ownership of the resources sent to the home country, and the recipient simply invests these resources on the migrant's behalf. This situation differs from that of a traditional capital inflow in that the domestic intermediary who is entrusted with investing the remitted funds is typically a family member, rather than a formal financial intermediary in the destination country. It is more likely to arise when the recipient country's financial system is poorly developed, so domestic investors can lower the external finance premium they face by borrowing from family members living abroad, rather than from a domestic financial institution.

Although this situation has implications for the behavior of remittances (e.g., they should be responsive to return differentials between the economy in which the migrant resides and that to which he or she remits), its growth implications are less clear, for at least two reasons. First, and most obviously, the demand for loans in the recipient country can arise to finance either consumption or investment. But second, even if the loan is intended to finance investment, adverse selection and moral hazard problems (aggravated by familial relationships and distance) make it uncertain that the loan funds will indeed be used for investment purposes or that, if they are, the resulting investment will be productive.

Remittances and the Efficiency of Investment

Aside from their effects on the *level* of investment, remittance flows may affect the *efficiency* of investment in the receiving country, both in the short run and in the long run. In the short run, remittance flows can have an effect on investment efficiency if remittances are transfers with a merit good component, that merit good happens to be an investment good (e.g., education for the children, residential investment), and the migrant can indeed enforce his or her preferences on the recipient, as discussed previously. Under these circumstances, remittance flows may affect the efficiency of investment if the migrant is either more or less well informed about relative rates of return among competing projects in the domestic economy than is the recipient. To the extent that remittances represent a disguised capital inflow, replacing other flows that would have been intermediated differently in the domestic economy (e.g., through the domestic banking system), they tend to have effects on the efficiency of investment depending on whether the individual investing the funds on behalf of the migrant is a more or less efficient intermediary than the alternative intermediary in the domestic financial system.

In the longer run, remittance flows may influence the efficiency of domestic investment less directly: by affecting the state of financial development in the recipient economy. This effect may be operative if the presence of remittances affects the domestic demand for money and thus the public's demand for the liabilities of the domestic financial system; this can happen in at least two ways.

First, if remittance flows are exogenous, a higher level of remittances increases the resources (income) available to domestic households and thus increases household expenditure, as argued in "Workers' Remittances and Short-Run Macroeconomic Performance." The implication is that the transactions demand for money increases in the receiving economy.

Second, if remittances are altruistic, the presence of remittance flows may affect the demand for money through the implications of those flows for the level of economic uncertainty the recipient households face. A commonly held view is that the demand for domestic money decreases in response to an increase in domestic macroeconomic uncertainty (i.e., domestic uncertainty causes domestic agents to shift their assets abroad, rather than holding them in the domestic financial system). To the extent that altruistic remittances function as insurance for the recipient household, however (see Chapter 4), the presence of such remittances tends to reduce the impact of aggregate uncertainty on the individuals who receive them, thus tending to weaken the effect of aggregate uncertainty on their demand for money. For a given level of aggregate uncertainty, then, altruistic remittances tend to increase the demand for money at any given level of income.[8]

In either case—with either exogenous or altruistic remittance flows—the presence of remittances tends to increase the supply of funds faced by the domestic banking system. Such an increase lowers the cost of borrowing for banks, and with the marginal cost of intermediation held constant, reduces the cost of funds for the banks' private and public borrowers. The implication is that remittance inflows increase conventional measures of financial development such as the ratio of M2 to GDP or the ratio of credit to the private sector to GDP.

But financial development is best understood as referring not to such variables, which are just crude *indicators* of an economy's degree of financial development, but rather to the size of the external finance premium in the economy. In the context of banks, this is measured by the spread between deposit and lending rates. When this spread falls, the two conventional indicators of financial development mentioned in the previous

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[8]In other words, suppose the nominal demand for money (M^D) can be written as a function of the price level (P), interest rates (i), income (Y), and uncertainty (σ), such that

$$M^D = PL(\underset{-}{i}, \underset{+}{Y}, \underset{-}{\sigma}),$$

where the signs beneath the variables indicate the relationship between money demand and that variable. Then altruistic remittances reduce the absolute value of the coefficient of σ.

paragraph tend to increase (which is what makes them useful indicators), but the converse (that an increase in these indicators implies a reduction in the spread) does not follow. Thus the question for remittances' impact on financial development is whether the increase in the demand for bank liabilities is likely to be associated with reductions in the marginal cost of intermediation.

One channel through which this could occur is through economies of scale in the domestic banking industry. As the demand for the liabilities of domestic banks increases and the banking system therefore increases in scale, the associated reduction in unit costs reduces the external finance premium. A less direct channel could also operate if the increased demand for domestic financial intermediation among the remittance-receiving public causes it to pressure the government to implement financial reforms to improve the domestic financial system's efficiency (as foreign banks are sometimes said to do when they are allowed into developing country financial sectors). The public would indeed have an incentive to do so, because a greater share of its financial portfolio would be invested in the domestic financial system in the presence of remittances than in their absence. Unfortunately, this is not the only possibility. An alternative outcome is that the increase in demand for domestic bank liabilities may cause the public to pressure the government to make banks more secure (as appears to have been the case in several bank-dominated economies in East Asia). This may have perverse implications for financial development: the implementation of policies that promote concentration in the financial system and that induce banks to hold relatively safe assets, such as government bonds.

Remittances and Government Debt Sustainability

As indicated in "Workers' Remittances and Short-Run Macroeconomic Performance," the fiscal response to the arrival of (or an increase in) workers' remittances can have a critical influence on how those remittances affect domestic short-run macroeconomic equilibrium. By allowing for productive public expenditures, distortionary taxation, or both, it is possible to extend the analysis presented in "Remittances and Growth" to explore how the possibility of taxing remittances and either saving or spending the proceeds also affects the rate of growth of an economy's productive capacity. However, the set of possible fiscal responses to an increase in remittance flows is potentially richer than those restricted to contemporaneous effects on government revenues and expenditures, because the presence of remittances may have more far-reaching effects on the government's intertemporal budget constraint. This section explores those effects, focusing particularly on

the impact of workers' remittances on the sustainability of government debt. Because remittance flows may affect both the magnitude and the stability of government revenues, we analyze this impact separately in a world of perfect certainty and one with stochastic elements.

The Certainty Case

The maximum sustainable value of the ratio of government debt to GDP is the present value of the ratio to GDP of the government's maximum sustainable primary surplus plus seigniorage revenue, discounted at a rate equal to the difference between the real interest rate and the economy's sustainable real growth rate. If workers' remittances are taxable, an increase in the ratio of remittances to GDP increases the government's tax base, without a necessary increase in the tax rate. Because there are no necessary implications for government spending, the sustainable value of the primary surplus will rise, and so will the sustainable value of government debt. In other words, with taxable remittances an increase in the size of remittance inflows eases the government's intertemporal budget constraint.

However, an increase in remittance flows may increase the maximum sustainable ratio of government debt to GDP even if remittances are *not* taxable. This can happen in a variety of ways. First, even if they are not taxed directly, remittance flows may indirectly increase the revenue that the government receives from other taxes, such as the consumption taxes considered in Chapter 7, even if the applicable tax rates are not changed. Second, since remittance inflows represent an increase in domestic household incomes, they may make it possible for the government to raise the tax rate on the portion of household incomes that *is* taxable. In other words, the presence of remittance income may increase the maximum feasible tax rate on GDP.[9] Third, even with no change in tax rates, if an increase in remittance inflows increases the economy's growth rate, as discussed in "Remittances and Growth," the rate at which the government's future primary surplus plus seigniorage revenue are discounted will fall. Finally, if remittances increase the domestic demand for banking sector liabilities, as discussed in "Remittances and Growth," the demand for the monetary base will rise. As a result, for a given rate of inflation, the government's seigniorage revenue will tend to increase. For all three of these reasons, an increase in workers' remittances will result in an increase in the maximum

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[9]In this case, even if remittances do not affect the rate of growth of GDP, they may affect the rate of growth of the tax base if the government's maximum sustainable tax effort depends on the ratio of remittances to GDP and that ratio is increasing over time because remittances grow faster than GDP.

sustainable debt-to-GDP ratio. In other words, whether remittance flows are taxable or not, through these mechanisms their presence will increase the sustainable value of government debt and thus its borrowing capacity.

In addition to these considerations, if the size of the domestic banking sector affects the demand for government debt, a separate effect may be at work that operates in the same direction. Suppose that, for whatever reason, banks are willing to pay a premium to hold government debt rather than other assets. In that case, the larger the size of the domestic banking sector, the higher the demand for government debt, and thus the lower the cost to the government of financing its debt. It follows that if an increase in the flow of workers' remittances increases the demand for the liabilities of the domestic banking system, as discussed in "Remittances and Growth," then a larger flow of remittances tends to increase the government's maximum sustainable debt-to-GDP ratio.

The Role of Uncertainty

In reality, of course, a government's future fiscal intentions are unknown, and it would be reasonable to expect a variety of future exogenous shocks to affect its budget. Consequently, in calculating the government's maximum sustainable debt-to-GDP ratio, the appropriate discount factor to apply to the government's future flows of primary surpluses plus seigniorage revenue is not the risk-free real interest rate, but the interest rate applicable for discounting cash flows with the risk characteristics of government debt.

The implication of this observation is that another channel through which workers' remittances may affect the maximum sustainable value of government debt is through their effect on the stability of government revenues. To the extent that the presence of workers' remittances in an economy makes government revenue more stable—say, by stabilizing household consumption and thus government revenue from consumption taxes—the interest rate appropriate for discounting government debt falls. The opposite is true, of course, if the presence of remittances makes government revenue *less* stable. In the former case the sustainable value of government debt increases, whereas in the latter it decreases.

For example, if remittances are countercyclical, and if they consequently have the effect of stabilizing the time path of real GDP, then their effect is to stabilize the government's tax base over time and thus stabilize the future ratio of primary surplus to GDP. This reduces the risk profile of government debt and allows future government debt service payments to be discounted at a lower real interest rate (i.e., it reduces the sovereign risk premium). Since a given expected flow of future government resources (primary surplus plus seigniorage) is discounted at a lower rate, the present value of the maximum sustainable primary surplus plus seigniorage increases, and that increases the maximum sustainable value of the government's debt-to-GDP ratio (increases the government's borrowing capacity).

Conclusion

The purpose of this chapter has been to explore how the macroeconomic variables of interest to policymakers behave given the interaction between remittance flows and the recipient economy. Although the challenge for policymakers is to understand this interaction and the role that policy can play in maximizing the benefits derived from remittance flows, the analysis in this chapter shows that workers' remittances may not have uniform macroeconomic effects from country to country or over time. We therefore urge policymakers to conduct a thorough diagnostic analysis of the role remittances play in economies, with particular emphasis on the incentive effects of remittance flows, the effects of these flows on macroeconomic variables of interest, and the existence of any specific constraints on economic growth in the given environment in a particular economy.

Although the conclusions presented in the various sections of this chapter may appear general and incontrovertible, any specific policy recommendations must come after a thorough examination of the interplay between economic structure and remittances. In the next chapter, we develop an example of such an examination using a specific real business cycle model and analyze the optimal conduct of fiscal and monetary policy in this setting. The model is designed to investigate the incentive effects that remittances have on household labor supply and traces these effects to the macroeconomy and government policy under the existence of technology and government spending shocks.

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VI Macroeconomic Implications of Remittances: A General Equilibrium Model with Money

The existing literature has largely been silent concerning the impact of remittances on the functioning of government policy and the macroeconomy. In the absence of a unified framework for evaluating this impact, a positive aura has surrounded and colored the role of remittances and the policy prescription toward these flows. The conventional wisdom, with few exceptions, is that remittances (1) represent a stable and reliable source of foreign exchange, (2) reduce poverty, (3) insure consumption against negative shocks, (4) reduce macroeconomic volatility, (5) enhance investment in physical and human capital, and (6) alleviate credit constraints. Consequently, the current emphasis among policymakers is to highlight and attract remittances as a costless cure for the many economic challenges facing developing countries. Without careful analysis of the macroeconomic implications of such transfers, however, policies aimed at encouraging remittances may have unintended and possibly adverse consequences for the recipient economies.

The purpose of this chapter is threefold: to examine first, how the behavior of real and nominal variables differs in remittance-dependent economies relative to their behavior in economies that receive little or no remittances; second, how remittances influence the conduct of optimal monetary and fiscal policy; and third, whether a preferred policy structure exists that allows policymakers to achieve their objectives most effectively in economies where the remittances-to-GDP ratio is significant or growing. These questions are examined in a stochastic dynamic general equilibrium model with money and distortionary government policy. The model specifies remittances exogenously as countercyclical real income transfers to households, and the government is allowed to operate under two possible tax structures: a tax on labor income or one on consumption. Consequently, the chapter represents a first step toward implementing some of the general equilibrium ideas presented in Chapter 5.

The main findings from this exercise are as follows:

- Remittances increase consumption and leisure in the recipient household, indicating that remittances improve welfare and can be effective in poverty reduction.

- Remittances improve the sustainability of government debt in the recipient economy and reduce country risk by lowering the marginal cost of servicing debt.

- Remittances cause the labor supply in the recipient economy to become more procyclical and increase the magnitude of the domestic business cycle, indicating that the presence of remittances in an economy yields some negative externalities.

- The ability of remittances to provide an insurance effect against shocks to household income is dependent on the recipient economy's cash-credit intensiveness, meaning that the level of financial development in an economy may play a role in maximizing the benefits from such transfers.

- Tax structures and the conduct of optimal fiscal and monetary policy may differ across countries, since consumption taxes in lieu of labor income taxes enable the government to finance its operations with fewer distortionary costs to economic activity when remittance flows become significant.

The chapter proceeds as follows. The next section explains the main features of the stochastic general equilibrium model and discusses the main results under labor and consumption taxation. This is followed by a discussion of remittances and heightened macro risk, an examination of the welfare gains to households from remittance flows, and concluding statements. A detailed exposition of the general equilibrium model is provided in the chapter appendix.

Remittances in a Business Cycle Framework

This chapter examines the properties of remittances and the relation of those properties to optimal policies and allocations in a stochastic monetary economy composed of a representative household, a representative firm, a government, and remitters. The household in this economy receives utility from leisure and two consumption goods, a cash good and a credit good, and earns income through domestic production by supplying labor to firms. Output is produced according to a production function that combines capital, labor, and

technology in which the process governing technology is assumed to be exogenous and stochastic. The household values money, since it must be accumulated to facilitate consumption of the cash good.[1] Under this specification, anticipated inflation acts as a distorting tax on activities involving the use of cash.

Given the preponderance of evidence supporting the altruistic motive for remitting, including the evidence presented in Chapter 4, and the treatment of these flows in balance of payments accounting as discussed in Chapter 2, the representative household receives remittances, which are exogenously specified as countercyclical real income transfers that augment the income the household receives from production.[2] The countercyclical remittance function used in the model results in increased real transfers to the household when domestic output falls below the equilibrium level of output and in reduced real transfers during economic expansions. Remittance flows to the household, however, are assumed to be less than fully compensatory in nature, only partly offsetting changes in domestic output.[3] The level of remittances and their sensitivity to the business cycle are varied in the calibration process.

The government is considered benign in that policymakers maximize the welfare of the average household in the economy subject to raising revenues sufficient to cover the exogenously determined level of government expenditures. The government raises revenue through taxation, printing money, or debt issuance via one-period real bonds and uses this revenue to finance its spending and service existing debt. The model includes an exogenous shock to government spending, and this shock and the shock to technology are the two main sources of uncertainty in the model. According to evidence from various studies (e.g., World Bank, 2005, p. 93) that indicates that governments do not typically tax remittances directly, the government in the model is not permitted to levy a direct tax on remittance transfers. Instead, following the evidence from Gordon and Li (2006), the model includes two different tax structures: one in which the government imposes a tax on labor income and a second in which the government raises revenue through a consumption tax.[4] Government policies that change the growth rate of the money supply or the tax rates on labor income and consumption impose an excess burden on households and distort economic decisions, causing households to alter their decision making in response to changes in government policy.[5] Consequently, the government must search for a revenue policy mix that satisfies its budget constraint while simultaneously minimizing the welfare costs of this policy mix for households.

The model is calibrated to match the features of the Chilean and U.S. economies. These countries serve as reasonable case studies, since remittance activity relative to GDP is negligible in both countries, the required data to calibrate the model properly are available, and the two countries differ with respect to economic structure. Though the United States is the largest source country of remittance flows, with $39 billion in outward remittances in 2004 (World Bank, 2005), this total amounts to only 0.3 percent of the country's GDP. Remittance flows into Chile amounted to $13 million in 2004, or 0.1 percent of GDP. Chile and the United States differ with respect to the level of government debt and business cycle volatility, with Chile having relatively lower debt-to-GDP ratios and more pronounced business cycles. The process governing technology in Chile is more volatile and persistent than in the United States, but only slightly so. The process for government spending, however, differs greatly in the two countries, as Chile experiences much larger spending shocks and significantly less persistence relative to those found in the United States. Finally, Chile is a cash-based economy—that is, more of its transactions are accomplished with the use of cash—whereas credit-based transactions dominate in the United States. Calibration of the

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[1]The neoclassical growth and business cycle literature typically introduces money in one of three ways: money enters directly into households' utility function, saves on transaction costs associated with consumption, or is required to purchase all or a subset of consumption goods. The model in this chapter pursues the last of these courses, which is often referred to as a cash-in-advance constraint. The specification is useful, since it introduces a nominal rigidity through which economic shocks are propagated and implies a set of strong restrictions that help calibrate an abstract monetary model to an actual economy.

[2]The use of a representative agent means that all households in the model receive remittances to the same degree. A consequence of this specification is that the model can address the effects of remittances on economic decisions and the benefits of remittances to the average household but cannot be used to address differences between households that receive remittances and those that do not. Including both remittance-receiving households and non-remittance-receiving households would greatly increase the model complexity and involve assessment of potential welfare transfers between households.

[3]The altruistic motivation to remit, as captured in the model's remittance function, mirrors bequest behavior from parents to dependents. For example, Wilhelm (1996) tested several altruistic models of optimal bequest behavior and found that a $1 increase in the earnings of a dependent results in a reduction in bequests of between $0.12 and $0.19.

[4]Using data from 1996–2001, Gordon and Li (2006) found that developing countries receive 51 percent of tax revenues from consumption and production taxes versus only 31 percent from income taxes. In contrast, developed countries rely more heavily on income taxation, receiving 54 percent of tax revenue from income taxes and only 33 percent from consumption and production taxes. The authors report that developing countries also receive significant revenue from seigniorage and the inflation tax, providing additional justification for the inclusion of money as a distortionary source of government revenue in our model.

[5]The alternative would be to implement lump-sum taxation. Despite reducing the model's complexity, lump-sum taxation eliminates changes in relative prices, thereby removing an important channel through which to evaluate the impact of government policy instruments on economic decisions.

model to these two economies provides a rich set of characteristics through which to examine remittance flows and their effect on activity and policy. The initial calibration procedure captures the economic relationships in a non-remittance-dependent setting, in which the ratio of the level of remittances to GDP is zero. To these baselines, the model adds remittances-to-GDP ratios ranging from 5 percent to 25 percent.

