3

REMITTANCES AND POVERTY IN MIGRANTS' HOME AREAS: EVIDENCE FROM THE PHILIPPINES

Dean Yang and Claudia A. Martínez

Introduction

Between 1965 and 2000, individuals living outside their countries of birth grew from 2.2 percent to 2.9 percent of world population, reaching a total of 175 million people in 2001.[1] The remittances that these migrants send to origin countries are an important but poorly understood type of international financial flow. In 2002, remittance receipts of developing countries amounted to $79 billion.[2] This figure exceeded total official development aid ($51 billion), and amounted to roughly four-tenths of foreign direct investment inflows ($189 billion) received by developing countries in that year.[3]

What effect do remittance flows have on poverty and inequality in migrants' origin households, and in their home areas more broadly? The answer to this question is central to any assessment of the effect of international migration on origin countries,[4] and of the benefits to origin countries of developed-country policies liberalizing inward migration—for example, as proposed in Rodrik (2002) and Bhagwati (2003). Remittance flows have their most direct effect on incomes in migrants' origin households. More generally, remittances may have broader effects on economic activity in migrants' home areas, leading to changes in poverty and inequality even in households without migrant members. In addition, remittance inflows to certain regions may reduce poverty more broadly if remittance-receiving households make direct transfers to nonrecipient households.

A major obstacle to examining the causal impact of remittance flows on aggregate poverty and inequality is the fact that remittances are not randomly assigned across areas, so that any observed relationship between remittances and

an aggregate outcome of interest may not reflect the causal impact of remittances. Reverse causation is a serious concern. For example, if remittances serve as insurance for recipient households, worsening economic conditions could lead to increases in remittance flows (as documented in Yang and Choi 2005), leading to a positive relationship between poverty and remittances. Omitted variables could also be at work. For instance, sound macroeconomic policies could lead to reductions in poverty and simultaneously attract remittances intended for investment in the local economy, so that poverty and remittances would be negatively correlated.

This chapter exploits a unique natural experiment that helps identify the causal impact of remittances on poverty in migrants' origin households and, more broadly, in remittance-receiving areas. In identifying the causal impact of remittances, it is useful to have a source of random or arbitrary variation in remittance flows to more readily put aside concerns about reverse causation and omitted variables. In June 1997, 6 percent of Philippine households had one or more members working overseas. These overseas members were working in dozens of foreign countries, many of which experienced sudden changes in exchange rates because of the 1997 Asian financial crisis. Crucially for the empirical analysis, there was substantial variation in the size of the exchange rate shock experienced by migrants. Between July 1997 and October 1998, the U.S. dollar and currencies in the Middle Eastern destinations of Filipino workers rose 52 percent in value against the Philippine peso. Over the same time period, by contrast, the currencies of Taiwan (China), Singapore, and Japan rose by only 26 percent, 29 percent, and 32 percent, while those of Malaysia and Republic of Korea actually fell slightly against the peso.[5]

These sudden and heterogeneous changes in the exchange rates faced by migrants allow us to estimate the causal impact of the shocks on remittances, household income, and poverty in the migrants' origin households. Appreciation of a migrant's currency against the Philippine peso leads to increases in household remittance receipts and in total household income. In migrants' origin households, a 10 percent improvement in the exchange rate leads to a 0.6 percentage point decline in the poverty rate. The instrumental variables estimate indicates that an increase in migrant households' remittance receipts equivalent to 10 percent of precrisis household income reduces the poverty rate among such households by 2.8 percentage points.

In addition, different regions within the Philippines sent migrants to somewhat different overseas locations, so that the *mean* exchange rate shock experienced by a region's migrants also varied considerably across the country. For example, the mean exchange rate shock faced by migrants from Northern Mindanao was 34 percent, while the mean shock for migrants from the Cordillera Administrative Region was 46 percent, and the average across all migrants in the

country was 41 percent. To understand the regional impact of aggregate remittance flows to certain regions, we ask how changes in the mean exchange rate shock influence changes in region-level poverty and inequality. We find evidence of favorable spillovers to households without migrant members. In regions with more favorable mean exchange rate shocks, aggregate poverty rates decline. However, there is no strong evidence that the region-level mean exchange rate shock affects measures of aggregate inequality. This aggregate decline in poverty may be due to increases in economic activity driven by remittance flows, as well as by direct transfers from migrants' origin households to households that do not have migrant members.