The calibration procedure for Chile uses quarterly data from 1986–2000 and follows the procedures outlined by Bergoeing and Soto (2002).[6] The calibration process results in a ratio of government spending to GDP in Chile of 12 percent and of total government debt to GDP of 13 percent. The fraction of time spent working is 0.43, which is markedly higher than that found in developed countries. Bergoeing and Soto attribute the difference to established practices in the formal labor market that discourage part-time work. The U.S. model is calibrated to match the general features of the post–Korean War economy. Using quarterly data from 1990–2002, the ratio of government spending to GDP in the United States is 14 percent and the ratio of federal government debt held by the public to GDP is 39 percent.[7] The fraction of time spent working is set at 0.31, in accordance with Juster and Stafford (1991). Finally, the real interest rate is higher in Chile than in the United States, with annual real rates in Chile averaging 9.3 percent versus 3.6 percent in the United States, reflecting the historical country risk premium for investing in Chile.

The remaining parameters for both countries, including the marginal utility of leisure and the depreciation of the capital stock, are derived from first-order conditions and the nonstochastic steady-state government budget constraint. Once properly specified, each model economy is solved and simulated under the effects of technology and government spending shocks. The following sections discuss the results from this process, with the results under labor taxation presented first, followed by a discussion of the main differences under a system of consumption taxes.

Results with Labor Income Taxation

Table 6.1 reports the steady-state values for both Chile and the United States under labor income taxation for the baseline case without remittances and for various remittances-to-GDP ratios. The presence of remittances provides the household with additional disposable income, and the household spreads these resources over each of the consumption goods as well as leisure. Consequently, as remittances are added to the model economies, steady-state consumption of the cash and credit goods increases, whereas steady-state labor supply decreases. For example, Table 6.1 reports that as the remittances-to-income ratio rises to 25 percent in Chile, the steady-state labor supply declines by 23 percent and output falls by slightly more than 16 percent relative to the baseline. A similar pattern is found for the United States. Despite the decline in domestic output as the household chooses more leisure, the household is still able to increase overall consumption, since disposable income has risen. In other words, the reduction in output resulting from a decline in household labor supply is not sufficient to offset fully the increase in remittances. The increase in household disposable income—income from production plus remittances—leads to an increase in steady-state consumption of both the cash and credit goods.

Government Policy under Remittances

Table 6.1 also reports the behavior of optimal government policy in the presence of remittances and labor taxation. In the baseline economies without remittances, optimal monetary policy sets the rate of money growth equal to the rate of time preference, which is known in the literature as the Friedman rule. By doing this, the monetary authority is equating the real return on money balances and government debt in expectation, satisfying Euler conditions in the model.[8] The household can transfer resources across time using money balances or government debt, and enacting the Friedman rule means that government policy does not impose an inflation tax wedge between cash and credit good consumption, since both assets earn the same expected rate of return. Enacting the Friedman rule requires the government to run a gross-of-interest surplus by setting equilibrium labor income taxes high enough to cover government spending, interest on the debt, and the withdrawal of money balances from the economy. This is one reason the equilibrium labor

[6]The calibration procedure uses National Income and Product Accounts data for Chile and the United States to derive parameter values for the share of income attributable to capital and labor, the capital-output ratio, the fraction of time households spend working in the market, the relative importance of the cash and credit good in the household utility function, the magnitude and persistence of technology and government spending shocks, the ratio of government spending to output, and the level of debt. In addition to Bergoeing and Soto (2002) for Chile, see Stock and Watson (1999) and Cooley and Hansen (1995) for examples of this procedure applied to the United States.

[7]In both cases a gross capital concept is assumed, so that investment includes government investment and government spending is defined as net real government spending on goods and services. For example, in the United States this is equal to real total government spending less the sum of real defense investment, real nondefense investment, and real state and local investment.

[8]According to Friedman (1969), optimal monetary policy satiates the economy with real balances to the extent that it is possible to do so. In his many public statements on monetary policy rules, Friedman often interpreted this result to mean that central banks should impose a low, yet positive, constant rate of growth in M2. For the U.S. economy, Friedman advocated a constant growth rate in M2 of between 3 and 5 percent a year.

Table 6.1. Steady-State Values Under Labor Taxation

	Remittances-to-Income Ratio							
	Chile (Cash-Based Economy)				United States (Credit-Based Economy)			
Variable	0%	5%	15%	25%	0%	5%	15%	25%
	(In levels)							
Output	1.61	1.55	1.44	1.35	1.73	1.67	1.55	1.45
Remittances		0.08	0.22	0.34		0.08	0.23	0.36
Cash good	0.85	0.86	0.88	0.90	0.49	0.50	0.50	0.51
Credit good	0.28	0.29	0.31	0.32	0.63	0.64	0.67	0.69
Labor	0.44	0.41	0.37	0.34	0.31	0.29	0.26	0.23
Shadow price of debt	0.11	0.10	0.08	0.05	0.14	0.13	0.12	0.11
	(In percent)							
Inflation rate	−2.2	1.0	4.5	4.6	−0.9	1.1	4.2	5.9
Real interest rate	2.2	2.2	2.2	2.2	0.9	0.9	0.9	0.9
Money growth rate	−2.2	0.9	4.4	4.5	−0.9	1.1	4.1	5.7
Tax rate	25.0	22.8	20.4	21.9	31.4	31.7	32.5	34.1

Source: Authors' calculations.

Note: "Output" is output from production (excluding remittances). The inflation rate, real interest rate, and money growth rate are expressed as quarterly growth rates in net terms. The tax rate is expressed as a percentage of labor income.

income tax in the U.S. economy reported in Table 6.1 is higher in the baseline case than that found in Chile. As discussed in Alvarez, Kehoe, and Neumeyer (2004), Aiyagari and others (2002), and Chari, Christiano, and Kehoe (1991, 1996), the Friedman rule is optimal in a variety of monetary economies with distortionary taxes. That the government should avoid taxation of intermediate goods, in this case money balances, is also a well-established result from public finance (e.g., Diamond and Mirrlees, 1971).

The introduction (or increase) of remittances under labor income taxation complicates the conduct of optimal government policy. As the level of remittances increases and the household chooses additional leisure on the margin, the resulting declines in domestic output leave the government with a smaller tax base through which it can raise revenue. Furthermore, raising additional revenues by increasing the labor tax rate is problematic, since household labor supply responds negatively to increases in labor taxes. Enacting such a policy would reinforce the household's preference for additional leisure in the presence of remittances. In both country cases, optimal government policy responds by increasing money growth relative to the baseline, meaning that the governments are using both labor income taxes and the inflation tax to finance government obligations. The balance between the labor income tax and the inflation tax, however, differs between the countries. In cash-based Chile, the increase in money growth relative to the baseline enables the government to reduce equilibrium labor tax rates. The steady-state growth rate of money rises to 4.4 percent quarterly at a

remittances-to-income ratio of 15 percent, and the tax on labor income falls from 25.0 percent to 20.4 percent. Beyond this level of the remittances-to-income ratio, however, the government in Chile elects to lean more heavily on labor taxes relative to further increases in money growth, though the 21.9 percent labor tax at the 25 percent remittances-to-income ratio remains well below the 25 percent labor tax found in the baseline.

In contrast, optimal policy in the credit-based U.S. economy settles on both higher money growth and higher labor income tax rates at all levels of remittances. The tax on labor income rises from 31.4 percent under the baseline to 34.1 percent at a remittances-to-income level of 25 percent. The reason for the differences in policy response across the two cases is derived from the cash-intensive nature of the calibrated Chilean economy. The inflation tax is imposed on a larger base in Chile, since it is more dependent on currency transactions, and as a result, the inflation rate does not have to increase as much, and the strong revenue generation from the inflation tax increase makes it feasible to reduce the tax on labor. The U.S. economy's credit-intensive nature means that the inflation tax cannot access the same base of transactions, and government policy in this setting must therefore rely on higher inflation and labor tax rates.

Remittances and Debt Sustainability

Following the recent survey by Kocherlakota (2005), nonoptimality of the Friedman rule in a representative agent model with flexible prices is unusual. Violating

the Friedman rule and using the inflation tax enables the government to tax remittances indirectly through the cash-in-advance constraint. Increases in money growth and labor taxation, as seen in both country cases at higher levels of remittances, raise the cost of distortionary government policy at the margin, which under normal conditions would increase the shadow price of debt in the government budget constraint.[9] The presence of remittances increases the government's tax base even though the distortionary inflation tax must be used to tap into these resources. Consequently, the shadow price of government debt falls as the potential tax base expands, indicating that the welfare cost of increases in government debt has fallen. With a lower shadow price of debt, the government finds that it has much more flexibility in its debt management practices. For example, policymakers can let the debt fluctuate to insure households against economy-wide shocks, as opposed to financing the shocks exclusively with distortionary labor taxes or money growth. The government also finds that it can either raise the level of debt while maintaining the same welfare costs of policy under the baseline or maintain the same debt levels under the baseline and reduce the level of country risk. Country risk is lowered in the presence of remittances, since the larger tax base makes existing levels of debt easier to finance.[10] Remittances, therefore, improve debt sustainability while also enhancing the ability of debt to act as a shock absorber.

Results with Consumption Taxation

The use of a tax on labor income has the undesirable effect of making the government rely more on inflation to appropriate resources as the level of remittances increases. This is especially problematic given the current trend among countries to establish inflation targets as the focus of monetary policy. If an inflation target were imposed on the optimal government policy problem, then the government in our model would not

[9]The model endogenously solves for the multiplier on the government budget constraint. The multiplier is the value that the household places on the government's ability to raise revenue from a source "outside" the economy, or the value to the household if the government were relieved of the obligation to service one unit of existing government debt. This would be equivalent to collecting a lump-sum tax, making the multiplier equal to the shadow price of debt. Solving for the multiplier as an endogenous policy variable reveals how the shadow price of debt behaves relative to marginal taxation and money growth.

[10]Reductions in country risk are manifested in financial markets through reductions in real interest rates. Reductions in steady-state real interest rates are not possible in the model, since interest rate data are used in the calibration process and linked with the rate of time preference. The model captures reductions in country risk and lower marginal costs of policy through the shadow price of debt on the government budget constraint.

Table 6.2. Steady-State Values Under Consumption Taxation

| Variable | Chile (Cash-Based Economy) Remittances-to-Income Ratio | | | |
	0%	5%	15%	25%
	(In levels)			
Output	1.56	1.51	1.42	1.34
Remittances		0.08	0.21	0.34
Cash good	0.84	0.86	0.90	0.93
Credit good	0.28	0.28	0.29	0.31
Labor	0.42	0.40	0.36	0.33
Shadow price of debt	0.09	0.08	0.04	0.01
	(In percent)			
Inflation rate	−2.2	−2.2	−2.2	−2.2
Real interest rate	2.2	2.2	2.2	2.2
Money growth rate	−2.3	−2.3	−2.2	−2.2
Tax rate	18.8	18.4	17.7	17.1

Source: Authors' calculations.
Note: "Output" is output from production (excluding remittances). The inflation rate, real interest rate, and money growth rate are expressed as quarterly growth rates in net terms. The tax rate is expressed as a percentage of household consumption.

be allowed to use inflation to tax remittances indirectly and would instead have to resort to further labor income taxation, which harms output. An alternative would be to allow the government to use a consumption tax rather than a labor tax.[11] Table 6.2 presents the steady-state equilibrium under optimal government policy in both levels and growth rates under consumption taxes for the case of Chile. (The results for the calibrated U.S. economy are similar.)

As in the case of labor taxation in Table 6.1, optimal government policy with consumption taxes in the baseline case without remittances follows the Friedman rule by setting money growth equal to the rate of time preference. The presence of remittances under consumption taxation still leads to a reduction in steady-state labor supply as the household spreads the additional resources across consumption and leisure. As in the labor tax case, the overall level of household disposable income still increases, since the drop in domestic output is not enough to fully offset the increase in remittance income. Therefore, the use of a consumption tax leads to an increase in the tax base, as the government

[11]Gordon and Li (2006) examined reliance on various types of taxes, arguing that the government wants to account for the differences in the cost of obtaining information needed to implement the various tax systems. For example, switching production of services to the informal sector may have a low cost compared to that of switching production of manufactured goods. As a result, the government will be reluctant to rely on a VAT on services. Our analysis does not account for these enforcement issues.

now taxes total consumption, derived from domestic production and exogenous remittances, instead of taxing income from declining domestic production under labor taxation. As the level of remittances increases, the government finds that it can reduce the tax rate on consumption while still having enough resources to cover exogenous government expenditures, pay debt service costs, and maintain the Friedman rule. In the case of Chile, the tax on consumption, expressed as a percentage of total consumption of cash and credit goods, falls from 18.8 percent in the baseline economy without remittances to 17.1 percent at the 25 percent level of the remittances-to-income ratio. In contrast to what takes place in the economies with labor taxation, therefore, optimal government policy does not deviate from the Friedman rule in the presence of remittances so long as the government has the ability to enact a consumption tax. At each level of the remittances-to-income ratio, the optimal policy of equating the ex ante real returns on money and government bonds remains in place.

With declining steady-state tax rates on consumption and constant money growth rates, government policy becomes less distortionary. Government policy is relatively more distortionary under labor taxation after remittances are introduced, since the government finds it optimal to increase money supply and labor taxation. With the labor tax base falling, the government switches to a separate instrument—the inflation tax—that imposes additional welfare costs through the cash-in-advance constraint by distorting the choice between the cash and credit goods. Policy is relatively less distortionary under consumption taxation, since the tax base on consumption is increasing and the government has the proper instrument to act upon this base. With the proper instrument already in place, the government can refrain from imposing additional costs through the cash-in-advance constraint.

Under consumption taxes, the presence of remittances also leads to a larger reduction in the shadow price of debt and greater improvement in debt sustainability than is found under labor taxes. Under labor taxes, for example, the shadow price of debt in Table 6.1 declines almost 55 percent, from 0.11 to 0.05, when the economy moves from the baseline to a remittances-to-income ratio of 25 percent. Under consumption taxation, the shadow price of debt in Table 6.2 declines 88 percent in value. The relatively larger decline in the shadow price of debt under consumption taxation as the remittances-to-income ratio increases suggests that debt sustainability should improve more in the country or, equivalently, country risk should be reduced more through the implementation of a consumption tax system. Remittances as countercyclical income transfers create a countercyclical revenue base for the government, and the consumption tax provides direct access to this base without driving a wedge between cash and credit consumption. The relatively larger decline in the shadow price of debt under consumption taxation indicates that the consumption tax system is more efficient at extracting resources to service existing or new debt than a combination of the labor tax and the inflation tax.

Remittances and Macroeconomic Risks

Table 6.3 reports summary statistics on the moments of the business cycle for the calibrated Chile economies. As is commonly found in most real business cycle models, the baseline economy without remittances generates about half of the standard deviation of output as is found in the actual Chilean economy. However, the model economies without remittances generate volatilities for consumption, prices, and inflation that more closely match the features of actual data as reported by Bergoeing and Soto (2002).[12] Although money supply has very little volatility in either of the baseline economies without remittances, the volatilities for the price level and rate of inflation in each period are also determined by the volatility of the cash good, as a result of the cash-in-advance specification. The volatility of the interest rate is lower than that found in other studies, since the values reported here are based on the filtered value of the gross interest rate series as opposed to a series of net interest rates.

Although the results of the simulation procedure presented in the previous sections confirm some of the preconceived ideas about the benefits derived from remittances—increased consumption, potential poverty reduction, and more robust debt sustainability—they indicate that these benefits come at a cost. As remittances are added to the baseline economies in Table 6.3, the reported standard deviation of output rises, indicating that the presence of remittances leads to increased business cycle volatility. This result holds regardless of the tax system in place. Business cycle volatility rises by one-third under the labor tax case and by one-fourth under the consumption tax case. The increase in business cycle volatility arises because the presence of remittances increases the correlation between labor supply and output. In each of the model economies for

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[12]Bergoeing and Soto (2002) report standard deviation of real GDP in Chile of 2.20 percent, whereas the volatility reported in Table 6.3 is 1.17 percent for the economy with labor taxation. The lower model volatility results from the assumption of a fixed capital stock, since standard deviation of investment is much higher than that for output and consumption. The authors also report standard deviation of nondurable consumption, the price level, and inflation in Chile of 1.88, 2.12, and 0.93 percent, respectively. The volatility of the calibrated baseline economy under labor taxation generates similar moments, with standard deviations of 1.67 percent for consumption, 1.67 percent for the price level, and 1.21 percent for inflation.

Table 6.3. Standard Deviation of Calibrated Chile Economies
(In percent)

Variable	Remittances-to-Income Ratio							
	Labor Taxation				Consumption Taxation			
	0%	5%	15%	25%	0%	5%	15%	25%
Output	1.17	1.25	1.39	1.56	1.18	1.24	1.37	1.49
Remittances		0.62	0.70	0.78		0.62	0.68	0.75
Cash good	1.67	1.68	1.65	1.59	1.66	1.61	1.52	1.43
Credit good	1.66	1.54	1.39	1.36	1.66	1.61	1.52	1.43
Labor	0.26	0.13	0.10	0.37	0.23	0.13	0.07	0.26
Shadow price of debt	3.78	3.90	3.86	3.87	3.41	3.26	2.87	8.83
Price level	1.67	1.70	1.82	1.76	1.41	1.38	1.30	1.23
Inflation	1.21	1.18	1.13	1.10	1.03	1.00	0.94	0.89
Real interest rate	0.05	0.05	0.03	0.03	0.03	0.03	0.02	0.02
Debt	0.20	0.23	0.24	0.29	0.26	0.24	0.21	0.17
Money growth rate	0.02	0.15	0.29	0.29	0.00	0.00	0.00	0.00
Tax rate	1.56	1.33	0.90	1.13	1.90	1.87	1.80	1.73

Source: Authors' calculations.

Note: "Output" is standard deviation of output from production (excluding remittances). The standard deviation of the interest rate is based on the gross real interest rate, whereas the standard deviation of the tax rate is based on the tax on labor income or consumption.