The results in this chapter relate to the immediate impact of changes in remittances (driven by exchange rate changes) on poverty in migrants' origin households and home areas. In addition, the changes in exchange rates could also have more persistent effects on households, if their newfound resources allowed them to make longer-term investments in child human capital and in entrepreneurial enterprises (that outlast the exchange rate shocks or the length of migrant members' overseas stays). Yang (2004) examines this issue in detail, finding that favorable exchange rate shocks lead to greater child schooling, reduced child labor, and increased education expenditure in migrants' origin households. Favorable exchange rate shocks raise hours worked in self-employment and lead to greater entry into relatively capital-intensive enterprises by migrants' origin households. At the end of the empirical section below, we provide a summary of the results in Yang (2004).

This chapter is related to an existing body of research on the impact of migration and remittances on aggregate economic outcomes (such as poverty and inequality) in migrants' origin areas. One approach used in previous research has been to compare the actual income distribution (including remittances) with the income distribution when remittances are subtracted from household income. The difference is then interpreted as the impact of remittances.[6] Such an approach assumes that domestic nonremittance income is invariant with respect to remittance receipts and thus is likely to yield biased estimates of the impact of remittances. With this concern in mind, other research constructs counterfactual measures of poverty and income distribution based on predicting the income of remittance recipients in the absence of remittances.[7] In contrast to existing work on the topic, we believe this is the first study to examine the impact of remittances on poverty and inequality in migrants' home areas using exogenous variation in an important determinant of remittances (exchange rates in migrants' overseas locations).

This chapter is organized as follows. The first section describes the dispersion of Filipino household members overseas and discusses the nature of the exchange

rate shocks at the household and regional levels. The second section describes the data used and presents the empirical results. The third section concludes the findings. Further details on the household data sets are provided in annex 3.A.

Overseas Filipinos: Characteristics and Exposure to Shocks

Characteristics of Overseas Filipinos

To ameliorate rising unemployment and aggregate balance of payments problems, in 1974 the Philippine government initiated an Overseas Employment Program to facilitate the placement of Filipino workers in overseas jobs. At the outset, the government directly managed the placement of workers with employers overseas, but it soon yielded the function to private recruitment agencies and assumed a more limited oversight role. The annual number of Filipinos going overseas on officially processed work contracts rose sixfold from 36,035 to 214,590 between 1975 and 1980, and more than tripled again by 1997 to 701,272.[8] Today, the government authorizes some 1,300 private recruitment agencies to place Filipinos in overseas jobs (Diamond 2002). Contracts for most overseas positions typically have an initial duration of two years and usually are open to renewal. For the majority of positions, overseas workers cannot bring family members with them and must go alone.

Data on overseas Filipinos are collected in the Survey on Overseas Filipinos (SOF), which is conducted in October of each year by the National Statistics Office of the Philippines. The SOF asks a nationally representative sample of households in the Philippines about household members who moved overseas within the last five years.

In June 1997 (one month before the Asian financial crisis), 5.9 percent of Philippine households had one or more household members overseas, in a variety of foreign countries. Table 3.1 displays the distribution of household members working overseas by country in June 1997.[9] Filipino workers are remarkably dispersed worldwide. Saudi Arabia is the largest single destination, with 28.4 percent of the total, and Hong Kong (China) comes in second with 11.5 percent. No other destination accounts for more than 10 percent of the total. The only other economies accounting for 6 percent or more are Taiwan (China), Japan, Singapore, and the United States. The top 20 destinations listed in the table account for 91.9 percent of overseas Filipino workers; the remaining 8.1 percent are distributed among 38 other identified countries or have an unspecified location.

TABLE 3.1 Locations of Overseas Workers from Sample Households, June 1997

Location	Number of overseas workers	% of total	Exchange rate shock (June 1997–Oct 1998)
Saudi Arabia	521	28.4%	0.52
Hong Kong, China	210	11.5%	0.52
Taiwan, China	148	8.1%	0.26
Singapore	124	6.8%	0.29
Japan	116	6.3%	0.32
United States	116	6.3%	0.52
Malaysia	65	3.5%	−0.01
Italy	52	2.8%	0.38
Kuwait	51	2.8%	0.50
United Arab Emirates	49	2.7%	0.52
Greece	44	2.4%	0.30
Korea, Rep.	36	2.0%	−0.04
Northern Mariana Islands	30	1.6%	0.52
Canada	29	1.6%	0.42
Brunei	22	1.2%	0.30
United Kingdom	15	0.8%	0.55
Qatar	15	0.8%	0.52
Norway	14	0.8%	0.35
Australia	14	0.8%	0.24
Bahrain	13	0.7%	0.52
Other	148	8.1%	
Total	1,832	100.0%	

Source: Data are from October 1997 Survey on Overseas Filipinos.