Chile, household labor supply is reacting to information from two channels, the domestic production process channel and the remittance channel. As the ratio of remittances to income increases, the household begins to respond more forcefully to the remittance channel, and it is through this channel that labor supply becomes more procyclical.
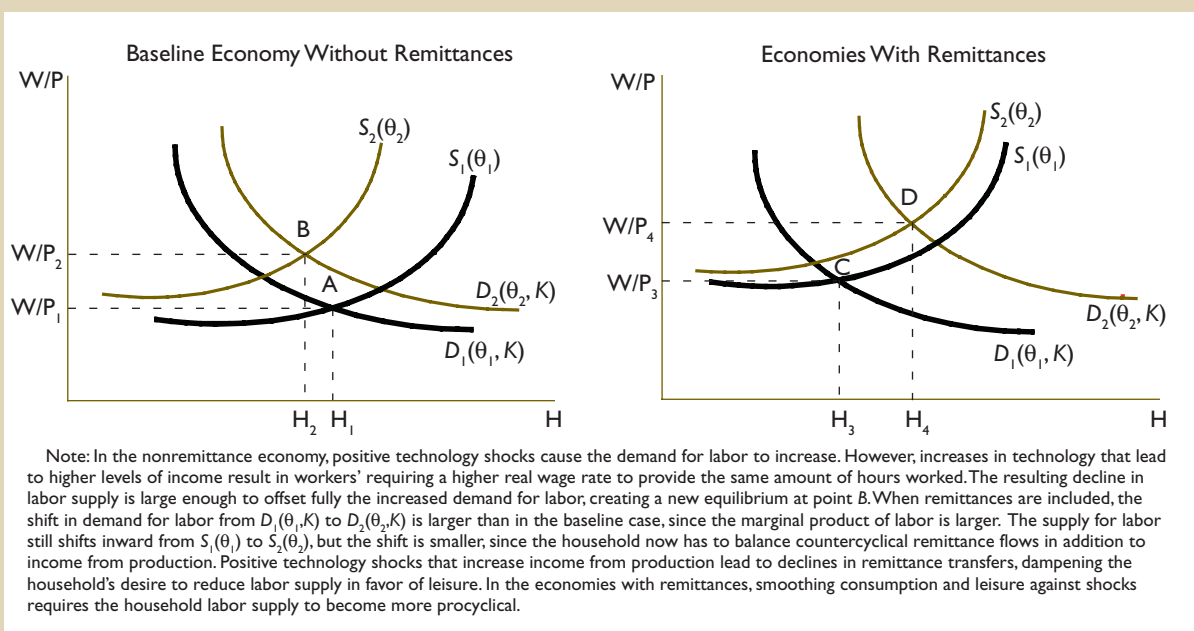
The increased correlation between labor and output in response to remittances and the resulting amplification in business cycle volatility behavior can best be understood by examining the demand and supply for labor in general equilibrium. Figure 6.1 illustrates the market for labor. The quantity demanded for labor, D, is decreasing in the real wage rate, whereas the quantity of labor supply, S, is increasing in the real wage rate. The figure illustrates the response of labor supply and demand to a positive technology shock in the baseline economy without remittances and in the economies with remittances. In the baseline economy without remittances, the labor market is initially in equilibrium at point A, with H_1 hours of labor supplied at a real wage of W/P_1. The realization of the positive shock to technology leads to an increase in the demand for labor among firms, since workers are more productive, causing the demand for labor curve to shift outward for every level of real wages. On the other hand, increases in technology that lead to higher levels of income through the production function lead to more consumption, so that workers require a higher real wage rate to provide the same amount of hours worked. The magnitude of the decline in labor supply depends on the marginal

disutility of supplying additional labor. In the U.S. and Chile cases, the calibrated values for the marginal disutility of labor are sufficiently high that the resulting decline in labor supply is large enough to offset fully the increased demand for labor, leading to a decline in the equilibrium level of hours worked and a higher real wage.[13] This is the situation illustrated in Figure 6.1 as the economy moves from initial equilibrium at point A to the new equilibrium at point B. Income to the household still rises despite the decline in labor (e.g., the decline in labor supply does not offset the impact of technology on production), and the household spreads these resources across consumption and leisure in equilibrium. Household labor therefore acts as a device to smooth shocks to consumption and leisure, resulting in an initial negative correlation between labor and technology.

When remittances are included in the calibrated economy, the behavior in the labor market changes. In Figure 6.1 the initial equilibrium hours worked with remittances included in the economy, H_3, is lower than that in the baseline case, H_1, but with remittances, the

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[13]When capital is introduced, the increase in demand for capital also increases the demand for labor, resulting in a net positive correlation between output and labor in the baseline economy without remittances. Without capital, this complementary inputs channel is not present. The increased procyclicality between labor and output will not be reversed if capital is allowed to fluctuate. A positive technology shock that causes a net increase in labor supply in the baseline economy without remittances will produce a larger net increase in equilibrium labor supply in the presence of remittances.
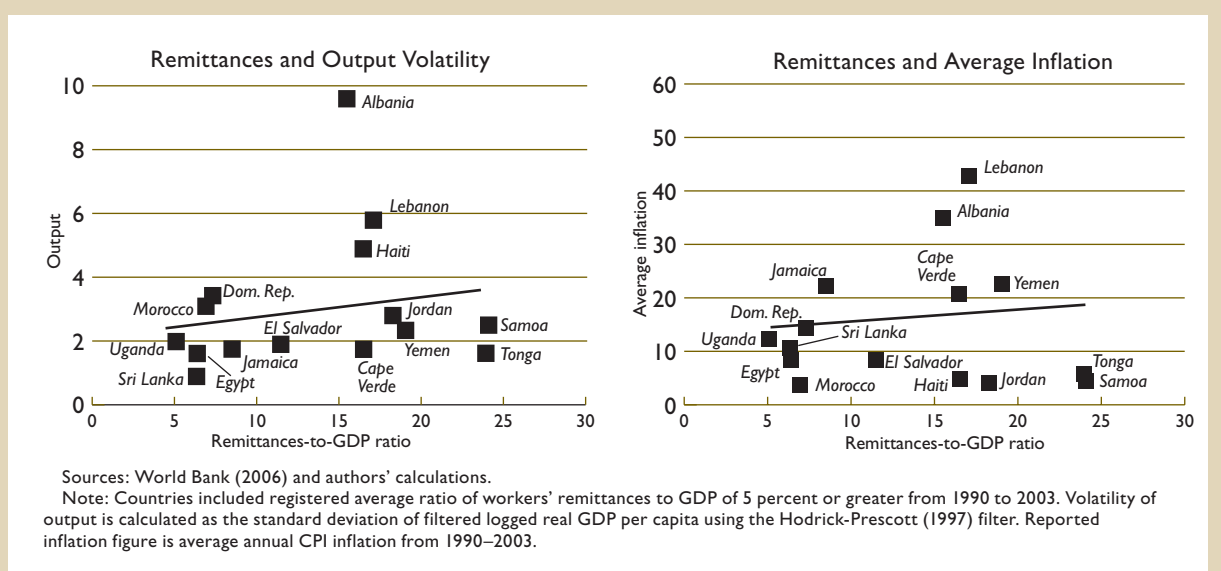
Figure 6.1. Labor Market Dynamics in Response to a Positive Technology Shock

Note: In the nonremittance economy, positive technology shocks cause the demand for labor to increase. However, increases in technology that lead to higher levels of income result in workers' requiring a higher real wage rate to provide the same amount of hours worked. The resulting decline in labor supply is large enough to offset fully the increased demand for labor, creating a new equilibrium at point *B*. When remittances are included, the shift in demand for labor from $D_1(\theta_1,K)$ to $D_2(\theta_2,K)$ is larger than in the baseline case, since the marginal product of labor is larger. The supply for labor still shifts inward from $S_1(\theta_1)$ to $S_2(\theta_2)$, but the shift is smaller, since the household now has to balance countercyclical remittance flows in addition to income from production. Positive technology shocks that increase income from production lead to declines in remittance transfers, dampening the household's desire to reduce labor supply in favor of leisure. In the economies with remittances, smoothing consumption and leisure against shocks requires the household labor supply to become more procyclical.

equilibriums have higher output per worker and real wage rates. These results can be discerned from Tables 6.1 and 6.2. The outward shift in demand for labor by firms from $D_1(\theta_1,K)$ to $D_2(\theta_2,K)$ is larger when technology shocks occur in the presence of remittances, since the marginal product of labor is higher. The supply for labor still shifts inward from $S_1(\theta_1)$ to $S_2(\theta_2)$ in response to the technology shock, but the inward shift is smaller than in the baseline case. This dampened labor supply response is a consequence of the influence of the remittance channel on household labor supply decisions. Positive technology shocks lead to a net increase in income from production, despite the household's desires to choose more leisure. The net increase in production income causes output to rise above steady-state output, leading to a reduction in remittances owing to the countercyclical nature of these flows. Since the household is now concerned with smoothing consumption and leisure using resources from a pool that includes income from both production and remittances, the household does not reduce its labor supply in the economies with remittances as much as it does in the economies without remittances. The inward shift in the labor supply curve is therefore reduced when remittances are present. The net impact of the technology shock in the presence of remittances is an increase in labor supply from H_3 to H_4 as the economy moves from point *C* to point *D* in Figure 6.1. The results of the simulations indicate that the correlation between labor

hours and income, which starts out negative with no remittances, is positive at a remittances-to-income ratio of about 8 percent and reaches unity at a remittances-to-income ratio of 25 percent. In each case the household is interested in smoothing consumption and leisure in the face of shocks. Doing so in an economy with remittances requires household labor supply to become more procyclical. This increased procyclicality of labor, despite being derived from optimal behavior on the part of households, has the unsavory effect of producing additional business cycle volatility.

The simulation results also indicate that remittances' ability to provide an insurance effect for shocks to consumption should be viewed as conditional. An insurance effect is present for consumption of the credit good, since remittances can be converted into consumption of this good in the same period the household receives the countercyclical income transfer. In contrast, the cash-in-advance constraint means the household has to transfer remittance resources across time to consume the cash good, and the more volatile inflation and output processes lead to increased volatility of cash good consumption, though mainly under labor taxation. In the U.S. case under labor taxation, for example, volatility of credit good consumption declines, whereas volatility of cash good consumption increases as the level of remittances rises. The credit-intensive nature of the calibrated U.S. economy is instrumental in this regard. Though the economy's credit-based nature pro-

Figure 6.2. Remittance-Dependent Economies: Output Volatility and Inflation

Sources: World Bank (2006) and authors' calculations.
Note: Countries included registered average ratio of workers' remittances to GDP of 5 percent or greater from 1990 to 2003. Volatility of output is calculated as the standard deviation of filtered logged real GDP per capita using the Hodrick-Prescott (1997) filter. Reported inflation figure is average annual CPI inflation from 1990–2003.

vides for an insurance effect on shocks to income, the need to use the inflation tax to access a small cash good tax base for revenues increases inflation and cash good consumption volatility.[14] In contrast, volatilities for both the cash and credit good decline under consumption taxation. The ability of remittances to provide consumption insurance against shocks to household income depends on two factors: the relative importance of the cash and credit good in household consumption and the type of tax system in place.

Finally, the countercyclical nature of remittances and their procyclical effect on output has varying consequences for the volatility of government policy. In the economies without remittances in Table 6.3, nearly all the volatility in government policy appears in taxes, as the labor and consumption tax rates fluctuate to preserve the Friedman rule. As remittances are added to the economies, their effect on government policy risk is instrument dependent. Under labor taxation, the presence of remittances increases the mean equilibrium growth rate of money and also increases its volatility. Under consumption taxation, these effects are removed as the government finds itself with a countercyclical tax base, allowing for an improved set of optimal government policies. In both tax structures the volatility of the

shadow price of debt increases, reflecting the optimality of using debt as a shock absorber, since the marginal cost of servicing debt falls in equilibrium when remittances are present.

A preliminary examination of the data from remittance-dependent economies generally confirms the model results that economies with higher reliance on remittance flows experience higher rates of output volatility and inflation. Figure 6.2 plots the standard deviation of output volatility and the average inflation rate in economies with remittances-to-GDP ratios of 5 percent or more during the period from 1990 to 2003. The data indicate that economies that received higher levels of remittances also experienced higher rates of output volatility and higher average inflation rates, with the relationship between remittances and business cycle volatility appearing particularly strong.[15]

Welfare Implications of Remittances

Any increase in household utility resulting from remittances depends on the extent to which the marginal gain from remittances outweighs the marginal cost from additional volatility, and to what degree the household prefers one tax structure over another. A certainty equivalence framework is used to measure

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[14]The results for the U.S. simulations are not presented in Table 6.3 for reasons of space. Under labor taxation, the volatilities for credit good consumption, cash good consumption, and inflation without remittances are 1.38 percent, 1.43 percent, and 1.04 percent, respectively. The corresponding values at the 25 percent level of remittances are 1.17, 1.68, and 1.19, respectively.

[15]The relatively weaker observed correlation between remittances and inflation may be a result of the greater prevalence of consumption-based taxation in developing countries relative to their developed counterparts.

Table 6.4. Utility Gains from Consumption Taxation Versus Labor Taxation
(Difference in per period increase in utility, in percent)

	Remittances-to-Income Ratio					
	Chile			United States		
	5%	15%	25%	5%	15%	25%
Total utility	0.05	0.22	0.51	0.05	0.29	0.66
Consumption	1.60	3.77	6.12	1.45	3.98	6.32
Cash good	8.66	18.89	24.52	2.82	7.41	10.73
Credit good	−1.30	−2.54	−1.73	−0.23	−0.24	0.84
Labor	−0.83	−1.80	−2.70	−0.98	−2.44	−3.55

Source: Authors' calculations.

Note: The statistics reflect the difference in utility gains between the economies with remittances under consumption taxation and those under labor taxation. A positive value indicates that utility gains are larger under consumption taxation.

the gain to households from remittances and to discern household utility under the different tax systems. To measure the gain from remittances, utility equivalence is measured as the per period increase in utility that makes the household indifferent between the economy without remittances and the economy with remittances under the selected tax structure. Utility equivalence measures are constructed for both the United States and Chile under labor income and consumption taxation. Computing the difference in utility gains under each tax system reveals the optimal tax system.

The gain to the household from higher consumption and leisure as a result of remittances is found to greatly outweigh the increased business cycle volatility. For example, the per period gain in utility in moving from the economy without remittances to the economy with a 5 percent remittances-to-income ratio under labor taxation is 5.0 percent for Chile, and this gain increases to 21.2 percent at the 25 percent level of remittances. Countercyclical remittances provide enough insurance effects for consumption to minimize the costs of economic volatility and increased government policy distortions. The increased levels of consumption and leisure also represent first-order increases in utility versus a second-order loss from additional output volatility, and business cycle models are known to have difficulty in replicating the amount of volatility present in actual data. Though these gains appear extremely large on their face, most of the increase comes from additional leisure, which represents nearly 60 percent of the overall rise in per period utility.

The results displayed in Table 6.4 indicate that consumption-based taxation is preferable to labor-based taxation in remittance-dependent economies in terms of its effects on remittance-receiving households. The numbers in the table reveal the difference in utility gains between the two tax systems, measured as the

utility gains from various levels of remittances under consumption taxation minus those under labor taxation. The gains in total utility under consumption taxation are slightly higher in all cases than those under labor taxation. Per period increases in utility for Chile range from 0.05 percent to 0.51 percent. The results in the U.S. case are similar, with net per period gains increasing to 0.66 at a 25 percent remittances-to-income ratio. When the contribution to overall utility gains is examined, the relative gains from cash good consumption from restoration of the Friedman rule are revealed to be sufficient to outweigh the relative decline in leisure and credit good consumption when the household switches from labor taxation to consumption taxation. Marginal analysis can explain why the elimination of the inflation tax boosts the utility gains from the cash good by more than the decline in utility of the credit good. The presence of a significant inflation tax under labor income taxation drives the household toward more credit good consumption, increasing its level of satisfaction, but eroding the marginal utility of further credit good consumption. By switching to a consumption tax and eliminating the need for the inflation tax, the household returns to a more optimal balance between cash and credit consumption. On the margin this results in higher utility.

Although it appears to be small, the value of choosing the correct tax system is not negligible. The gains involved in moving from a system based on labor income taxes to one based on consumption taxes are roughly equivalent in magnitude to the cost of the business cycle volatility as reported by Lucas (1987) and the gains from eliminating moderate inflation reported by Cooley and Hansen (1991) and Aiyagari, Braun, and Eckstein (1998). Using the Lucas (1987) framework and the calibrated values from the current study yields a gain in per period utility of 0.9 percent through

elimination of the business cycle. Employing a stochastic monetary economy similar to the one used in the current analysis, Cooley and Hansen (1991) report that transitioning from 5 percent and 10 percent inflation to zero inflation results in gains in lifetime utility of 0.4 percent and 0.6 percent, respectively.

Conclusion

The purpose of this chapter has been to explain how remittances affect the economy and the conduct of optimal government policy. The results are derived in a dynamic general equilibrium model in which households receive countercyclical remittance flows and government policy is enacted with distortionary effects. They indicate that remittances increase household consumption and leisure, confirming the widespread belief that remittances can be useful in reducing poverty levels. As a second main benefit, remittances are found to improve the sustainability of government debt. The reduction in the marginal cost of servicing debt occasioned by the presence of remittances in an economy allows the government to expand its debt or service existing debt with less distortionary costs to the economy, thereby reducing country risk. The additional sustainable debt can be used to improve infrastructure or public education if the remittance-receiving country has a public project with high positive net present value. Alternatively, if the positive net present value projects reside in the private sector, the government can use its increased flexibility to reduce country risk and encourage private investment or development of human capital. Either way the increase in debt sustainability from remittances can lead to higher long-run economic growth as investment in physical and human capital increases.

However, the results also indicate that these gains come at the cost of greater macroeconomic risk. Remittances that cause the labor supply to become more procyclical increase the magnitude of the domestic business cycle. The countercyclical nature of remittances does provide some insurance against the increase in volatility of output and income from domestic production, but the level of insurance is dependent on the cash or credit intensiveness of the economy, indicating that the economy's level of financial development plays a role in maximizing the benefits of altruistic income transfers.

Finally, the presence of remittances highlights the need for policymakers to select the correct—or least distortionary—set of policy instruments when implementing fiscal and monetary policy. A reliance on labor income taxation may force the government to use the inflation tax to access the revenue base provided by remittances, thereby injecting additional distortions into the economy. The ability to enact a consumption tax removes this incentive and allows the government to finance its budgetary expenditures with the least distortionary impact on economic activity. Governments, and the official institutions that advise them, should be aware that the efficient conduct of policy may require a different policy apparatus when remittance flows become significant and should therefore avoid a one-size-fits-all solution to tax structure and policy implementation across countries.

Appendix 6.1. The Model

This appendix briefly explains the model used to generate the results presented in this chapter. The model, which is an extension of that used in Chami, Cosimano, and Gapen (2006), combines a cash-in-advance and stochastic growth model, similar to those used in Cooley and Hansen (1995), Chari, Christiano, and Kehoe (1991), and Lucas and Stokey (1983). The economy comprises a representative household, a representative firm, a government, and remitters.

Production

Output, Y_t, is produced from a constant-returns-to-scale production function,

$$Y_t = \exp(\theta_t)H_t^\alpha K_t^{1-\alpha}, \quad 0 < \alpha < 1, \qquad (6.1)$$

where K_t and H_t are the aggregate capital stock and labor supply, respectively, α is the share of income attributable to labor, and θ_t represents technology. Changes in technology are assumed to be the realization of an exogenous autoregressive stochastic process,

$$\theta_t = \rho_\theta \theta_{t-1} + \varepsilon_t, \quad 0 < \rho_\theta < 1, \qquad (6.2)$$

where the random variable, ε_t, is normally distributed with mean zero and standard deviation $\sigma_{\theta t}$. The realization of the shock to technology is known to all agents at the beginning of period t.

Investment in physical capital in period t produces capital in period $t + 1$ according to

$$K_{t+1} = (1 - \delta)K_t + X_t, \quad 0 < \delta < 1, \qquad (6.3)$$

where X_t is the level of investment and δ is the rate of depreciation. The capital stock is assumed to be fixed so that $X_t = X = \delta K$. The representative firm seeks to maximize profit by choosing labor supply resulting in the standard first-order conditions for the wage rate and rental rate on capital, adjusted for constant capital.

Households

The representative household obtains utility from consumption and leisure. Preferences are summarized by the following utility function:

$$E_t \sum_{t=0}^{\infty} \beta^t [a\log(C_{1t}) + (1 - a)\log(C_{2t}) - \gamma H_t], \qquad (6.4)$$

where β is a discount factor, C_1 is a cash good, C_2 is a credit good, a is the relative weight of cash to credit goods in utility, γ is a positive constant measuring the marginal disutility of supplying additional labor, and $0 < \beta, a < 1$. The specification of linear disutility of labor is derived from the assumptions that labor is indivisible and allocation of labor is determined by employment lotteries (Hansen, 1985; Rogerson, 1988). The household enters the period with previously accumulated assets composed of money holdings, M_t, and gross returns from government bonds, $B_t R_{t-1}$, where B_t is the stock of bonds and R_{t-1} is the gross real interest rate.

Based on the existing evidence in the literature, which shows remittances to be countercyclical, the household receives remittances, η, equal to

$$\eta_t = r_0 \left(\frac{\bar{Y}}{Y_t} \right)^{r_1}, \tag{6.5}$$

where $\bar{Y}$ is the steady-state level of output and r_0 and r_1 are positive constants, with the former determining the responsiveness of remittances to the business cycle and the latter equaling the steady-state level of remittances.