Note: "Other" includes 38 additional countries plus a category for "unspecified" (total 58 countries explicitly reported). Overseas workers in table are those in households included in sample for empirical analysis (see Data Appendix for details on sample definition). Exchange rate shock: Change in Philippine pesos per currency unit where overseas worker was located in Jun 1997. Change is average of 12 months leading to Oct 1998 minus average of 12 months leading to Jun 1997, divided by the latter (e.g., 10% increase is 0.1).

Table 3.2 displays summary statistics on the characteristics of overseas Filipino workers in the same survey. In the households included in the empirical analysis, 1,832 workers were overseas in June 1997 (see annex 3.A for details on the construction of the household sample). The overseas workers have a mean age of 34.5 years; 38 percent are single and 53 percent are male. The two largest occupational categories are (a) production and related workers and (b) domestic servants, each

TABLE 3.2 Characteristics of Overseas Workers from Sample Households

	Mean	Standard deviation	10th percentile	Median	90th percentile
Age	34.49	9.00	24.00	33.00	47.00
Marital status is single (indicator)	0.38				
Gender is male (indicator)	0.53				
Occupation (indicators)					
Production and related workers	0.13				
Domestic servants	0.31				
Ship's officers and crew	0.12				
Professional and technical workers	0.11				
Clerical and related workers	0.04				
Other services	0.10				
Other	0.01				
Highest education level (indictors)					
Less than high school	0.15				
High school	0.25				
Some college	0.31				
College or more	0.30				
Postition in household (indicators)					
Male head of household	0.28				
Female head or spouse of head	0.12				
Daughter of head	0.28				
Son of head	0.15				
Other relation to head	0.16				
Months overseas as of Jun 1997 (indicators)					
0–11 months	0.30				
12–23 months	0.24				
24–35 months	0.16				
36–47 months	0.15				
48 months or more	0.16				
Number of individuals	1,832				

Source: October 1997 Survey on Overseas Filipinos, National Statistics Office of the Philippines.

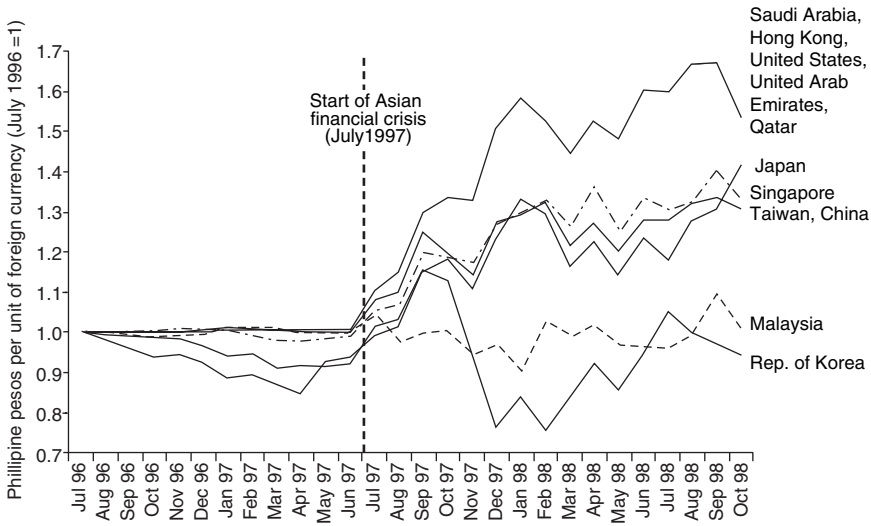
Note: "Other" occupational category includes "administrative, executive, and managerial workers" and "agricultural workers." Overseas workers in table are those in households included in sample for empirical analysis (see Data Appendix for details on sample definition).

accounting for 31 percent of the total. Thirty-one percent of overseas workers in the sample have achieved some college education, and an additional 30 percent have a college degree. In terms of position in the household, the most common categories are male heads-of-household and daughters of household heads, each accounting for 28 percent of overseas workers. Sons of household heads account for 15 percent, female household heads or spouses of household heads account for 12 percent, and other relations account for 16 percent of overseas workers. As of June 1997, the bulk of overseas workers had been away for relatively short periods: 30 percent had been overseas for just 0–11 months, 24 percent for 12–23 months, 16 percent for 24–35 months, 15 percent for 36–47 months, and 16 percent for 48 months or more.

Shocks Generated by the Asian Financial Crisis

The geographic dispersion of overseas Filipinos meant that there was considerable variety in the exchange rate shocks they experienced in the wake of the Asian financial crisis, starting in July 1997. The devaluation of the Thai baht in that

FIGURE 3.1 Exchange Rates in Selected Locations of Overseas Filipinos, July 1996 to October 1998 (Philippine pesos per unit of foreign currency, normalized to 1 in July 1996)



Source: Bloomberg L.P.
Note: Exchange rates are as of last day of each month.

month set off a wave of speculative attacks on national currencies, primarily (but not exclusively) in East and Southeast Asia.

Figure 3.1 displays monthly exchange rates for selected major locations of overseas Filipinos (expressed in Philippine pesos per unit of foreign currency, normalized to 1 in July 1996). [10] The sharp trend shift for nearly all countries after July 1997 is the most striking feature of this graph. An increase in a particular country's exchange rate should be considered a favorable shock to an overseas household member in that country: each unit of foreign currency earned would convert to more Philippine pesos once remitted.

For each country *j*, we construct the exchange rate change between the average level during October 1997–September 1998 and the average level during July 1997–June 1996: following measure of the exchange rate change.

$$\text{ERCHANGE}_j = \frac{Averagecountryjexchangeratefrom Oct.1997 to Sep.1998}{Averagecountryjexchangeratefrom Jul.1996 to Jun.1997} - 1. \quad (3.1)$$

A 50 percent improvement would be expressed as 0.5, a 50 percent decline as −0.5. Exchange rate changes for the 20 major destinations of Filipino workers are listed in the third column of table 3.1. The changes for the major Middle Eastern destinations and the United States were all at least 0.50. By contrast, the exchange rate shocks for Taiwan (China), Singapore, and Japan were 0.26, 0.29, and 0.32, respectively, while those for Malaysia and Korea were negative: −0.01 and −0.04, respectively. Workers in Indonesia experienced the worst exchange rate change (−0.54), while workers in Libya experienced the most favorable change (0.57) (not shown in table).

Household-level exchange rate shock

We construct a household-level exchange rate shock variable as follows. Let the countries in the world where overseas Filipinos work be indexed by $j\varepsilon\{1,2,...,J\}$. Let n_{ij} indicate the number of overseas workers a household i has in a particular country j in June 1997 (so that $\sum_{j=1}^{J} n_{ij}$ is its total number of household workers overseas in that month). The exchange rate shock measure for household i is as follows.

$$\text{ERSHOCK}_i = \frac{\sum_{j=1}^{J} n_{ij}\,\text{ERCHANGE}_j}{\sum_{j=1}^{J} n_{ij}} \quad (3.2)$$

In other words, for a household with just one worker overseas in a country j in June 1997, the exchange rate shock associated with that household is simply ERCHANGE_j. For households with workers in more than one foreign country in June 1997, the exchange rate shock associated with that household is the weighted average exchange rate change across those countries, with each country's exchange rate being weighted by the number of household workers in that country.[11] Because this variable is undefined for households without overseas migrants, when examining the impact of ERSHOCK_i, we restrict the sample to households with one or more members working overseas one month before the Asian financial crisis (in June 1997). To eliminate concerns about reverse causation, it is crucial that ERSHOCK_i is defined solely on the basis of migrants' locations before the crisis. For example, households experiencing positive shocks to their Philippine income source might be better positioned to send members to work in places that experienced better exchange rate shocks.

Region-level exchange rate shock. For analysis of poverty in nonmigrant households, and of inequality across all households, we calculate the mean exchange rate shock across migrants within 16 geographic regions of the Philippines.[12] This measure varies across regions because of regional differences in the locations of overseas workers.

For Philippine region k, the region-level migrant exchange rate shock is as follows.

$$\text{REGSHOCK}_k = \frac{\sum_{j=1}^{J} N_{kj}\,\text{ERCHANGE}_j}{\sum_{j=1}^{J} N_{kj}} \tag{3.3}$$

As before, countries in the world where overseas Filipinos work are indexed by $j\varepsilon\{1,2,...,J\}$, and ERCHANGE_j is the exchange rate shock for a migrant in country j as defined in equation 3.1 above. N_{kj} is the number of overseas workers a region k has in a particular country j in June 1997 (so that $\sum_{j=1}^{J} N_{kj}$ is the total number of the region's workers overseas in that month). As with the household-level shock measure, it is important that REGSHOCK_k is defined solely on the basis of migrants' locations before the crisis.