Labor Taxation

The model used to generate the results in this chapter does not allow direct taxation of remittances, but instead allows the government to use either a tax on labor income or one on consumption. When a labor income tax is employed, the household, government, and economy-wide resource constraints are as follows.

Previously accumulated assets, after-tax income from production, and remittance income are all used to finance household expenditures. Households know the past and current realization of technology and government spending. After these shocks are revealed and expectations are formed, the household then decides on labor supply, receives remittances, and chooses consumption of the cash and credit goods and government bonds and the amount of money to be carried into the next period. Overall, household allocations must satisfy the following budget constraint:

$$C_{1t} + C_{2t} + \frac{M_{t+1}}{P_t} + B_{t+1} \leq (1 - \alpha \tau_t^h)(Y_t - X)$$
$$+ \eta_t + \frac{M_t}{P_t} + B_t R_{t-1}, \tag{6.6}$$

where P_t is the price level and τ^h is the tax applied to labor income.[16] M_{t+1} is the demand for money balances that are used in the next period and aggregated

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[16]The firm is allowed to take depreciation charges before taxes are applied at the household level; otherwise the government would find it optimal to tax inelastically supplied investment to retire money balances.

across households in relation to the money supply in equilibrium.

Previously accumulated money balances are used to purchase the cash good in the current period and must satisfy the cash-in-advance constraint,

$$P_t C_{1t} \leq M_t. \tag{6.7}$$

Real government consumption, G_t, is assumed to follow an exogenous stochastic process. Government policy includes sequences of labor taxes and supplies of money and bonds, which must satisfy the following budget constraint:

$$\frac{M_t}{P_t} + B_t R_{t-1} = \tau_t^h \alpha (Y_t - X) - G_t + B_{t+1} + \frac{M_{t+1}}{P_t}, \tag{6.8}$$

where the initial stocks of money, M_0, and bonds, B_0, are given. The money supply and government spending in period t are assumed to grow at the net rate of $\exp(g_t) - 1$ and $\exp(\mu_{t+1}) - 1$, respectively. Thus, the level of government spending and money stock, respectively, are defined as

$$G_t = \exp(g_t) G_{t-1} \tag{6.9}$$

and

$$M_{t+1} = \exp(\mu_{t+1}) M_t. \tag{6.10}$$

The random variable g_t is assumed to evolve according to

$$g_t = \rho_g g_{t-1} + \xi_t, \quad 0 < \rho_g < 1, \tag{6.11}$$

where ξ_t is normally distributed with mean zero and standard deviation σ_{gt}. As with the shock to technology, the realization of the spending shock is known to all at the beginning of the period. Finally, the economy-wide resource constraint is

$$C_{1t} + C_{2t} + X + G_t = Y_t + \eta_t, \tag{6.12}$$

which states that output from production plus remittances can be consumed by either the household or the government or used to replace depreciated capital.

Consumption Taxation

If the government chooses to implement a consumption tax instead of a labor income tax, equations (6.6)–(6.8) must be altered to account for the change in tax structure. Household allocations must satisfy the following budget constraint under consumption taxation:

$$(C_{1t} + C_{2t})(1 + \tau_t^c) + \frac{M_{t+1}}{P_t} + B_{t+1} + X \leq Y_t$$
$$+ \eta_t + \frac{M_t}{P_t} + B_t R_{t-1}, \tag{6.13}$$

where τ^c is the tax on household consumption and is applied at the same rate to both the credit and cash good. The household pays the tax on credit good con-

sumption with credit and that on cash good consumption with previously accumulated money balances according to[17]

$$P_t C_{1t} (1 + \tau_t^c) \leq M_t. \tag{6.14}$$

Government policy includes sequences of consumption taxes and supplies of money and bonds that must satisfy the following budget constraint:

$$\frac{M_t}{P_t} + B_t R_{t-1} = \tau_t^c (C_{1t} + C_{2t}) - G_t + B_{t+1} + \frac{M_{t+1}}{P_t}. \tag{6.15}$$

The equations for the remaining processes describing the growth of money, government spending, the shocks to technology and spending, and the economy-wide resource constraint are identical to those under labor-based taxation.

The Ramsey Equilibrium with Remittances

The government's goal is to maximize the household's welfare subject to raising revenues through distortionary means. After the shocks to the system are revealed, the government selects a policy profile and the household responds with a set of allocations that together satisfy budget and resource constraints and determine the equilibrium price system. The *Ramsey problem* is to choose a competitive equilibrium that maximizes household utility (Ramsey, 1927). The competitive equilibrium that solves the Ramsey problem is called the *Ramsey plan* or *Ramsey equilibrium*.

Like that of the household, the government's maximization problem can be set up as a dynamic-programming problem. For example, under labor taxation the government seeks to maximize

$$V(s_t) = \max_{\Delta_t} \left\{ \begin{array}{l} a\log(C_{1t}) + (1-a)\log(C_{2t}) - \gamma H_t + \\ \lambda_t \left[\tau_t^h \alpha (Y_t - X) - G_t + B_{t+1} + \frac{M_{t+1}}{P_t} - \frac{M_t}{P_t} - B_t R_{t-1} \right] \\ + \beta E_t V(s_{t+1}) \end{array} \right\} \tag{6.16}$$

where $\Delta_t = (\tau_t, \mu_{t+1}, B_{t+1})$ is the set of choice variables, s_t represents the set of state variables $(B_t, M_t/P_{t-1}, \theta_{t-1}, g_{t-1}, \tau_{t-1}, R_{t-1})$, and λ_t is the Lagrange multiplier on the government budget constraint or the value that the household places on the government's ability to raise revenue from a source "outside" the economy. Such an ability would be equivalent to collection of a lump-sum tax, making the multiplier equal to the shadow value of reducing debt. Solving for the multiplier as an endogenous policy variable reveals how the shadow price of

debt behaves relative to marginal taxation and money growth.

A similar set of equations can be developed for the case of consumption-based taxation. The Euler conditions from the Ramsey problem, the labor equation from the household's problem, and the government budget constraint yield a set of operator equations that define the Ramsey equilibrium with remittances.

Solution Method

The system of equations that characterize the optimal policies in the Ramsey equilibrium theoretically is nonlinear. An accurate assessment of the relationship between remittances, government policy, and household decisions requires a solution procedure that preserves these nonlinearities. The computational solution procedure used in this analysis is based on the projection approach as described in Judd (1992, 1998), which defines the optimal set of policies (H_t, μ_{t+1}, τ_t, λ_t) as polynomial functions of the exogenous shocks and state variables that satisfy the Ramsey equilibrium.[18]

The Ramsey equilibrium is then characterized quantitatively by assigning values to the parameters of technology, spending, preferences, and policy variables. Once properly specified, each economy is solved using a nonlinear equation optimizer in Matlab. For the research reported in this chapter, each economy was then simulated under the effects of technology and government spending shocks. Statistics were computed by conducting simulations of 10,000 periods in length, taking logarithms, and filtering each simulated time series using the Hodrick-Prescott filter (Hodrick and Prescott, 1997).

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[17]The specification of consumption taxation in equations (6.13)–(6.15) minimizes the distortion from the consumption tax. Forcing the household to pay all taxes with money balances would change the relationship between cash and credit good consumption and the interest rate.

[18]The projection approach begins by defining the policy functions in terms of polynomials, with the polynomial degree determining the amount of nonlinearity. The solution procedure then searches for the optimal coefficients on each policy function that set the system of residual equations equal to zero simultaneously.

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VII   An Empirical Investigation of the Macroeconomic Effects of Remittances

This chapter presents an empirical examination of the macroeconomic effects of remittances on remittance-receiving economies. Much of the early work on remittances' macroeconomic impacts was carried out within the broader context of the economic development impact of migration. Taylor and others (1996a, 1996b) provide extensive surveys of this research, which includes discussion of the impacts of remittances.

The chapter is organized into four sections, each considering how remittances affect a particular macroeconomic variable of interest to policymakers: GDP growth, GDP volatility, the real exchange rate, and debt sustainability. The main findings from this exercise are as follows:

- It is difficult to obtain a consistently robust positive effect of workers' remittances on economic growth across a variety of econometric specifications.
- A positive and significant coefficient on the effect of workers' remittances on economic growth appears only when the estimation excludes investment and in the absence of country fixed effects.
- The econometric evidence suggests that remittances may decrease economic growth in some countries through a reduction in total factor productivity.
- Remittances diminish macroeconomic volatility over long horizons, likely through reductions in aggregate consumption volatility.
- Higher remittance receipts tend to appreciate the equilibrium real exchange rate, implying that the beneficial effects of remittances in generating higher and more stable levels of consumption may come at the expense of long-run growth.
- The presence of remittances can support higher future debt levels in countries that receive such flows in sufficient quantities, though enhanced sustainability depends on the persistence and elasticity of these flows with respect to income differentials, interest rate differentials, and changes in exchange rates.

The chapter proceeds as follows. The next section details the empirical relationship between workers' remittances and GDP growth, which is followed by an examination of remittances' effects on economic volatility and the real exchange rate. The chapter concludes with a discussion concerning assessments of debt sus-

tainability in remittance-dependent countries. Descriptions of the data used in the chapter are provided in the chapter appendix.

Remittances and GDP Growth

Economists have recently turned their attention to estimating the impact of remittances on longer-term economic growth using modern growth theory.[1] Previous chapters introduced several possible mechanisms through which remittances may affect economic growth. The following discussion summarizes these mechanisms to motivate the empirical work that has examined the relationship between remittances and growth. The discussion groups the mechanisms into those through which remittances potentially have positive effects on growth and those through which they may have negative effects.

On the positive side, remittances may increase or enhance investment in physical capital. To the extent that there are frictions in domestic financial intermediation, imperfect capital mobility is present and remittances are not simply "disguised" capital flows. The receipt of temporary remittances in an economy may lead to an increase in the domestic investment rate, thus increasing economic growth. If financial constraints are significant—for example, a large group of households are rationed out of credit markets because of the lack of domestic financial development—then remittances may help to ease the constraints. This results in an increase in investment, provided that the rationed households

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[1]Earlier studies investigating the macroeconomic impact of remittances used standard growth-accounting exercises or estimated Keynesian multipliers. See Amjad (1986), Burney (1989), Tingsabadh (1989), and more recently, Kannan and Hari (2002) for examples of the growth-accounting approach. Stahl and Habib (1989), Rodrigo and Jayatissa (1989), Adelman and Taylor (1990), Nishat and Bilgrami (1991), and Glytsos (1993) all estimate short-run Keynesian multipliers, whereas Durand, Parrado, and Massey (1996) further explore the implications of Adelman and Taylor's analysis. At least one long-run multiplier estimate also exists in the literature. Hyun (1989) uses a computable general equilibrium model to estimate a long-run multiplier for the Korean economy and finds that a 10 percent increase in remittances increases GDP by 0.22 percent.

also have access to productive investment opportunities and use the remittances to expand investment rather than consumption.[2] Alternatively, if remittances are primarily disguised capital flows—the recipients are investing on behalf of the remitter—then efficiency in investment is enhanced to the extent that the family member receiving the remittance flows possesses some informational advantage or expertise with respect to formal financial intermediaries.

Another channel through which remittances may have a positive impact on growth is via the facilitation of human capital formation. Even though, as discussed in Chapter 4, the majority of remitted funds are devoted to consumption and residential investment, significant productivity spillovers may result from the recipients' improved nutrition and shelter, assuming that they participate in the labor market. In addition, the literature offers several examples in which a significant fraction of remittances are spent on education, assuming that those who receive the education do not in turn emigrate. As such, remittances may increase total factor productivity. These two channels through which remittances may have a positive impact on growth, the accumulation of physical capital and total factor productivity, are not mutually exclusive, but it may be possible to distinguish between them empirically.

In addition to enhancing investment and total factor productivity, remittances may also have a positive impact on growth through their effect on the recipient economy's financial system. By increasing the recipient country's demand for money, remittances are likely to expand the supply of funds to the banking system. This in turn may lead to enhanced financial development through a reduction in the external finance premium and thus to higher economic growth through one of two channels: (1) economies of scale, or (2) a political economy effect, whereby a larger constituency (depositors) is able to pressure the government into undertaking beneficial financial reform.

It is far from assured that remittances will have a positive impact on economic growth in any particular country, however. Each mechanism described in the foregoing discussion relies on a particular set of circumstances that may not be present in a given country; alternative conditions that reduce or eliminate the positive impact of remittances may be found there instead. In general, the greater the degree of capital mobility in a country, the less remittances will affect the domestic investment rate. Also, if remittances are perceived to be permanent, they will tend to be consumed in their entirety and therefore will not affect aggregate investment. A similar argument applies to credit-constrained households: even if the constraints are relaxed, addi-

tional funds from remittances may simply be consumed. Finally, the family member who receives a migrant's remittances may actually be less skilled in investing than are financial intermediaries, which has important implications in this context if remittances are disguised capital flows.

Prevailing circumstances in a particular economy may likewise reduce the human capital and financial sector impacts of remittances. The consumption impact of remittances on labor productivity depends on recipient families' standard of living. If a family's standard of living is sufficiently high before the receipt of remittances that its basic needs are adequately met, then the labor productivity effect of remittances vanishes for that family. Also, any human capital accumulation impacts depend on the recipients' participation in the labor force after accumulation of capital. In some remittance-receiving societies, education funded by remittances is intended to enable the recipients themselves to migrate. Finally, in terms of financial sector impacts, an increase in the size of the domestic banking system via an increase in the supply of funds does not necessarily reduce the external finance premium. The political economy mechanism arising from a larger banking system may have an adverse effect on financial development: depositors lobby the government for reforms favoring safety over intermediation, for example, causing banks to increase their holdings of safe assets rather than lending.

The question of whether remittances increase an economy's growth is not simply a matter of whether conditions in the economy are favorable to the operation of the channels described previously. Remittances can also decrease economic growth through two means that operate differently than the positive channels. One that is increasingly mentioned in the literature is a Dutch disease effect, which requires that the traded goods sector of a remittance-receiving economy be the source of significant positive externalities that enhance other sectors' productive capacity. If this condition is satisfied, a Dutch disease effect may arise from remittances to the extent that they cause the economy's real exchange rate to appreciate. The third section of this chapter presents a separate discussion of the effect of remittances on the real exchange rate.

Acosta, Lartey, and Mandelman (2007) offer some empirical evidence on Dutch disease effects of remittances. These authors first develop a two-sector real business cycle model with remittances that produces Dutch disease effects in the remittance-receiving economy. The model is calibrated and simulated for El Salvador, and then impulse response functions from the model are compared to those calculated from a Bayesian vector autoregression (B-VAR) estimated on data for El Salvador from 1991–2006. The B-VAR response functions agree qualitatively with the model predictions, revealing evidence of Dutch disease effects of

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[2]Chapter 4 reviews the empirical evidence on the extent to which remittance recipients invest the funds they receive.

remittances (during this period, remittances increased 500 percent, and the country's real exchange rate appreciated 30 percent).

A second means by which remittances may harm economic growth is through the moral hazard problem, an idea that was first formalized by Chami, Fullenkamp, and Jahjah (2003). Given that remittances are non-market income transfers that occur under asymmetric information and that monitoring and enforcement are extremely difficult because of the distance separating remitter and recipient, they may be plagued by severe moral hazard. The evidence discussed in Chapter 4 that remittances are compensatory transfers motivated by altruism supports such a view. The moral hazard problem manifests itself in two ways: recipients reduce their labor market effort and they make riskier investments. Anecdotal evidence of the labor effort effect is abundant, and academic studies have detected such an effect as well.[3] The formal model developed in Chapter 6, which is designed to focus on households' labor supply decisions, yields a similar conclusion. Reduced labor effort and increased investment risk lead to reduced economic growth.

Recent Empirical Findings

As noted in Chapters 2 and 3, the data on remittances recently improved to the point that cross-country studies of the macroeconomic effects of remittances became feasible. Thus, a relatively recent and growing literature attempts to measure empirically remittances' impact on economic growth. The first of these studies was the Chami, Fullenkamp, and Jahjah (2003) cross-country study of workers' remittances. The study used a sample of 83 countries during the 1970–1998 period and conducted panel regressions of growth in real GDP per capita on both the workers' remittances–to–GDP ratio and the change in that ratio, conditioned on the investment rate, the rate of inflation, regional dummies, and the ratio of net private capital flows to GDP. Overall, it found that whereas domestic investment and private capital flows were positively related to growth, the workers' remittances–to–GDP ratio either was not significant or was negatively related to growth, with the same holding true when a squared term of the ratio was included in the analysis as well. Annual changes in the workers' remittances–to–GDP ratio were found to be negative and significant on growth. To account for possible endogeneity of remittances to the macroeconomic

controls, the study also conducted an instrumental variables estimation, whereby a first-stage regression estimated the workers' remittances–to–GDP ratio as a function of each country's income gap and real interest rate gap relative to the United States.[4] With the predicted value for the workers' remittances–to–GDP ratio as a regressor, the second stage continued to find that changes in remittances are negatively related to growth.

The IMF (2005) performed cross-country growth regressions with specifications similar to those in Chami, Fullenkamp, and Jahjah (2003) on a set of 101 countries measured over the 1970–2003 period. However, in contrast to Chami, Fullenkamp, and Jahjah (2003), the IMF (2005) used an aggregate remittance variable, or the sum of workers' remittances, employee compensation, and migrant transfers, which was shown in Chapter 2 to capture behavior not associated with workers' remittances. We refer to this aggregate measure as *total remittances* when discussing this and other studies that use a similar aggregation method. The IMF study also used two instruments for remittances: distance between the migrants' home and main destination country, and a dummy measuring whether the home and main destination country shared a common language. Because the instruments did not vary over time, panel estimation techniques could not be used. The IMF (2005) found no statistically significant effect of total remittances on economic growth.

Faini (2006) estimated cross-sectional growth regressions on a set of 68 countries[5] in which the dependent variable is the average annual per capita GDP growth rate from 1980 to 2004. These growth regressions do not include an investment variable; the reason given is that investment could be driven in part by remittances, and hence its coefficient could be capturing some of the effect of remittances. Faini (2006), like the IMF (2005), used an aggregate measure of remittances obtained by summing workers' remittances, employee compensation, and migrant transfers. The estimated coefficient on the total remittances–to–GDP ratio in Faini's ordinary least-squares (OLS) regression was positive and significant, both when average and when initial remittances were used in the total remittances–to–GDP variable. Faini also conducted an instrumental variables estimation, using distance from the migrants'

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[3]For example, Kozel and Alderman (1990) studied labor force participation and labor supply in Pakistan using data from the 1986 survey by the Pakistan Institute of Development Economics and found a significant negative impact of remittances on the labor force participation of males. Similarly, Itzigsohn (1995) also found, in a sample of Caribbean Basin cities, that remittances significantly reduce the labor force participation of household heads as well as other members of remittance-receiving families.

[4]The first-stage estimation showed that this ratio responded significantly and negatively to the income gap but did not respond significantly to the real interest rate gap. The negative relationship between workers' remittances and relative GDP is consistent with the Chapter 3 finding of a negative cross-country correlation between remittances and level of income, whereas the result in a time-series sense is consistent with countercyclicality; as the gap between the recipient country and the United States closes—the upswing of the domestic business cycle—remittances decrease.

[5]Faini (2002) also performed a cross-sectional regression of GDP growth on remittances, finding a positive relationship.

main destination countries as the instrument for remittances. In this estimation, the coefficient on total remittances remained positive but lost its significance.