Across regions in the Philippines, REGSHOCK_k has a mean of 0.40 and a standard deviation of 0.03. The lowest value of REGSHOCK_k is 0.34 (Northern Mindanao) and the highest value is 0.46 (Cordillera Administrative Region).

Empirical Analysis

In this section, we first describe the data and sample construction and the characteristics of sample households. We then discuss the regression specification and various empirical issues, and present estimates of the impact of exchange rate shocks on poverty and inequality. At the end of the empirical section, we summarize related results (from Yang 2004) on the impact of the exchange rate shocks on human capital investment and entrepreneurial activity in these same households.

Data

Household surveys. The empirical analysis uses data from a set of linked household surveys conducted by the National Statistics Office of the Philippine government, covering a nationally representative household sample: the Labor Force Survey (LFS), the Survey on Overseas Filipinos (SOF), the Family Income and Expenditure Survey (FIES), and the Annual Poverty Indicators Survey (APIS).

The LFS is administered quarterly to inhabitants of a rotating panel of dwellings in January, April, July, and October; the other three surveys are administered less often as riders to the LFS. Usually, one-fourth of dwellings are rotated out of the sample in each quarter, but the rotation was postponed for five quarters starting in July 1997. Thus, three-quarters of dwellings included in the July 1997 round were still in the sample in October 1998 (one-fourth of the dwellings had just been rotated out of the sample). The analysis of this study takes advantage of this fortuitous postponement of the rotation schedule to examine changes in households over the 15-month period from July 1997 to October 1998.

Survey enumerators note whether the household currently living in the dwelling is the same as the household surveyed in the previous round; only dwellings inhabited continuously by the same household from July 1997 to October 1998 are included in the sample for analysis. Because the exchange rate shocks are likely to have different effects on households depending on whether they have migrant members, we separately analyzed households that reported having one or more members overseas in June 1997 and households that did not report having migrant members in that month.

Before being used as dependent variables, all variables denominated in currency terms are converted into real 1997 terms using the 1997–98 change in the regional consumer price index. See annex 3.A for other details regarding the contents of the household surveys and the construction of the sample for analysis.

Poverty statistics. Poverty variables take household per capita income as the basis, where overseas household members are not included in the per capita income calculations. However, remittances received from the overseas members

are included in household income. This procedure acknowledges the lack of information on the earnings of overseas migrants and is consistent with that used in constructing the Philippine government's poverty statistics (Virola and others 2005). To construct poverty measures, we used poverty lines for 1997 and 1998, by locality, from the Philippine government's National Statistical Coordination Board (NSCB).[13]

The empirical analysis focuses on three poverty measures. First, a *poverty indicator* for household i in period t, POV_{it}.

$$\text{POV}_{it} = \begin{cases} 1 \text{ if } Y_{it} < \tilde{Y}_{it} \\ 0 \text{ otherwise} \end{cases} \tag{3.4}$$

where Y_{it} is household per capita income, and Y_{it} is the per capita poverty line for household i and period t. The second poverty measure is the *poverty gap*, expressed in pesos.

$$\text{POVGAP}_{it} = \begin{cases} \tilde{Y}_{it} - Y_{it} \text{ if } Y_{it} < \tilde{Y}_{it} \\ 0 \text{ otherwise} \end{cases} \tag{3.5}$$

The third poverty measure is the *poverty gap (as fraction of the poverty line)*, expressed in pesos.

$$\text{POVGAPFR}_{it} = \begin{cases} \dfrac{\tilde{Y}_{it} - Y_{it}}{Y_{it}} \text{ if } Y_{it} < \tilde{Y}_{it} \\ 0 \text{ otherwise} \end{cases} \tag{3.6}$$

The poverty indicator provides information on the incidence of poverty in particular households. Conversely, the measures for poverty gap provide information on the depth of poverty.

Rainfall shocks. A number of the analyses in this study examine the impact of region-level exchange rate shocks, and so it is crucial to control for the impact of other types of region-level shocks on poverty and inequality that might be correlated (coincidentally) with the region-level exchange rate shocks. Reflecting the central role of agriculture in the Philippine economy, important regional economic fluctuations derive from rainfall variation (as documented in Yang and Choi 2005).