Giuliano and Ruiz-Arranz (2005) gathered a sample of 73 countries during the 1975–2002 period, then calculated five-year averages for all variables used in their study to smooth out cyclical variations. Again, remittances were defined as the sum of workers' remittances, employee compensation, and migrant transfers. This study conducted OLS as well as fixed-effects panel estimates, and through a system generalized method of moments (SGMM) procedure used internal instruments to account for possible endogeneity. The study's basic specification regressed per capita GDP growth on the total remittances–to–GDP ratio, conditioning on the initial level of GDP per capita, the investment rate, population growth, the fiscal balance as a percentage of GDP, years of education, a measure of openness, and inflation. This specification did not find total remittances to be significantly related to growth. However, the authors also explored possible interactions between the total remittances–to–GDP ratio and financial deepening,[6] as a way of testing whether remittances might enhance growth by relaxing credit constraints. Indeed, the authors found significant negative interaction terms and interpreted these results as indicative of the credit constraint hypothesis; total remittances appeared to have positive effects on growth only in countries with small financial sectors where presumably credit constraints would be more pervasive.

Another study, by Catrinescu and others (2006), incorporated institutional variables into the analysis, which covered 114 countries during the 1991–2003 period. Catrinescu and colleagues conducted OLS cross-sectional and various static and dynamic panel regressions of per capita GDP growth on the (log of) total remittances–to–GDP, controlling for initial GDP per capita, ratios of gross capital formation and net private capital inflows to GDP, and such institutional variables as the United Nations Human Development Index, six governance indicators as in Kaufmann, Kraay, and Mastruzzi (2003), and risk ratings from the *International Country Risk Guide* (*ICRG*). Overall, their study found a robust positive relationship between growth and gross capital formation, as well as between growth and some of the institutional variables. The study also found some evidence of a positive relationship between growth and total remittances, although this relationship was not very robust and, as the authors acknowledge, relatively mild.

Finally, the World Bank (2006) conducted cross-country growth regressions on a data set of 67 countries measured over 1991–2005. The control variables

included (logs of) initial GDP per capita, the secondary school enrollment ratio, the ratio of private domestic credit to GDP, the *ICRG* political risk index, the ratio of real imports and exports to GDP, the inflation rate, real exchange rate overvaluation, government consumption, and time period dummies. An SGMM estimation was performed, in which the instrument for remittances was a set of "migration" instruments formed by computing the product of the share of a country's migrants going to each of its top five OECD country destinations (as of 2000) and a measure of the respective OECD country's economic performance, such as GDP per capita, the GDP growth rate, or the unemployment rate. These instruments reflect the idea that income in the host country appears to be a key driver of remittances. The inverse of the distance between the migrants' destination country and the remittance-receiving country was also used in place of migration shares in the migration instruments described above to form "distance" instruments. The growth regressions found a consistently positive relationship between the total remittances–to–GDP ratio and GDP growth, both when investment was included and when it was excluded from the estimations. When investment was excluded, however, the coefficients lost their significance. The authors also calculated the contribution of total remittances to growth rates and found that it was small.

A later exercise in the same World Bank study included interaction terms for remittances and education, remittances and financial depth, and remittances and institutional quality indicators in three separate growth equations that had the same specification as the growth equations examined previously, with the argument that remittances augment growth in the presence of complementary policies that enhance education, financial market depth, or institutional quality. The World Bank study found a negative and significant coefficient on the total remittances–to–GDP ratio, but positive and significant coefficients on each of the interaction terms. The study argued that this implies a net positive impact of total remittances on GDP, when the complementarities are included. In addition, the study included an estimate of total remittances' impact on investment, finding a similar pattern of coefficients.

Estimating the Remittances-Growth Relationship

Overall, the results of the aforementioned studies are inconclusive. To the extent that a "best practice" for estimating the remittances-growth relationship exists, it is identified and incorporated into the empirical exercises that follow this discussion.

The disparity of results in the studies discussed previously has several sources. The first of these is the underlying data used to construct the time series for remittances. Given the conclusion reached in Chap-

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[6]The study used three measures to proxy for the level of financial deepening, all expressed as a ratio to GDP: M2, aggregate banking sector deposits, and aggregate bank credit to the private sector.

ter 2 that the categories *employee compensation* and *migrant transfers* in the balance of payments are conceptually different from and behave differently than the category *workers' remittances*, the preferred measure for use in econometric analysis is the ratio of workers' remittances to GDP. Of the papers referenced previously, only Chami, Fullenkamp, and Jahjah (2003) used this more precise definition of workers' remittances. The estimations that follow incorporate the workers' remittances–to–GDP ratio in three different ways: alone, together with its squared term to account for possible nonlinearities, and interacted with a financial deepening variable, the M2-to-GDP ratio,[7] to examine possible credit constraint effects as in Giuliano and Ruiz-Arranz (2005).

A second source of disparity in the results of previous studies may arise from the differing time periods and sets of countries included, which vary greatly among the papers previously cited. The estimations in the following sections cover the 1970–2004 period, the longest period for which remittances data are available. To keep the reporting simple, two different sets of countries are analyzed: all countries, and emerging economies only (defined as in Chapters 2 and 3).

A third source of disparity in the studies discussed previously is the control variables included in the growth regressions. In particular, the presence of investment as a control variable seems to make a difference in the magnitude and significance of the remittances variable. Including a measure of domestic investment (the investment ratio or gross capital formation) as a regressor implies that any estimated growth effects of remittances will be through total factor productivity (TFP) rather than the quantity of investment. Since the preceding theoretical discussion also included possible effects of remittances on the volume of domestic investment, some of the regressions in the current study exclude this variable as a regressor to account for this possibility. More generally, different conditioning sets of variables are used, in order to incorporate the principal control variables employed in previous studies. Furthermore, to smooth out cyclical fluctuations, five-year averages of the macroeconomic variables are calculated and used in the regressions in place of single-year values.

An Instrument for Remittances

The set of variables used as an instrument for remittances in regressions is also an important potential source of the differences among estimation results in the studies discussed earlier in the chapter. Finding an appropriate instrument or set of instruments that corrects for the endogeneity of remittances has been a challenge for researchers. Two key features govern the selection of an instrument for remittances: the instrument must be correlated with remittances, and its effect on individual country growth must operate solely through its effect on remittances. Although two likely choices come to mind—GDP per capita, and growth in the developed countries where migrants from the remittance-receiving countries reside—both are also expected to have a direct impact on growth. Chapter 3 showed the first of these, GDP per capita, to be negatively correlated with remittance receipts, but it also affects economic growth directly through convergence. The second variable, GDP growth in developed countries where remitters reside, is likely to be correlated with trade flows,[8] which in turn are expected to exert an independent impact on growth as well.

In general, the challenge in finding an appropriate instrument is that most variables that might explain remittances—domestic and foreign macroeconomic variables in particular—also tend to affect growth. For this reason, internal instruments (lagged right-hand-side variables) have been criticized (see especially World Bank, 2006), and migration and distance instruments have been suggested. These instruments may not be as great an improvement over internal instruments as they initially seem, however. Distance between migrants' destination country and the remittance-receiving country is exogenous but time invariant, so it must be multiplied by host country GDP to obtain a time-varying instrument. Thus, distance instruments may be too strongly correlated with the growth rate in remittance-receiving countries. A similar argument can be made for migration instruments (migration shares are reported only periodically, so the migration shares are fixed and must be multiplied, again by host country GDP, to make the instrument time varying).

Thus, other determinants of remittances, such as their transaction costs, are likely candidates as instruments. In the absence of a direct observation of this cost variable, another (observable) variable might capture general trends in remittances throughout the world, including changes in transaction costs: the ratio of remittances to GDP *of all other recipient countries* ($wrrow_i$). Admittedly, this instrument does not

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[7]Although other indicators, such as the ratio of private sector credit to GDP, might be better approximations for the degree of financial deepening, the M2-to-GDP ratio is used here because of its greater coverage across countries and time periods. It must also be noted that the term *financial deepening* is used rather than *financial development*, since the former has a connotation relating more to size than to overall performance. As argued in Chapter 5, financial development is related to a noticeable improvement in intermediation activities, which ultimately should be reflected in a reduction in the external finance premium. Although financial development and growth in the size of the banking sector (financial deepening) are often simultaneous processes, one does not imply the other.

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[8]Lueth and Ruiz-Arranz (2006) showed that, just as is the case for trade, a gravity equation explains a large portion of the variation in bilateral remittance flows. Thus, trade and remittance flows tend to be highly correlated.

eliminate all endogeneity, but it represents a significant improvement over internal, lag-driven instruments and over previous attempts at obtaining an external instrument. By excluding the remittances-to-GDP ratio of the country in question, $wrrow_i$ is free of a direct causal link with other domestic macroeconomic variables. Furthermore, although one also expects $wrrow_i$ to capture income growth in the developed world, the correlation with trade effects is diluted to the extent that, for a given country i, $wrrow_i$ also incorporates the income movements in countries that have little trade with i. In other words, the diversification effect reduces any correlation between the instrument and the growth rate in the remittance-receiving country.

Using this variable as an instrument, the first-stage regression is given by

$$wr_{it} = \alpha_i + \beta wrrow_{it} + u_{it},$$

where wr_{it} denotes the ratio of workers' remittances to GDP in country i and year t, and $wrrow_{it}$ denotes the ratio of workers' remittances to GDP in the rest of the world—that is, in all countries except i—in year t. Thus, the first-stage regression includes the general world trend in remittances as an explanatory variable, along with a country-specific fixed effect to determine the average level of remittances for each given country. The second stage includes the fitted values from the first stage as a regressor.

Empirical Findings

Tables 7.1–7.4 present the main results of the growth regressions. For simplicity, the tables show only the coefficients for variables related to workers' remittances, although three distinct combinations of a wide set of conditioning variables were included in the estimations. The basic conditioning set included initial per capita GDP; the ratios of trade and M2 to GDP, both in log terms; and the inflation rate. Through the addition of the ratio of domestic investment to GDP in the second conditioning set, a distinction could be made regarding whether remittances might have an impact on growth through higher investment or through higher TFP. Finally, the full conditioning set included the following additional variables: foreign direct investment and the fiscal balance, both in relation to GDP; the rate of population growth; and the composite *ICRG* political risk indicator, as in Catrinescu and others (2006). Thus, each table includes results under each conditioning set, and both OLS and fixed-effects estimations are shown. Tables 7.1 and 7.2 report the results using *wr* as the remittance regressor, whereas Tables 7.3 and 7.4 report those using the second-stage *fitted wr* from the first-stage regression. In addition, results for the full country sample are reported in Tables 7.1 and 7.3, and those for the emerging economy subsample in Tables 7.2 and 7.4. Finally, each table shows the three alternative ways of

including workers' remittances identified in the previous subsection.

The first two tables, which show estimations using *wr*, provide little evidence of an impact of workers' remittances on economic growth through the TFP channel; a positive significant impact of remittances on growth arises only in a few OLS regressions, and mainly in the first column, where the conditioning set does not include the investment ratio. Once the investment ratio or country fixed effects are included, many significant impacts on growth disappear. Furthermore, the *square* of *wr* is often negative but does not reach statistical significance in any of the regressions, thus ruling out a quadratic effect of remittances on growth. Regarding the credit constraint hypothesis, although the term for the interaction between *wr* and the financial deepening variable (the M2-to-GDP ratio) tends to be negative across most regressions, it is significant in only one case: the OLS estimation for emerging economies that excludes the investment ratio (first column of Table 7.2). Thus, there might be a small effect of remittances easing credit constraints in countries with small banking systems. However, it should be stressed that such an effect would operate primarily through investment volume, since the interaction term becomes nonsignificant once the investment ratio is included, and such an effect is difficult to separate from the country fixed effects, since it also disappears once these are included.

One additional feature of the estimations is that there are only minor differences between the results for the full country and emerging economy samples. Since most industrial countries historically have not tended to report remittance inflows, few observations are lost when the growth regressions exclude these countries. The main difference in results was highlighted in the preceding paragraph: that the negative interaction between remittances and financial deepening appears to be slightly stronger within the emerging economy sample.

Tables 7.3 and 7.4 show the results of the instrumental variables estimations, using *fitted wr* as the relevant explanatory variable. Two main results contrast with those discussed in the last paragraph. First, some of the fixed-effects estimations, primarily those obtained under the second conditioning set, reveal a significant negative impact of remittances on economic growth. That is, the portion of domestic remittance inflows that is related to global trends in remittances appears to have a negative impact on economic growth. Given that the second conditioning set includes the investment rate, this effect must be operating primarily through a reduction in TFP. In some cases, the squared term of the fitted remittances is also negative and significant.

Second, the significance of the (negative) term for the interaction between remittances and financial deepening increases in the instrumental variables estimation. However, it is not always clear that the *direct* impact of workers' remittances is positive; thus, whereas it

Table 7.1. OLS and Fixed-Effects Regressions Explaining Per Capita GDP Growth as a Function of Workers' Remittances and Different Conditioning Sets, All Countries

| | Conditioning Sets of Variables | | | | | |
| | Basic Conditioning Set: Excludes Domestic Investment | | Basic Conditioning Set Plus Domestic Investment | | Full Conditioning Set, Including Institutional Variable | |
	OLS	Fixed Effects	OLS	Fixed Effects	OLS	Fixed Effects
Sample: All Countries						
Specification:						
1. *wr* only						
wr	0.200	0.172	0.171	0.202	0.056	−0.099
	(2.50)**	(0.90)	(2.21)**	(1.09)	(0.61)	(0.48)
R^2	0.049	0.169	0.139	0.218	0.354	0.373
Observations	383	383	374	374	189	189
Countries	108	108	105	105	66	66
2. *wr* and *wr-squared*						
wr	0.125	−0.030	0.105	−0.017	−0.005	0.012
	(1.26)	(0.13)	(1.07)	(0.08)	(0.04)	(0.04)
wr-squared	−0.033	−0.073	−0.028	−0.077	−0.028	0.032
	(1.27)	(1.48)	(1.09)	(1.62)	(0.74)	(0.59)
R^2	0.051	0.175	0.139	0.226	0.352	0.375
Observations	383	383	374	374	189	189
Countries	108	108	105	105	66	66
3. *wr* and *interaction with M2-GDP*						
wr	0.798	0.550	0.570	0.423	0.039	−1.033
	(1.95)*	(0.83)	(1.45)	(0.65)	(0.08)	(1.18)
wr × M2-GDP	−0.176	−0.111	−0.118	−0.065	0.005	0.296
	(1.49)	(0.60)	(1.03)	(0.35)	(0.03)	(1.09)
R^2	0.052	0.170	0.176	0.218	0.350	0.379
Observations	383	383	374	374	189	189
Countries	108	108	105	105	66	66

Note: This table shows results of panel data regressions of real per capita real GDP growth on remittances and different sets of conditioning variables, as explained below. *t*-statistics are reported in parentheses. The variable *wr* denotes the log of the ratio of workers' remittances to GDP. Basic conditioning set: five-year averages of initial GDP per capita, the trade-to-GDP ratio, the M2-to-GDP ratio (all in logs), and the inflation rate. A five-year average of the log of the investment-to-GDP ratio is included in the second conditioning set. The full conditioning set includes, in addition, five-year averages of logs of ratios to GDP of foreign direct investment, the fiscal balance, and population growth, and the log of the five-year average of the composite *ICRG* political risk indicator. The table reports adjusted R^2 values for OLS regressions and within-R^2 values for fixed-effects regressions.

*significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

appears that higher remittances coupled with greater financial deepening may be related to lower rates of economic growth, it is not clear whether even at very low levels of financial deepening remittances can have a positive impact. For example, in the second column of Table 7.4, the interaction term is negative and significant, but the direct impact is negative and nonsignificant. Thus, even in the most underdeveloped financial system, remittances would not have a positive impact on economic growth.

The estimation results show that it is difficult to obtain a robust positive effect of workers' remittances on economic growth. In many of the specifications, the remittances-to-GDP ratio has no significant correlation with economic growth. A positive and significant coefficient on remittances appears only when investment is excluded from the estimation and in the absence of country fixed effects. To the extent that country fixed effects proxy for differences in investment, this specification is a better indication of remittances' true contribution to growth. On the other hand, the country fixed-effects results may be indicating that the contribution of remittances to growth is highly dependent on individual country circumstances. The results suggest, moreover, that remittances may be reducing economic growth in many countries. When endogeneity is controlled for, the

Table 7.2. OLS and Fixed-Effects Regressions Explaining Per Capita GDP Growth as a Function of Workers' Remittances and Different Conditioning Sets, Emerging Economies

| | Conditioning Sets of Variables | | | | | |
| | Basic Conditioning Set: Excludes Domestic Investment | | Basic Conditioning Set Plus Domestic Investment | | Full Conditioning Set, Including Institutional Variable | |
	OLS	Fixed Effects	OLS	Fixed Effects	OLS	Fixed Effects
Sample: Emerging Economies						
Specification:						
1. *wr* only						
wr	0.207	0.192	0.182	0.223	0.053	−0.095
	(2.50)**	(0.97)	(2.28)**	(1.16)	(0.57)	(0.46)
R^2	0.051	0.724	0.140	0.221	0.353	0.375
Observations	365	365	356	356	184	184
Countries	104	104	101	101	64	64
2. *wr* and *wr-squared*						
wr	0.119	−0.012	0.109	0.008	−0.005	0.008
	(1.16)	(0.05)	(1.08)	(0.03)	(0.04)	(0.03)
wr-squared	−0.039	−0.073	−0.031	−0.076	−0.027	0.030
	(1.46)	(1.46)	(1.20)	(1.55)	(0.70)	(0.55)
R^2	0.054	0.179	0.141	0.228	0.352	0.376
Observations	365	365	356	356	184	184
Countries	104	104	101	101	64	64
3. *wr* and *interaction with M2-GDP*						
wr	0.933	0.564	0.617	0.429	0.076	−1.068
	(2.14)**	(0.84)	(1.46)	(0.64)	(0.14)	(1.20)
wr × *M2-GDP*	−0.216	−0.110	−0.129	−0.061	−0.007	0.308
	(1.69)*	(0.58)	(1.05)	(0.32)	(0.04)	(1.12)
R^2	0.056	0.173	0.140	0.221	0.389	0.382
Observations	365	365	356	356	184	184
Countries	104	104	101	101	64	64

Note: This table shows results of panel data regressions of real per capita real GDP growth on remittances and different sets of conditioning variables, as explained below. *t*-statistics are reported in parentheses. The variable *wr* denotes the log of the ratio of workers' remittances to GDP. Basic conditioning set: five-year averages of initial GDP per capita, the trade-to-GDP ratio, the M2-to-GDP ratio (all in logs), and the inflation rate. A five-year average of the log of the investment-to-GDP ratio is included in the second conditioning set. The full conditioning set includes, in addition, five-year averages of logs of ratios to GDP of foreign direct investment, the fiscal balance, and population growth, and the log of the five-year average of the composite *ICRG* political risk indicator. The table reports adjusted R^2 values for OLS regressions and within-R^2 values for fixed-effects regressions.

*significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

effect of remittances becomes negative and significant regardless of whether investment is excluded. This negative effect appears to be operating through a reduction in TFP, in accordance with the theoretical descriptions of how remittances can reduce growth.

Remittances and Macroeconomic Volatility

This section examines the relationship between macroeconomic volatility and remittances and relates it to the findings of previous chapters. The evidence presented in Chapters 4 and 5 suggests that macroeconomic fluctuations exert a strong influence on remittances. But this same evidence, as well as the evidence analyzed in the previous section, suggests that remittances also affect economic fluctuations. As in the case of the correlation between remittances and GDP growth, there exist multiple pathways through which remittances can influence economic volatility, and these pathways imply contradictory effects.