To construct measures of rainfall shocks, we use rainfall data obtained from the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA). Daily rainfall data are available for 47 weather stations, often as far back as 1951. Rainfall variables are constructed by station separately for the two

distinct weather seasons in the Philippines: the dry season from December through May, and the wet season from June through November. Monthly rainfall is calculated by summing daily rainfall totals, with daily missing values replaced by the average among the nonmissing daily totals in the given station-month, as long as the station had 20 or more daily rainfall records. When a particular station-month had less than 20 daily rainfall records, monthly rainfall for the station is taken as the monthly rainfall recorded at the nearest station with 20 or more daily rainfall records. Seasonal total rainfall for each station in each year is obtained by summing monthly rainfall for the respective months in each wet or dry season (December observations are considered to belong to the subsequent calendar year's dry season).

Households are assigned the rainfall data for the weather station geographically closest to their local area (specifically, the major city or town in their survey domain), using great circle distances calculated using latitude and longitude coordinates. Because some stations are never the closest station to a particular survey domain, the number of stations that ultimately are represented in the empirical analysis is 38.

Rainfall shock variables are then constructed as the change in rainfall between the two years relevant for household incomes in the survey reporting periods. The rainfall taken to be relevant for income in January through June 1997 (the first observation for each household) is in the wet and dry seasons of 1996, while the rainfall taken to matter for income in April through September 1998 (the second observation for each household) is in the wet and dry seasons of 1997. So the wet (dry) rainfall shock variables will be rainfall in the wet (dry) season of 1997 minus rainfall in the wet (dry) season of 1996. Yang and Choi (2005) document that these rainfall shock variables are strongly correlated with changes in income across localities in the Philippines during this same time period and using these same household data.

Characteristics of Sample Households.

Tables 3.3 and 3.4 present descriptive statistics for the households used in the empirical analysis, separately for migrant households (table 3.3, N=1,646) and nonmigrant households (table 3.4, N=26,121). Migrant households are those with at least one member working overseas in June 1997 and nonmigrant households account for all others.

The top row of each table displays summary statistics for the relevant exchange rate shock. For migrant households, the shock is at the household level, and it has a mean of 0.41 and a standard deviation of 0.16. For nonmigrant households, the shock is at the regional level, and it also has a mean of 0.41. The cross-regional

variation in the size of the shock is substantially smaller than the overall variation, so the region-level exchange rate shock has a standard deviation of only 0.03.

In migrant households, the mean number of overseas workers in June 1997 was 1.11, mean remittance receipts were 36,194 pesos ($1,392) in January through June 1997, and the mean of remittances as a share of household income was 0.40. Nonmigrant households by definition have no members overseas initially. As a result, they also have substantially smaller remittances, with a mean of 1,889 pesos ($73), amounting to 2 percent of household income on average in January through June 1997.

Migrant households tend to be wealthier than other Philippine households in terms of their initial (January through June 1997) per capita income. Fifty-one percent of migrant households are in the top quartile of the national household income per capita distribution, and 28 percent are in the next-highest quartile. Nine percent of migrant households are below the poverty line, and the poverty gap (as fraction of the poverty line) has a mean of 0.02. Mean precrisis income per capita in migrant households is 20,235 pesos ($778).[14] By contrast, nonmigrant households are fairly evenly split across income quartiles and have a mean per capita income of 11,857 ($456). They have higher poverty rates (31 percent) and a higher mean poverty gap (as a fraction of the poverty line) of 0.10.

In terms of gift-giving,[15] migrant households do not appear to be dramatically different from other households: mean gifts to other households are 527 pesos ($20) and 406 pesos ($16), respectively, from January through June 1997. Gifts received do tend to be somewhat higher for migrant households, so that net gifts (gifts given minus gifts received) are more negative for migrant households.

Education levels and occupational groups of migrant household heads also indicate higher socioeconomic status. Thirty percent of migrant household heads have some college or more education, compared with just 20 percent of nonmigrant household heads. Twenty-three percent of migrant household heads work in agriculture, compared with 38 percent in all other households. In addition, 68 percent of migrant households are urban, compared with 58 percent of nonmigrant households.

Regression Specification

We are interested in the impact of migrants' exchange rate shocks on poverty in migrant households and, more broadly, in other (nonmigrant) households. For a migrant household, the shock in question is the household-level migrant exchange rate shock, ERSHOCK_{it}, as defined in equation 3.2. For a nonmigrant household, the shock is the region-level migrant exchange rate shock, REGSHOCK_{kt}, defined in equation 3.3.