Much of the theoretical evidence examined in Chapter 4 suggests that remittances are motivated by

Table 7.3. OLS and Fixed-Effects Instrumental Variables Regressions Explaining Per Capita GDP Growth as a Function of Workers' Remittances and Different Conditioning Sets, All Countries

	Conditioning Sets of Variables					
	Basic Conditioning Set: Excludes Domestic Investment		Basic Conditioning Set Plus Domestic Investment		Full Conditioning Set, Including Institutional Variable	
	OLS-IV	Fixed Effects–IV	OLS-IV	Fixed Effects–IV	OLS-IV	Fixed Effects–IV
Sample: All Countries						
Specification:						
1. *wr* only						
fitted wr	0.091	−5.667	0.044	−5.997	0.036	6.822
	(1.07)	(2.33)**	(0.53)	(2.56)**	(0.36)	(1.35)
R^2	0.037	0.169	0.128	0.233	0.353	0.382
Observations	383	383	374	374	189	189
Countries	108	108	105	105	66	66
2. *wr* and *wr-squared*						
fitted wr	0.047	−5.525	0.011	−5.814	0.040	3.863
	(0.45)	(2.27)**	(0.10)	(2.49)**	(0.30)	(0.74)
fitted wr-squared	−0.021	−0.951	−0.015	−1.245	0.002	−1.978
	(0.75)	(1.22)	(0.54)	(1.65)*	(0.04)	(1.88)*
R^2	0.035	0.187	0.126	0.241	0.349	0.400
Observations	383	383	374	374	189	189
Countries	108	108	105	105	66	66
3. *wr* and *interaction with M2-GDP*						
fitted wr	1.270	−3.005	0.854	−4.321	0.134	6.441
	(2.86)***	(1.10)	(1.98)**	(1.57)	(0.26)	(1.22)
fitted wr × M2-GDP	−0.349	−0.652	−0.239	−0.389	−0.029	0.092
	(2.70)***	(2.07)**	(1.91)*	(1.16)	(0.19)	(0.25)
R^2	0.052	0.195	0.134	0.237	0.350	0.382
Observations	383	383	374	374	189	189
Countries	108	108	105	105	66	66

Note: This table shows results of panel data regressions of real per capita real GDP growth on remittances and different sets of conditioning variables, as explained below. *t*-statistics are reported in parentheses. The variable *fitted wr* denotes the fitted value from a first-stage regression of the log of the ratio of workers' remittances to GDP as a function of remittances in the rest of the world. Basic conditioning set: five-year averages of initial GDP per capita, the trade-to-GDP ratio, the M2-to-GDP ratio (all in logs), and the inflation rate. A five-year average of the log of the investment-to-GDP ratio is included in the second conditioning set. The full conditioning set includes, in addition, five-year averages of logs of ratios to GDP of foreign direct investment, the fiscal balance, and population growth, and the log of the five-year average of the composite *ICRG* political risk indicator. The table reports adjusted R^2 values for OLS regressions and within-R^2 values for fixed-effects regressions.

*significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

altruism, which implies a desire among migrants to compensate their households for the negative impacts of economic fluctuations in the home country. In addition, the empirical evidence presented in that chapter shows that remittances tend to be compensatory rather than opportunistic. In other words, remittances enable recipient households to smooth their consumption over time. This implies that if they are large enough, remittances will reduce economic fluctuations in a remittance-receiving country.

Remittances can also reduce the volatility of investment through two distinct pathways. First, because firms rely mostly on internal financing to fund their investments, smoother consumption implies smoother business earnings and hence smoother investment. Sec-

ond, to the extent that remittances flow through the financial system, they may make it easier for firms to borrow and hence can enable firms to smooth their investment expenditures over time.

On the other hand, remittances may change recipients' behaviors in ways that tend to increase economic volatility. This is a further implication of the moral hazard argument discussed in the chapter's first section. First, there is a moral hazard in terms of labor income. If remittance recipients reduce their labor effort, this will increase the likelihood of poor firm performance, effectively imposing more risk on firms. Risk-neutral firms will react by adjusting labor contracts in ways that shift this risk back onto the households: by increasing the dispersion of wages and employment levels over

Table 7.4. OLS and Fixed-Effects Instrumental Variables Regressions Explaining Per Capita GDP Growth as a Function of Workers' Remittances and Different Conditioning Sets, Emerging Economies

	Conditioning Sets of Variables					
	Basic Conditioning Set: Excludes Domestic Investment		Basic Conditioning Set Plus Domestic Investment		Full Conditioning Set, Including Institutional Variable	
	OLS-IV	Fixed Effects–IV	OLS-IV	Fixed Effects–IV	OLS-IV	Fixed Effects–IV
Sample: Emerging Economies						
Specification:						
1. *wr* only						
fitted *wr*	0.094	−5.312	0.052	−5.732	0.035	6.877
	(1.06)	(2.08)**	(0.60)	(2.33)**	(0.34)	(1.34)
R^2	0.038	0.183	0.128	0.233	0.388	0.384
Observations	365	365	356	356	184	184
Countries	104	104	101	101	64	64
2. *wr* and *wr-squared*						
fitted *wr*	0.039	−4.993	0.012	−5.348	0.039	3.926
	(0.36)	(1.95)*	(0.11)	(2.17)**	(0.30)	(0.74)
fitted *wr-squared*	−0.027	−1.069	−0.019	−1.325	0.003	−2.145
	(0.91)	(1.29)	(0.64)	(1.66)*	(0.06)	(1.96)
R^2	0.037	0.188	0.126	0.241	0.349	0.404
Observations	365	365	356	356	184	184
Countries	104	104	101	101	64	64
3. *wr* and *interaction with M2-GDP*						
fitted *wr*	1.536	−2.526	1.007	−3.998	0.187	6.488
	(3.22)***	(0.88)	(2.15)**	(1.38)	(0.34)	(1.20)
fitted *wr* × *M2-GDP*	−0.431	−0.669	−0.284	−0.395	−0.046	0.092
	(3.08)***	(2.07)**	(2.07)**	(1.14)	(0.28)	(0.24)
R^2	0.060	0.197	0.136	0.237	0.349	0.384
Observations	365	365	356	356	184	184
Countries	104	104	101	101	64	64

Note: This table shows results of panel data regressions of real per capita real GDP growth on remittances and different sets of conditioning variables, as explained below. *t*-statistics are reported in parentheses. The variable *fitted wr* denotes the fitted value from a first-stage regression of the log of the ratio of workers' remittances to GDP as a function of remittances in the rest of the world. Basic conditioning set: five-year averages of initial GDP per capita, the trade-to-GDP ratio, the M2-to-GDP ratio (all in logs), and the inflation rate. A five-year average of the log of the investment-to-GDP ratio is included in the second conditioning set. The full conditioning set includes, in addition, five-year averages of logs of ratios to GDP of foreign direct investment, the fiscal balance, and population growth, and the log of the five-year average of the composite *ICRG* political risk indicator. The table reports adjusted R^2 values for OLS regressions and within-R^2 values for fixed-effects regressions.

*significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

the business cycle. The increased dispersion of firm earnings and wage income will then lead to increased economic volatility. Furthermore, the theoretical model presented in Chapter 6 also indicates that remittances may generate increased economic volatility if the presence of remittances causes household labor supply to become more procyclical. There is also a moral hazard in terms of investment effort. Recipients will choose riskier projects, or expend less effort on their existing investment projects, leading to an increased dispersion of investment returns and hence an increase in output volatility.

Two recent studies, IMF (2005) and World Bank (2006), estimated the correlation between remittances and output volatility.[9] The IMF (2005), in conjunction with the growth estimations described in the previous section, found negative and significant relationships between the total remittances–to–GDP ratio and several measures of volatility: GDP volatility, consumption volatility, and investment volatility (all defined as the standard deviation of the annual growth rate of the variable). The study also used the largest annual decline in GDP over the period as an alternate measure of volatility and obtained similar results. The World

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[9]Refer to the previous section for definitions of remittances, instruments, and other control variables used.

Bank (2006) performed a panel estimation of the determinants of output growth volatility in conjunction with the growth regressions discussed in the previous section. In addition to total remittances–to–GDP, control variables were inflation, monetary policy, and fiscal policy volatility; real exchange rate overvaluation; frequency of banking crises; trade openness; terms of trade and foreign growth rate volatilities; country fixed effects; and time period effects. The study found a negative and significant coefficient on the ratio of total remittances to GDP that was robust to the different instruments used.

Given that the IMF and World Bank studies did not use the preferred definition of remittances, it is important to conduct new volatility estimations using this variable. Therefore, a cross-sectional regression was estimated for a sample of 70 countries, comprising 16 advanced economies and 54 developing countries. The dependent variable in the regression is defined as the standard deviation of real per capita GDP growth over the 1970–2004 period.[10] The explanatory variables are similar to those that have been used in other studies examining output volatility (e.g., Easterly, Islam, and Stiglitz, 2001; Kose, Prasad, and Terrones, 2003)—relative income, relative income squared, terms of trade volatility, trade openness, financial openness, government consumption, institutional quality, an indicator of financial sector development, a trade concentration ratio, and an indicator of the commodity composition of exports—plus the ratio of workers' remittances to GDP. Data sources and definitions of the variables are discussed in the appendix to this chapter. The explanatory variables are constructed as averages over the 1970–2004 period, except for the relative income variable, which is measured using its value in 1970, with at least 15 years of available data for a particular country required for inclusion of that country in the sample for the variable. Also, the averages for the variables are calculated including only data for those years for which data are present for all the explanatory variables included in the regression.

An OLS regression was estimated including all the possible explanatory variables in the regression. A preferred-specification regression was also conducted, with insignificant variables dropped from the regression, using a country sample identical to that employed in the regression that included all of the explanatory variables. The results of the cross-country regression, presented in Table 7.5, indicate that there is a negative relationship between workers' remittances and the volatility of output and that this relationship is of marginal statistical significance. In practical terms, an increase in the workers' remittances–to–GDP ratio of one per-

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[10]The standard deviation of output growth for each country is calculated only over the years for which data are present for all of the explanatory variables in the regression.

Table 7.5. Cross-Sectional Regression Explaining GDP Volatility as a Function of Workers' Remittances and Conditioning Variables

Conditioning Set of Variables	
Workers' remittances to GDP	−0.164
	(−1.68)*
Terms of trade volatility	0.090
	(1.95)*
Financial openness	0.012
	(2.04)**
Commodity export composition	0.016
	(1.79)*
Government consumption to GDP	0.066
	(1.75)*
Government consumption to GDP	−0.064
* Industrial	(−2.28)**
R^2	0.374
Observations	70

Note: This table shows results of a cross-sectional regression explaining volatility of per capita output growth, defined as the standard deviation of the real GDP per capita growth rate over 1970–2004. The explanatory variables include remittances plus a set of conditioning variables, as explained below. *t*-statistics are reported in parentheses. All variables are calculated as averages over the 1970–2004 period. The conditioning set includes *Terms of trade volatility,* measured as the standard deviation of the annual change in the terms of trade; *Financial openness,* the ratio of the stock of foreign liabilities and foreign assets to GDP; *Commodity export composition,* measured as the share of primary commodities in total exports; *Government consumption to GDP,* measured as the ratio of government consumption to GDP in constant 2000 prices, both on its own and interacted with a dummy variable, *Industrial,* denoting industrial countries.

*significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

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centage point leads to a reduction of 0.164 percent in the standard deviation of GDP growth, according to the regression results. This implies that countries with high workers' remittances–to–GDP ratios experience significantly lower economic volatility than they would in the absence of remittances. Interestingly, the estimated coefficient on remittances has the same sign and nearly the same magnitude as the estimated coefficients in the studies mentioned previously. Figure 7.1 plots output volatility against the ratio of workers' remittances to GDP for the countries in the regression sample and suggests that the negative relationship found in the regression would have been stronger if not for the presence of one outlier (Jordan).

The results of the foregoing estimation seem to imply that the volatility-dampening effects of remittances out-

Figure 7.1. Output Volatility and the Ratio of Workers' Remittances to GDP
(In percent)

Sources: World Bank (2006) and authors' calculations.
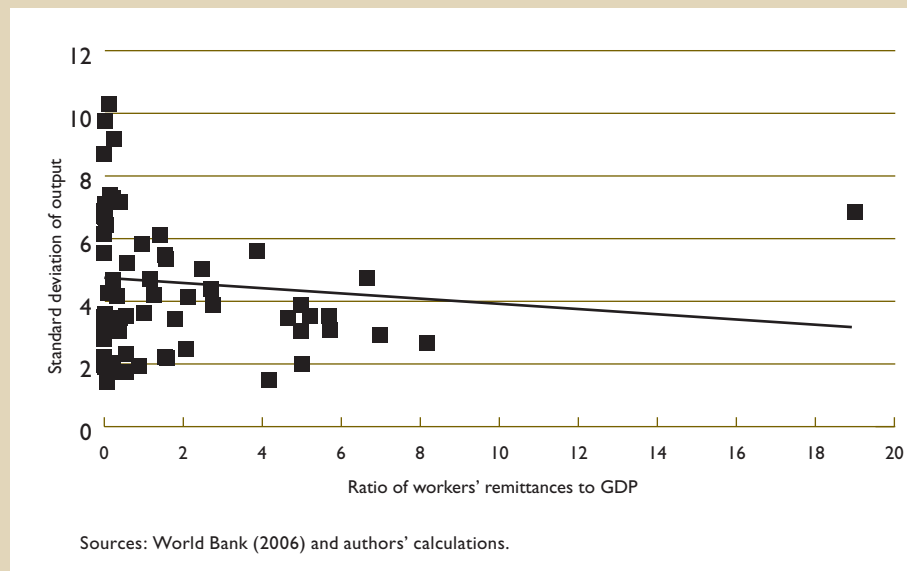
weigh the volatility-increasing effects described earlier. But there are several reasons why the empirical results do not necessarily support this conclusion. First, there is a data measurement issue. The theoretical model underlying the moral hazard effect is a business cycle model, similar to that used in Chapter 6, so its predictions are most relevant to variables measured at business cycle frequencies, say, quarterly or annually. The empirical exercises use long-run estimates of volatility out of necessity, so their results are not directly applicable to the theoretical model. Second, the theoretical model assumes that resources, most notably labor, are fully employed. In reality, most countries that receive remittances have high rates of under- or unemployment. Thus, the average household in remittance-receiving countries probably does not exhibit the strong labor-leisure trade-off present in the theoretical model, like those calibrated in the cash and credit economies of Chapter 6. Finally, given the evidence on remittances and investment presented in Chapter 4 as well as in the preceding section, any impact remittances may have on the riskiness of investment is probably too small to detect in aggregate data.

Nevertheless, the empirical results support the idea that remittances reduce macroeconomic volatility over long horizons. Yet the exercise does not shed light on the exact mechanism by which remittances reduce such volatility. Given the analysis on motives, intended uses, and end uses of remittances from Chapter 4 and the

simulation results from Chapter 6, it appears likely that remittances reduce output volatility at the aggregate level because they dampen consumption volatility at the household level. The increased smoothness of consumption has a direct impact on measured GDP volatility, since consumption accounts for a large share of GDP. This will remain a conjecture, however, until detailed longitudinal studies of household consumption and investment, including both households that do and those that do not receive remittances, are conducted.

Workers' Remittances and the Equilibrium Real Exchange Rate

As indicated in Chapter 5, one of the most important potential macroeconomic effects of remittance inflows is on the recipient country's equilibrium real exchange rate. Changes in the equilibrium real exchange rate not only affect the distributional impacts of remittance inflows, both by altering the returns to factors employed in the traded and nontraded goods sectors and by affecting the relative price of traded and nontraded consumption goods, but may also be one of the mechanisms through which remittance flows exert their main impact on long-run growth, via Dutch disease effects. Deriving the theoretical implications of remittance inflows for the long-run equilibrium real exchange rates in recipient countries requires the use of

a macroeconomic model. Surprisingly, there has been relatively little analytical work on this issue. The discussion in this section is based on Montiel (2006), which explored the effects of remittance receipts on the long-run equilibrium real exchange rate in the context of a fairly standard two-sector open economy model. The equilibrium real exchange rate in the model is defined in Nurksian terms as the value of the real exchange rate that is simultaneously consistent with internal and external balance, conditioned on sustainable values of the economy's underlying real fundamentals.

External balance refers to a situation in which the ongoing current account deficit is financed by sustainable capital inflows. In the model of Montiel (2006), this condition generates a positive trade-off between the real exchange rate and real domestic consumption (measured in units of traded goods), because an increase in domestic consumption creates an excess demand for traded goods, requiring a real depreciation to generate the offsetting excess supply required to maintain the trade balance at the level that can be financed by sustainable capital flows. The resulting locus is depicted as curve *EB* in Figure 7.2. On the other hand, *internal balance* refers to a situation in which the market for nontraded goods is in equilibrium at full employment. This condition generates a negative trade-off between the real exchange rate and real domestic consumption, since the excess demand for nontraded goods caused by an increase in domestic consumption requires a real appreciation to sustain equilibrium in the market for nontraded goods. The implied internal balance locus is depicted as curve *IB* in Figure 7.2. The intersection of these loci at point *A* in Figure 7.2, where external and internal balance hold simultaneously, determines the long-run equilibrium real exchange rate.

Interpreted as an exogenous transfer from the rest of the world, workers' remittances are a component of the current account and thus affect the position of the *EB* curve. However, since remittances have no *direct* effect on the market for nontraded goods, changes in remittance flows leave the *IB* curve undisturbed.[11] For a given level of capital inflows, a larger inflow of remittances permits the economy to sustain a larger trade deficit, and thus a more-appreciated real exchange rate, without violating the external balance condition. Thus, an increase in remittance receipts shifts the *EB* curve downward, resulting in a more-appreciated long-run equilibrium real exchange rate and a higher level of real domestic consumption, as shown at point *B*. Note that the quantitative effect of the change in remittance flows on the equilibrium real exchange rate depends on the elasticities of the external and internal balance curves, such that the more elastic these curves are, the smaller

Figure 7.2. Remittances and the Equilibrium Real Exchange Rate
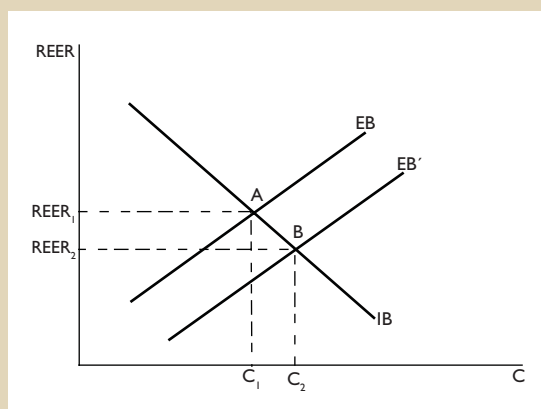
the change in the equilibrium real exchange rate resulting from a change in the amount of remittances. Thus, alterations in remittance flows have a smaller impact on the equilibrium real exchange rate the greater the degree of substitutability between traded and nontraded goods in both production and consumption.