TABLE 3.3 Descriptive Statistics for Households *with* Overseas Migrants

	Mean	Standard deviation	10th percentile	Median	90th percentile
Num. of observations: 1,646					
Exchange rate shock	0.41	0.16	0.26	0.52	0.52
Household financial statistics (Jan-Jun 1997)					
Total expenditures	73,596	66,529	24,600	57,544	132,793
Total income	94,272	92,826	28,093	70,906	175,000
Income per capita in household	20,235	21,403	5,510	15,236	39,212
Gifts to other households (a)	527	1,673	0	100	1,100
Gifts received (b)	4,000	25,934	0	613	9,380
Net gifts (a − b)	−3,474	25,950	−9,080	−340	480
Remittance receipts	36,194	46,836	0	26,000	87,500
Remittance receipts (as share of hh income)	0.40	0.31	0.00	0.37	0.85
Number of HH members working overseas in Jun 1997	1.11	0.36	1	1	1
HH size (including overseas members, Jul 1997)	6.16	2.42	3	6	9
Located in urban area	0.68				
HH position in national income per capita distribution, Jan–Jun 1997 (indicators)					
Top quartile	0.51				
3rd quartile	0.28				
2nd quartile	0.14				
Bottom quartile	0.07				
Poverty (based in Jan–Jun 1997 HH per capita income)					
Poverty indicator	0.09				
Poverty gap (pesos)	1,671	7,152	0	0	0
Poverty gap (fraction of poverty line)	0.02	0.09	0.00	0.00	0.00

Household head characteristics (Jul 1997):					
Age	49.9	13.9	32	50	68
Highest education level (indicators)					
Less than elementary	0.17				
Elementary	0.20				
Some high school	0.10				
High school	0.22				
Some college	0.16				
College or more	0.14				
Occupation (indicators)					
Agriculture	0.23				
Professional job	0.08				
Clerical job	0.13				
Service job	0.05				
Production job	0.14				
Other	0.38				
Does not work	0.00				
Marital status is single (indicator)	0.03				

Source: National Statistics Office, the Philippines.

Note: Surveys used: Labor Force Survey (Jul 1997 and Oct 1998), Survey on Overseas Filipinos (Oct 1997 and Oct 1998), 1997 Family Income and Expenditures Survey (for Jan-Jun 1997 income and expenditures), and 1998 Annual Poverty Indicators Survey (for Apr-Sep 1998 income and expenditures). Currency unit: Expenditure, income, and cash receipts from abroad are in Philippine pesos (26 per US$ in Jan–Jun 1997). Definition of exchange rate shock: Change in Philippine pesos per currency unit where overseas worker was located in Jun 1997. Change is average of 12 months leading to Oct 1998 minus average of 12 months leading to Jun 1997, divided by the latter (e.g., 10% increase is 0.1). If household has more than one overseas worker in Jun 1997, exchange rate shock variable is average change in exchange rate across household's overseas workers. (Exchange rate data are from Bloomberg L.P.) Sample: Households with a member working overseas in Jun 1997 (according to Oct 1997 Survey of Overseas Filipinos) and that also appear in 1998 Annual Poverty Indicators Survey, and excluding households with incomplete data (see Data Appendix for details).

TABLE 3.4 Descriptive Statistics for Households *without* Overseas Migrants

	Mean	Standard deviation	10th percentile	Median	90th percentile
Num. of observations 26,121					
Region-level exchange rate shock	0.41	0.03	0.35	0.41	0.43
Household financial statistics (Jan–Jun 1997)					
Total expenditures	47,436	54,156	13,657	32,495	93,493
Total income	56,053	77,659	13,516	35,909	113,452
Income per capita in household	11,857	15,115	2,864	7,625	24,100
Gifts to other households (a)	406	3,471	0	25	680
Gifts received (b)	1,609	7,192	0	276	3,718
Net gifts (a - b)	−1,202	7,793	−3,364	−150	290
Remittance receipts	1,889	13,183	0	0	0
Remittance receipts (as share of hh income)	0.02	0.10	0.00	0.00	0.00
Number of HH members working overseas in Jun 1997	0.00	0.00	0	0	0
HH size (including overseas members, Jul 1997)	5.23	2.26	3	5	8
Located in urban area	0.58				
HH position in national income per capita distribution, Jan–Jun 1997 (indicators)					
Top quartile	0.23				
3rd quartile	0.25				
2nd quartile	0.26				
Bottom quartile	0.26				
Poverty (based in Jan–Jun 1997 HH per capita income)					
Poverty indicator	0.31				
Poverty gap (pesos)	6,188	13,054	0	0	24,082
Poverty gap (fraction of poverty line)	0.10	0.18	0.00	0.00	0.41