Elements of the preceding analysis underlie the standard presumption that higher remittance flows are likely to result in an appreciation of the equilibrium real exchange rate. However, the analysis relies on several special assumptions. Montiel (2006) shows the following:

- If remittance inflows include a component that is inversely related to real income in the recipient country, a change in the exogenous component of remittance receipts has weaker effects on the equilibrium than in the absence of this endogenous component.
- Similarly, if remittance receipts are disproportionately devoted to spending on traded goods (say, because remittances are transferred in kind, or because they are used to import consumer durables), their effects on the long-run equilibrium real exchange rate tend to be weakened, and in the limit can be eliminated altogether. For example, if *all* remittance receipts are devoted to spending on traded goods, then the *EB* and *IB* curves in Figure 7.2 both shift to the right by exactly equal amounts in response to an increase in remittances. In that case, long-run domestic real consumption increases by the amount of increased remittance income, but the long-run equilibrium real exchange rate remains unchanged.
- Somewhat surprisingly, if the receiving country's external creditors treat remittance receipts as part of that country's wealth, and if an increase in remittance receipts consequently lowers the risk premium the country faces in international capital markets,

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[11]The model treats the supply of labor as exogenous, thus ruling out direct effects of remittance flows on the nontraded goods market arising from labor supply effects.

then a permanent increase in such receipts gives rise to a transitory consumption boom in the recipient country, but its long-run equilibrium real exchange rate remains unaffected.

Based on these considerations, the presumption from theory is that a permanent increase in remittance inflows is associated with an appreciation of the recipient economy's long-run equilibrium real exchange rate. However, under certain empirically plausible conditions, this effect may be weak, or even absent altogether. Thus the effect of remittance receipts on the equilibrium real exchange rate is an empirical question.

The next step for understanding the relationship between remittances and the real exchange rate, beyond casual data analysis, is to include remittances in the standard exchange rate estimation. Despite their empirical importance for many countries and the strong theoretical presumption that remittance inflows affect the equilibrium real exchange rate, the literature on equilibrium real exchange rate estimation has not typically incorporated remittance flows into the set of real exchange rate fundamentals. The studies that do incorporate remittances into this set of fundamentals have focused on the experience both of individual countries and of various country groupings as well. Such studies typically include remittance flows in the set of fundamentals that enter a cointegrating equation for the real exchange rate, thus controlling for other potential real exchange rate determinants in a single-country or panel context. An early single-country study by Bourdet and Falck (2003) examined the effect of workers' remittances on the equilibrium real exchange rate in Cape Verde over the period 1980–2000, confirming the conventional view that an increase in remittance receipts is associated with an appreciation of the equilibrium real exchange rate. Similar results were obtained by Hyder and Mahboob (2005), who found that higher remittance inflows tended to appreciate the equilibrium real exchange rate in Pakistan during 1978–2005, as well as by Saadi-Sedik and Petri (2006), who derived the same result for Jordan over 1964–2005.

For a sample of six Central American and Caribbean countries, Izquierdo and Montiel (2006) obtained mixed results over the period 1960–2004. They followed a procedure aimed at identifying cointegrating relationships between the real effective exchange rate and a set of nonstationary fundamental variables. Starting with a full set of possible fundamental variables—which included, in addition to the ratio of workers' remittances to GDP, a measure of average labor productivity; the ratios to GDP of government consumption and of the international investor position; trade openness; and terms of trade—their procedure eliminated those variables that did not form part of a cointegrating vector or those whose sign was not theoretically appropriate. Table 7.6 shows the final cointegrating vectors Izquierdo and Montiel obtained. In Honduras, Jamaica, and

Nicaragua, the authors found no influence of workers' remittances on the equilibrium real exchange rate—that is, workers' remittances were not part of a cointegrating vector with the real effective exchange rate—despite the fact that these countries received very large remittance inflows over the last half of their sample. For the Dominican Republic, El Salvador, and Guatemala, however, remittance inflows turned out to be important determinants of the equilibrium real exchange rate, with an increase in remittance inflows having a much more powerful effect on equilibrium real exchange rate appreciation in El Salvador and Guatemala than in the Dominican Republic.

Given the small set of countries examined in single-country studies to date, it is difficult to generalize from these results. However, other researchers have used panel methods to examine the effects of remittance inflows on the real exchange rate for larger samples of countries. Amuedo-Dorantes and Pozo (2004), for example, used a panel with 13 Latin American and Caribbean countries over the period 1978–98 and found that an increase in workers' remittances appreciated the real exchange rate. Holzner (2006) derived the same result using a worldwide sample. In contrast with these results, Rajan and Subramanian (2005) found, for a sample of 15 countries during the 1990s, that higher remittance receipts were not associated with slower growth in manufacturing industries with higher labor intensity or greater export orientation, as one might expect if remittance receipts are associated with Dutch disease effects operating through an appreciated real exchange rate.

Thus, although neither the single-country nor panel evidence speaks with a single voice, most of the research to date is consistent with the conventional presumption that higher remittance receipts tend to appreciate the equilibrium real exchange rate. The implication is that if Dutch disease effects are indeed present, the beneficial short-run effects of remittance inflows on economic welfare in the recipient countries through higher and more stable levels of consumption may come at the expense of reduced long-run growth. Chapter 8 considers the policy challenge posed by this trade-off.

Remittances, Fiscal Policy, and Debt Sustainability

The notion that remittances have a significant effect on fiscal policy and debt sustainability may at first be surprising, since governments have no direct claims on these person-to-person transfers. The fact that remittances enter the recipient economy through family transfers means that remittances affect fiscal policy and debt sustainability indirectly through the activities of remittance-receiving households, primarily through their consumption decisions and saving patterns. In

Table 7.6. Cointegrating Relations for the Real Exchange Rate, 1960–2004

	Dominican Republic	El Salvador	Guatemala	Honduras	Jamaica	Nicaragua
Workers' remittances/GDP	−1.085 (0.720)	−35.255 (0.444)	−44.611 (2.937)			
Other nonstationary fundamentals						
Average productivity of labor	−0.174 (0.409)	6.626 (0.662)		−5.340 (0.814)	−7.544 (0.725)	22.091 (5.088)
Government consumption/GDP		−0.410 (0.012)	−0.010 (0.006)	−0.028 (0.008)	−0.025 (0.002)	−0.008 (0.019)
Trade openness				0.008 (0.008)	0.003 (0.000)	
Terms of trade			−0.006 (0.001)	−0.003 (0.001)	−0.007 (0.000)	−0.065 (0.010)
International investor position/GDP				−0.004 (0.000)	−0.003 (0.000)	
Time trend		0.241 (0.004)	0.069 (0.005)	−0.032 (0.005)	−0.061 (0.003)	0.222 (0.065)

Source: Izquierdo and Montiel (2006), Table 1.

Note: The log of the real effective exchange rate is included in the cointegrating equation. An increase (decrease) in the real effective exchange rate corresponds to a depreciation (appreciation). Standard errors are shown in parentheses.

this respect remittances are quite different from natural resources, which governments may own and from which they derive revenue, and public aid transfers, which enter the government budget constraint directly. Since remittances contribute to higher consumption of domestic and imported goods, they may affect government revenues through consumption- and trade-based taxation.[12] Furthermore, remittances may lead to increased deposits in the banking system and, to the extent that the marginal propensity to consume is less than unity, they may increase the level of private saving. Both of these channels may affect fiscal policy through credit market activity. As a result, remittances can play an important role in the assessment of a country's debt sustainability, since they alter the fiscal balance and the evolution of the stocks of public and private sector liabilities over time.

To illustrate this concept, this section examines a simplified economy in which the government issues only domestic-currency-denominated debt. Furthermore, it is assumed that the household in this simplified economy

receives remittances only in terms of domestic currency.[13] Sustainability conditions are derived from the household and government budget constraints to illustrate the channel through which remittances alter the accumulation of liabilities and affect debt sustainability. After debt sustainability conditions are derived in this simplified setting, the more complex case with foreign-currency-denominated debt and the need to transfer remittances across the exchange rate is considered.

The government's intertemporal budget constraint in the presence of remittances, derived explicitly in Box 7.1, is useful for understanding the impact of remittances on fiscal policy choices. Since the stock of debt issued during the previous period, B_t, must be taken as a given state variable, increases in remittances that do not result in a one-to-one increase in household consumption will support new sequences of taxes, money growth, and bond issuance. For example, given a stream of future tax revenues chosen by the fiscal authority and a future stream of money growth chosen by the monetary authority, an increase in remittances will be met with an increase in future debt issuance, B_{t+i+1}, for some future period. The increase in government bond issuance can be viewed as a mechanism to absorb additional levels of household saving, S_{t+i}, and support the household's desire to smooth consumption across

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[12]To the extent that remittances are transmitted through formal channels and hence are measurable, they can be taxed using financial transactions taxes, but governments generally avoid this type of taxation for several reasons. Such a tax may cause the transfers to migrate to informal channels, lowering welfare by increasing the costs of remitting; counter the ongoing international efforts against money laundering; and potentially reduce the overall quantity of remittances.

[13]Some financial systems permit households to hold foreign-currency-denominated accounts in the financial system.

Box 7.1. Remittances and Fiscal Sustainability

Remittances are unrequited, nonmarket personal transfers between households across countries, and as such they enter the household budget constraint as an addition to income separate from the domestic production process. Previously accumulated stocks of money balances (M) and real government bonds (B), income from production (Y) net of taxes (T), and real remittance transfers (Rem) are all used to finance household expenditures (C). In this simplified setting the aggregate household budget constraint is

$$C_t + \frac{M_{t+1}}{P_t} + B_{t+1} = Y_t + Rem_t - T_t + \frac{M_t}{P_t} + B_t R_t,$$

where R is the gross domestic interest rate, or $R = (1 + r)$, where r is the net domestic interest rate, and P is the price level. The government uses taxes, money creation, and real bond issuance to finance its expenditures (G) according to

$$G_t + B_t R_t \frac{M_t}{P_t} = T_t + \frac{M_{t+1}}{P_t} + B_{t+1}.$$

Under the assumption that household and government consumption includes public and private investment, the economy-wide resource constraint is

$$C_t + G_t = Y_t + Rem_t.$$

A clearer picture of the effect of remittances on fiscal policy choices, including debt creation, can be obtained through examination of the intertemporal government budget constraint. Substituting for successive bond terms in the government budget constraint yields

$$B_t = \sum_{i=0}^{I} q_i \left[T_{t+i} - G_{t+i} + \frac{M_{t+1}}{P_{t+i}} (\mu_{t+i+1} - 1) \right] + q_I B_{t+I+1},$$

where μ is the growth rate of nominal money balances and

$$q_i = \prod_{n=1}^{i+1} \frac{1}{R_{t+n-1}}.$$

The usual interpretation of this exercise is that a positive stock of debt in the present period must eventually be paid for by generating fiscal surpluses or money creation. Using the economy-wide resource constraint to substitute for the future sequence of government spending results in

$$B_t = \sum_{i=0}^{I} q_i \left[T_{t+i} - \underbrace{(Y_{t+i} + Rem_{t+i} - C_{t+i})}_{s_{t+i}} + \frac{M_{t+1}}{P_{t+i}} (\mu_{t+i+1} - 1) \right]$$
$$+ q_I B_{t+I+1},$$

where S_{t+i} is the level of household saving.

time. If these flows were instead channeled through the financial system, an increase in remittances that led to additional household saving could also lead to increases in financial system liabilities, which in turn could lead to additional private and public sector credit provision.

However, should the fiscal authority not want to increase future debt levels, the increase in remittances given a future stream of monetary policy will be met by an increase in future tax revenue. Though remittances do not enter directly into the government budget constraint and empirical evidence suggests that governments do not tax remittances directly, governments receive tax revenue from remittances indirectly. As shown in Chapter 6, additional tax revenue may be collected with the least amount of distortion through a consumption-based tax system.[14] Consequently, remittances can be viewed as part of the potential tax base in addition to labor income from production, depending on the tax structure in place. Finally, for a given stream of future tax revenue and bond issuance by the fiscal authority, the monetary authority may also meet an increase in remittances with an increase in money

creation. In this regard, inflows of remittances have macroeconomic policy implications similar to those of inflows of market-based capital, and countries that operate within inflation-target regimes need to conduct liquidity operations to deal with any changes in liquidity resulting from remittances.

To examine some of the implications of remittances for fiscal policy and debt levels, data were assembled from the IMF World Economic Outlook database and the World Bank's World Development Indicators for the top 20 remittance-receiving economies, based on the average ratio of remittances to GDP between 1990 and 2005. Averages were computed for the ratio of workers' remittances to GDP, credit to the government as a percentage of total credit, the net general government debt-to-GDP ratio, and government consumption as a percentage of GDP. The minimum and maximum average remittances-to-GDP ratios in this sample were 3.1 and 18.3 percent, respectively. As the countries in the data set are a subset of remittance-receiving economies, any results drawn from this data set should be interpreted as relating to economies that can be characterized as significantly remittance dependent.[15]

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[14]See Chapter 6 for additional discussion on tax structures in emerging markets and optimal tax structures in remittance-dependent economies.

[15]For an examination of remittances and the fiscal balance across emerging economies, see Table 3.5.

As shown in the first panel of Figure 7.3, the ratio of workers' remittances to GDP has a positive relationship with the ratio of credit to the government to total credit, indicating that the banking system tends to channel additional household saving from remittances into credit provision to the government as opposed to the private sector. The figure's second panel plots the relationship between the ratio of average workers' remittances to GDP and the average net general government debt-to-GDP ratio. The positive relationship suggests that remittances also tend to result in higher levels of public sector debt. Finally, the third panel in Figure 7.3 plots the relationship between the ratios of average workers' remittances to GDP and average government consumption to GDP in remittance-dependent economies. The data indicate that the government's additional financing, whether channeled through the banking system or through an increase in government debt issuance, results in higher government consumption.

Given the discussion in earlier chapters regarding the stability of remittance flows and the focus in this chapter on total household resources (i.e., income from production plus remittances) when the intertemporal budget constraint is examined, a more accurate representation of debt sustainability for a country that receives significant remittance flows should employ as a base a more-aggregated measure of income than GDP. For example, gross national disposable income (GNDI) could be used instead of GDP when the evolution of liabilities in an open economy setting is computed. However, GNDI includes net factor income from nonresidents and public transfers, including grants, and may therefore be inappropriate, depending on the composition of flows that a particular country receives. Net factor income may not be suitable for inclusion as part of the potential revenue base of the fiscal authority, and public sector transfers may be lumpy and inconsistent over time. An alternative to using GNDI would be to construct a measure of GDP plus net current private transfers.

Normalizing the intertemporal government budget constraint in Box 7.1 by the sum of income from production and remittances yields the traditional debt sustainability relationship in terms of the debt-to-GNDI ratio, less net factor income and public transfers. Setting $i = 0$ and ignoring the use of money creation in debt financing results in the following equation describing the approximate evolution of debt in terms of growth rates:

$$b_{t+1} = \frac{(1 + r)}{(1 + \pi + \gamma + \eta)} b_t - (t_t - g_t), \qquad (7.1)$$

where b is the stock of domestic-currency-denominated government debt, r is the net interest rate, π is the growth rate of the GDP deflator, γ is the growth rate of real GDP, η is the growth rate of remittances in domestic currency terms, and $(t_t - g_t)$ is taxes less noninterest

Figure 7.3. Remittance-Dependent Economies and Fiscal Policy, 1990–2005
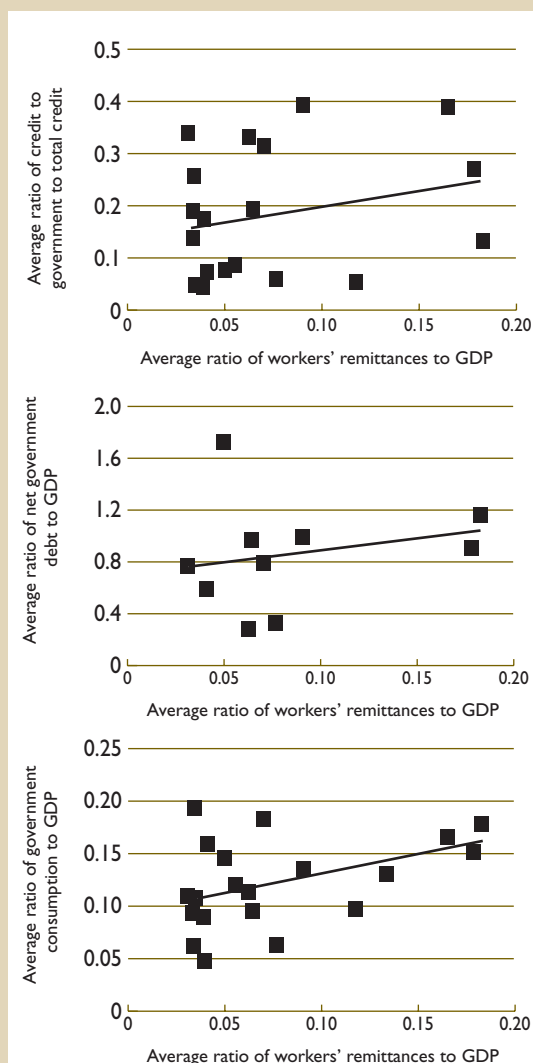
Sources: IMF (2006b) and World Bank (2006).
Note: Variables are averages for each country between 1990 and 2005. Remittance data include workers' remittances while excluding employee compensation and migrants' transfers.

government spending, or the primary fiscal balance. In this case, for a given set of remaining variables, increases in the growth rate of remittances in domestic currency units improve debt sustainability.

A more complete derivation of (7.1) to assess debt sustainability would also include exchange rate effects on remittances and foreign currency debt issued by the public sector. In addition to the sustainability of public

Box 7.2. Remittances and External Sustainability

Assessments of external sustainability are a key element in IMF surveillance of member countries and involve forming a view of how outstanding stocks of liabilities are likely to evolve over time. External debt evolves according to

$$D_{t+1} = (1 + r)D_t - CAB_t,$$

where D represents the stock of public and private external debt and CAB the noninterest current account balance in U.S. dollars. Separating the components of the noninterest current account means the equation can also be written as

$$D_{t+1} = (1 + r)D_t - [TB_t + Inc_t + Tr_t],$$

where TB is the balance on goods and services, Inc represents the balance on income less interest, and Tr is net current transfers, which includes workers' remittances.

Normalizing the preceding equation by nominal GDP results in an external debt-to-GDP ratio of

$$d_{t+1} = \frac{(1 + r)}{(1 + \gamma)(1 + \rho)} d_t - tb_t - inc_t - tr_t,$$

where γ is the growth rate of real GDP and ρ is the growth rate of the U.S. dollar value of the GDP deflator.[1] Here, lowercase variables (d, tb, inc, tr) are used to denote ratios

to GDP (of D, TB, Inc, and Tr, respectively). The change in the debt-to-GDP ratio is then

$$d_{t+1} - d_t = \frac{(r - \gamma - \rho - \gamma\rho)}{(1 + \gamma + \rho + \gamma\rho)} d_t - tb_t - inc_t - tr_t.$$

According to this debt dynamics equation, an increase in the level of the remittances-to-GDP ratio, all else equal, improves external sustainability. Remittances also have indirect beneficial effects on debt dynamics to the extent that their presence reduces external borrowing costs and causes the domestic currency to appreciate.

However, as mentioned in the chapter text, the improvement in debt dynamics should be qualified when the empirical results regarding the cyclicality of remittance flows and any potential adverse effects of real exchange rate appreciation are considered. An increase in domestic GDP relative to GDP abroad will improve debt dynamics through the coefficient on d_t but will be offset somewhat by a decline in remittances (e.g., transfers) and any increased demand for imports. Conversely, a relative increase in GDP abroad will lead to higher remittance inflows and possibly increase the demand for exports, both of which should lead to improvements in sustainability. Finally, external sustainability will improve if remittance transfers result in a real appreciation of the domestic currency, but such an appreciation will also adversely affect exports.

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[1] External sustainability analysis uses variables in U.S. dollars following traditional balance of payments accounting, whereas fiscal sustainability is analyzed in terms of domestic currency. The variable ρ captures the growth rate of the U.S. dollar value of the GDP deflator, which is similar to the use of changes in

the GDP deflator (π) and the exchange rate (ε) in equations (7.1) and (7.2).

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sector debt, remittances also affect external sustainability through their inclusion in net transfers as part of the noninterest current account balance. Box 7.2 discusses the role of remittances and external sustainability. Including the government's foreign currency debt and the need to translate remittance flows across currencies results in a debt evolution equation of

$$b_{t+1} = \frac{(1 + \varepsilon)(1 + r^*)}{(1 + \pi)(1 + \gamma)} \frac{\eta_t}{\eta_{t+1}} b_t^f$$
$$+ \frac{(1 + r)}{(1 + \pi)(1 + \gamma)} \frac{\eta_t}{\eta_{t+1}} b_t - (t_t - g_t), \qquad (7.2)$$

where lowercase terms denote ratios to income from production and remittances ($Y_{t+i} + Rem_{t+i}$) in domestic currency terms, $\varepsilon = (e_{t+1} - e_t)/e_t$ is the change in the exchange rate (e), defined as units of domestic currency per U.S. dollar, r^* is the net interest rate on foreign-currency-denominated debt, b^f is the stock of foreign-currency-denominated debt, and η is defined as $\eta_t = 1 + (Rem_t \cdot e_t)/Y_t$.

For a given exchange rate, an increase in the ratio of remittances to GDP in period $t + 1$ relative to period t

improves debt dynamics, since η_{t+1} increases relative to η_t. Essentially, the government's potential revenue base has increased. An increase in the exchange rate, $e_{t+1} > e_t$, however, has offsetting effects; it leads to an increase in the domestic currency value of foreign currency debt, which worsens sustainability. This can be observed in the numerator on the coefficient of b^f (i.e., $\Delta\varepsilon > 0$). On the other hand, an identical increase in the exchange rate for a given level of the remittances-to-GDP ratio improves sustainability through $\eta_{t+1} > \eta_t$, because each unit of remittance inflow in foreign currency is worth more in terms of domestic currency than before. The exchange rate effect on remittances therefore serves as a potential channel for offsetting the upward adjustment in the debt stock from a depreciation of the domestic currency. The ability of remittances to serve as a buffer against exchange rate shocks depends on many factors, including the source country of the remittance flows, the stability of those flows, the response of remittances to changes in the exchange rate, and the degree to which remittances augment the government's revenue base.

The empirical results on the cyclicality of remittance flows from Chapter 4, any potential adverse effects of real exchange rate appreciation as discussed in Chapter 5, and any effects of remittances on economic growth as examined earlier in this chapter should be taken into consideration as potential qualifiers on any improvement in debt dynamics. For example, an increase in domestic GDP relative to GDP abroad will improve debt dynamics, but a decline in remittances due to the countercyclicality of these flows, highlighted in Chapter 4, will offset this somewhat. Conversely, a relative increase in GDP abroad will lead to higher remittance inflows, which lead to improvements in sustainability either through a higher growth rate in equation (7.1) or via a higher remittances-to-GDP ratio in equation (7.2). Finally, debt sustainability will improve if remittance transfers result in a generalized real appreciation of the domestic currency.[16]

In the absence of remittances, the typical evaluation of an economy's ability to sustain its debt level relies solely on a comparison of the growth in the country's domestic income vis-à-vis the interest rate on its debt. As the remittance-determination equation in Chapter 4 shows, the growth rate in the remittance-sending country also positively affects remittances. This implies that periods of high growth in that country will lead to higher remittances, which will enhance the ability of the government in the remittance-receiving country to sustain its current policy stance, even if the local economy is concurrently experiencing a period of low growth. Consequently, the increased importance of remittance flows worldwide has opened a new channel through which changes in domestic income, income abroad, and market prices such as exchange rates and interest rates may have an impact on debt sustainability. The elasticities of remittances with respect to changes in these variables have become necessary inputs into a complete assessment of sustainability for countries that receive significant inflows of remittances relative to GDP.

In conclusion, in countries that receive remittance flows in sufficient quantities, the presence of remittances can support higher future debt levels, a finding that accords with the empirical conclusions in this section regarding the correlation between remittances, banking sector credit to the public sector, and public debt levels. These higher debt levels tend to be associated with increased government spending, yielding a positive correlation between remittances and the level of government spending in remittance-dependent economies, corroborating the empirical finding in this chapter that countries with higher remittances tend to have higher levels of government spending. In addition to the traditional focus on the stance of fiscal policy and the rate of domestic GDP growth versus interest rates in assessing sustainability, the ability of remittance-dependent economies to carry higher public sector debt loads also depends on the persistence of remittance flows and the elasticity of these flows with respect to income differentials, interest rate differentials, and changes in exchange rates, as estimated using the remittance-determination equation in Chapter 4. Inclusion of remittances in the government's potential revenue base, however, depends on the tax structure in place and the government's ability to access this potential tax base without injecting undue distortions into economic activity, a subject examined more thoroughly in the explicit theoretical monetary model in Chapter 6.

Appendix 7.1. Data Definitions, Sources, and Coverage

This appendix provides definitions and data sources for the variables used in the cross-sectional regressions in this chapter. It also defines the country groupings.

Data Definitions and Sources

Variables Included in the Preferred-Specification Regression

The following variables were used in the cross-sectional regressions presented in this chapter:

Volatility of per capita output growth is defined as the standard deviation of the real GDP per capita growth rate over 1970–2004. Per capita real GDP growth is measured using data on real per capita GDP in constant dollars (international prices, base year 2000) obtained from the Penn World Table, Version 6.2.

Workers' remittances is the ratio of workers' remittances to GDP. The source of the data is the World Bank's World Development Indicators database.

Terms of trade volatility is measured as the standard deviation of the annual change in the terms of trade over 1970–2004. The source of the data is the IMF's World Economic Outlook database.

Trade openness is defined as the sum of imports and exports of goods and services divided by GDP in constant 2000 prices. The source of the data is the Penn World Table, Version 6.2.

Financial openness is defined as the ratio of the stock of foreign liabilities and foreign assets to GDP. The source of the data is Milesi-Ferretti and Lane (2006).

The *commodity export composition* is the share of primary commodities in total exports. For each country,

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[16]Although a generalized appreciation of the domestic currency resulting from remittance inflows may improve the sustainability of the public debt, it may also worsen the trade balance and weaken external sustainability. See Box 7.2 and "Workers' Remittances and the Equilibrium Real Exchange Rate" for additional discussion.

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VIII   Policy Implications

The purpose of this chapter is to draw summary policy implications for countries that receive significant flows of remittances based on what the various facts, models, and arguments contained in the preceding chapters have added to our understanding of remittances and the role they play in a country's economy. The specific findings of the preceding chapters can be organized around three main points:

- First, the proper measurement of remittances is essential to estimating their impact on the macroeconomy, and hence for making sound policy.
- Second, remittances carry a number of potential benefits, but each is matched with a potential cost.
- Third, the challenge is to design policies that allow these benefits to flow to households and the economy while limiting or offsetting any counterproductive side effects.

Regarding the proper measurement of remittances, the variable known as *workers' remittances* in data sources such as the World Development Indicators database (World Bank, 2006) is the best measure of the private, unrequited transfers that economists have in mind when modeling remittances and ascertaining their economic impact. This classification is also a good fit with the changes that the IMF Committee on Balance of Payments Statistics and the Advisory Expert Group on National Accounts have proposed in order to properly classify, collect, and track remittance flows. The analysis in Chapters 2 and 3 indicates that the economic and statistical properties of the category *workers' remittances* in the balance of payments differ significantly from those of *employee compensation* and *migrants' transfers,* so that combining these three transfers into a single measure of remittances, as is common practice in the literature, can lead to invalid conclusions about the correlation of remittances with other variables. In turn, conclusions based on the improper measurement of remittances can lead to non-optimal policy decisions.

Regarding the potential benefits and costs of remittances, there are at least three reasons to be optimistic about remittances' economic impacts: remittances are private, dependable, and substantial. However, the systematic study of the remittances phenomenon conducted in previous chapters yields an important caveat to this optimism. The aspects of remittances that generate economic benefits are also the sources of potential pitfalls that must be understood and managed. The following discussion illustrates how each benefit of remittances is paired with a potential problem.

To begin with, remittances directly and indirectly improve the welfare of individual households by lifting families out of poverty and insuring them against income shocks, such as those generated from business cycle fluctuations or natural disasters. Chapter 4 shows that although the exact motivations for remittances are nearly impossible to discern, the available survey evidence on the uses of remittances reveals that remittances primarily fund consumption, and the econometric analysis of remittances across countries over time strongly suggests that they are compensatory rather than opportunistic transfers. The theoretical analysis in Chapter 6 illustrates that the increased consumption of goods and leisure that can be attributed to receipt of remittances is the result of optimal decision making by households and leads to significant increases in welfare even after other effects are netted out. The simulation results from Chapter 6 show the consumption-smoothing effect to be robust to different economic structures and tax regimes, and Chapter 7 presents empirical evidence that remittances are indeed associated with lower output volatility. Consequently, the compensatory nature of remittances facilitates consumption smoothing and decreases the volatility of both consumption and output, directly benefiting risk-averse households.

On the other hand, the analysis in Chapter 5 suggests that remittances are not necessarily associated with an increase in, or a more efficient allocation of, domestic investment. The relative permanence of remittance flows plays an important role in determining whether they are used for consumption rather than investment. But other effects on investment may also be present. For instance, remittances alter incentives to work. Remittance recipients rationally substitute unearned remittance income for labor income, which must be earned through the expenditure of effort. The labor-leisure trade-off, for example, is clearly illustrated in the model of Chapter 6, in which the optimal decision of households leads, in both of the calibrated economies, to greater use of leisure over labor after remittances are

introduced. Since labor and capital are complementary goods in production, this may negatively affect the rate of capital accumulation in the economy as a whole. Finally, the analysis further indicates that the effects of remittances on the efficiency of investment depend on their impact on financial development and the marginal cost of financial intermediation, which could be positive or negative.

Although it is difficult to gauge the size of the incentive effect on work and investment, this effect does help explain two additional findings. First, the survey evidence on the uses of remittances presented in Chapter 4 shows that remittances primarily fund consumption and the accumulation of housing and real estate assets rather than investment in business capital. Second, the estimates presented in Chapter 7, which use properly measured remittance data and an improved instrument for remittances, show that remittances have no statistically significant effect on GDP growth.

A further main benefit of remittances is that they improve the sustainability of government debt. The analysis of Chapter 5 and the theoretical model in Chapter 6 provide the underlying rationale for this conclusion: significant inflows of remittances can directly or indirectly increase a government's revenue base, thereby reducing the marginal cost of raising revenue for debt service purposes. Chapter 7 also discusses how remittances may lead to additional household saving and illustrates how traditional debt sustainability analysis might be conducted in regard to remittance-dependent economies. The evidence in these chapters suggests that remittances enable a government to service existing debt with less distortionary costs to the economy or to increase the level of debt while maintaining the same level of distortions. In either case, the presence of remittances leads to reduced country risk. Governments should, of course, use any fiscal space created by remittance inflows in constructive ways. Suggested courses of action are discussed in further detail later in the chapter.

As with those of households, however, remittances may also alter government incentives in a non-growth-friendly way. In particular, a potential risk from remittances is that they may reduce the government's incentive to maintain fiscal policy discipline. The loosening of the government's intertemporal budget constraint may lead to the issuance of additional public sector debt to finance expenditure increases or tax reductions that are not growth enhancing.[1] The empirical evidence presented in Chapter 7 suggests that governments take advantage of the fiscal space afforded by remittances by consuming and borrowing more. But just because remittances enable the public sector to carry more debt,

that does not mean that it should. Nor should remittances be used as a reason to postpone needed fiscal consolidation.

A final benefit of remittances is that they constitute a source of financing in an economy's balance of payments. For example, to the extent that they provide financing for current account deficits, remittances can facilitate the increases in domestic consumption mentioned previously. Yet the benefit to the current account is matched by a potential cost in the form of Dutch disease effects. Chapters 5 and 7 discuss the relationship between remittance inflows and real exchange rates, and the empirical evidence presented suggests that remittances are positively correlated with real exchange rate appreciation. Hence, there is some evidence of remittance-driven Dutch disease effects in remittance-receiving countries. (As the discussion in Chapter 7 indicates, however, this is an area in which additional research is needed.) To the extent that Dutch disease effects are present in a particular remittance-receiving economy, policymakers must find ways to offset the effects of remittance flows on the equilibrium real exchange rate or to compensate the economy's traded goods sector for the loss of competitiveness that it suffers from the equilibrium real exchange rate appreciation.

In sum, the previous seven chapters, taken together, produce a picture of remittances that is much more nuanced and complete than is currently obtainable from individual studies of the subject, one that imparts a better understanding of some of the puzzles observed in the data. For example, perhaps the greatest question regarding remittances is why they have not clearly contributed to the economic growth and development of recipient countries despite the large size and persistent nature of remittance flows. Part of the answer is found in the evidence that remittances are compensatory in nature and are simply not intended to be used in ways that directly promote economic growth. Furthermore, the compensatory nature of remittances implies that they may alter work and investment incentives, thereby weakening their potential to increase economic growth. Given this more complete and nuanced view of remittances, it is not surprising that it has been difficult to detect a positive impact of remittances on growth. A second, and more important, benefit of possessing a complete understanding of remittances and their macroeconomic impacts is that this knowledge provides a sound basis for policy advice. The next section takes up the main policy recommendations emanating from this more-nuanced view of remittances.

Policy Implications of Remittances

Unfortunately, the task of policymakers becomes more difficult when the complexities of remittances

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[1]Similarly, the inflow of remittances may finance current account deficits and hence postpone a devaluation of the currency.

are taken into consideration. It is clear that remittances improve the welfare of households that receive them and, as such, should be encouraged (or, at a minimum, remittances policy should be neutral, neither encouraging nor discouraging them). The main challenge, stated in general terms, is to design policies that promote remittances and increase their benefits while limiting or offsetting any counterproductive side effects. There are several ways in which policy can be designed to meet this challenge.

First, with regard to tax policy, remittances should not be taxed directly. Doing so may cause a decline in remittance activity or increase the transaction costs of remitting as some portion of the flow migrates from formal to informal channels. Any reduction in net transfers to recipients reduces remittances' ability to alleviate poverty, causing a large loss in welfare. Instead, the evidence indicates that consumption-based taxation, already a staple in many emerging and developing countries, provides the correct incentive structure for maximizing the benefits of remittances to households while simultaneously permitting the government to finance its budgetary expenditures with the least-distortionary impact on economic activity.[2] An overreliance on labor income taxation may exacerbate the labor-leisure trade-off incentives of remittances and encourage the use of inflation as an indirect tax, which is also distortionary. Remittance-receiving countries that rely too heavily on labor taxes should be advised to shift toward consumption-based tax systems in order to mitigate possible negative effects on economic growth, minimize the level of distortions generated by fiscal and monetary policy, and benefit from any tax-induced increase in investment that may result from the inflow of remittances into the economy.

Second, any loosening of the government budget constraint due to remittances must be used to channel remittances into activities that promote long-run economic development while preserving their poverty-reducing effects in the short run. It is not obvious that these two objectives are compatible, and indeed they may not be, if measures to divert remittance flows to specific productive uses significantly reduce the amount of remittance flows allocated to the alleviation of poverty. Nevertheless, poverty alleviation and growth promotion can be complementary to the extent that growth promotion involves public expenditure. This is an example of the constructive use of the fiscal space referred to in the previous section.

One way that governments can use public expenditure to enhance remittances' development impact is to improve public infrastructure, both physical infrastructure and public institutions as well. This policy recommendation lends support to the emphasis on institutional reform in Sing and others (2005) and Krueger (2004) and echoes the rest of the migration and development literature, which finds that poor physical infrastructure and poor governance discourage private investment.[3] But the complex nature of remittances lends additional urgency to this argument: the receipt of remittances exacerbates the negative impact of poor infrastructure on investment. Stated in positive rather than negative terms, the more remittances a country receives, the higher the quality of the country's public infrastructure must be in order to induce a given amount of investment from individuals. In short, the receipt of remittances raises the hurdle that governments must overcome in order to facilitate growth. Using improvements in public infrastructure and institutions to increase the return to private investment is crucial in light of the difficulty in finding a robust positive effect of workers' remittances on economic growth.

However, remittances may pose a moral hazard problem by reducing the political will to enact policy reform. Remittances that insure the public against adverse economic shocks, including those caused by poor economic policies and poorly performing institutions, may reduce households' incentives to pressure their governments to implement the reforms and improvements necessary to facilitate economic growth. At the same time, the receipt of remittances loosens fiscal constraints on governments, putting off any day of reckoning instigated by a faulty policy stance. In other words, remittance flows act as a buffer between households and the governments that serve them, creating the potential for a negative political economy effect. Remittances can therefore delay needed upgrades to public infrastructure by reducing both public demand for them and the likelihood of a crisis that will make such reforms necessary.

In the extreme case,[4] remittance-dependent countries could become mired in a "remittances trap" of the following sort. The households in a particular country receive a significant quantity of remittances, which lifts most of them up to an acceptable standard of living. Private investment in the country is low because of poor investment opportunities due to low-quality physical infrastructure and missing or malfunctioning institutions, so economic growth in the country is also low. The country's government spends its revenues on nonproductive consumption (perhaps patronage) and maintains a high debt-to-GDP ratio, which is financed at a high interest rate, either domestically or through external debt. Individuals who are frustrated with the

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[2]Care must be taken when implementing consumption taxes to exempt basic necessities such as food and clothing, in order to avoid adverse effects on poverty alleviation.

[3]See Acemoglu, Johnson, and Robinson (2001) and Easterly and Levine (2003) for additional support on the role of institutions in promoting economic performance.

[4]This does not describe any particular remittance-receiving country.

lack of opportunities at home migrate, rather than becoming politically active, and send remittances back to support those who stay behind. Those who remain also lack the incentive to put pressure on the government to reform, because remittances partly compensate them for the negative consequences of the government policy. Therefore, the country persists in a state characterized by low growth, poor economic policy, and high remittances.

Thus a third and broader policy recommendation arising from the political economy effects of remittances is that outside engagement may be required to prompt governments to undertake needed reforms when a country receives a significant inflow of remittances. In particular, international institutions have an important role to play in convincing remittance-receiving countries to undertake or accelerate necessary reforms. Currently, a review of governance and institutional quality is routinely undertaken as a part of IMF Article IV consultations. The incentive effects of remittance flows suggest that such reviews are of particular importance in remittance-receiving economies.

A final, and correlated, lesson to take away is that a one-size-fits-all reform strategy to promote growth and development is likely to be counterproductive. Instead, a nuanced approach to reform that differentiates among countries based on their reliance on remittances will likely be more successful in achieving its targets. This recommendation echoes those of the World Bank (2005), Hausmann, Rodrik, and Velasco (2005), and Rodrik (2006), who argue that growth and development strategies should involve a combination of diagnosis and policy design tailored to alleviate the most significant constraints on growth across countries. In countries that receive remittances, the constraints on growth will likely require a different policy reform package than in countries that do not receive such flows. A complete understanding of how remittances affect the macroeconomy will allow for a tailoring of policy recommendations to preserve the positive benefits of remittances while minimizing their negatives.

Getting these policy prescriptions correct is imperative, since labor migration and remittances have a long history, and it is doubtless that such activity will continue throughout the world well into the future. Globalization and the aging of some developed economy populations will ensure that demand for migrant workers remains robust for years to come. Hence, the volume of workers' remittances is likely to continue to grow, and with it, the challenge of unlocking the maximum societal benefit from these transfers.

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