Household head characteristics (Jul 1997):					
Age	46.7	14.1	30	45	67
Highest education level (indicators)					
Less than elementary	0.28				
Elementary	0.22				
Some high school	0.11				
High school	0.18				
Some college	0.11				
College or more	0.09				
Occupation (indicators)					
Agriculture	0.38				
Professional job	0.06				
Clerical job	0.11				
Service job	0.07				
Production job	0.26				
Other	0.12				
Does not work	0.00				
Marital status is single (indicator)	0.03				

Source: National Statistics Office, the Philippines.

Note: Surveys used: Labor Force Survey (Jul 1997 and Oct 1998), Survey on Overseas Filipinos (Oct 1997 and Oct 1998), 1997 Family Income and Expenditures Survey (for Jan–Jun 1997 income and expenditures), and 1998 Annual Poverty Indicators Survey (for Apr–Sep 1998 income and expenditures). Currency unit: Expenditure, income, and cash receipts from abroad are in Philippine pesos (26 per US$ in Jan–Jun 1997). Definition of region-level exchange rate shock: mean (within one of 16 regions) of migrant households' exchange rate shocks (see previous table). Sample: Households without a member working overseas in Jun 1997 (according to Oct 1997 Survey of Overseas Filipinos) and that also appear in 1998 Annual Poverty Indicators Survey, and excluding households with incomplete data (see Data Appendix for details).

The regression equation for migrant and nonmigrant households will be similar, with the only difference being in the shock variable. Each household in the data set is observed twice, so the analysis asks how changes in outcome variables between 1997 and 1998 are affected by intervening shocks. A first-differenced regression specification is therefore natural for a household i in region k and time period t.

$$\Delta Y_{ikt} = \beta_0 + \beta_1 \text{SHOCK}_{ik} + \varepsilon_{ikt} \tag{3.7}$$

For household i, ΔY_{ikt} is the change in an outcome of interest (such as the poverty indicator or remittance receipts). SHOCK_{ik} is the relevant exchange rate shock for household i in region k (either ERSHOCK_i or REGSHOCK_k). First-differencing of household-level variables is equivalent to the inclusion of household fixed effects in a levels regression, so that estimates are purged of time-invariant differences across households in the outcome variables. ε_{ikt} is a mean-zero error term.

The constant term, β_0, accounts for the average change in outcomes across all households. This is equivalent to including a year fixed effect in a regression where outcome variables are expressed in levels (not changes). It also accounts for the shared impact across households of the decline in Philippine economic growth after the onset of the crisis (and any other change between 1997 and 1998 common to all households).[16]

The coefficient of interest is β_1, the impact of a unit change in the exchange rate shock on the outcome variable. The identification assumption is that if the exchange rate shocks faced by households had all been of the same magnitude (instead of varying in size), then changes in outcomes would not have varied systematically across households on the basis of their overseas workers' locations.

While this parallel-trend identification assumption is not possible to test directly, a partial test is possible. An important type of violation of the parallel-trend assumption occurs (a) if households with migrants in countries with more favorable shocks vary along certain precrisis characteristics from households whose migrants had less favorable shocks, and (b) if changes in outcomes vary according to these same characteristics even in the absence of the migrant shocks. In fact, households experiencing more favorable migrant shocks do differ along a number of precrisis characteristics from households experiencing less favorable shocks. Yang (2004) documents that the household's exchange rate shock can be predicted by a number of preshock characteristics of households and their overseas workers.[17]

Any correlation between precrisis characteristics and the exchange rate shock is only problematic if precrisis characteristics are also associated with differential

changes in outcomes independent of the exchange rate shocks (that is, if precrisis characteristics are correlated with the residual ε_{it} in equation 3.7.

To check whether the regression results are, in fact, contaminated by changes associated with precrisis characteristics, we also present coefficient estimates that include a vector of precrisis household characteristics $\mathbf{X}_{it-1}$ on the right-hand side of the estimating equation.

$$\Delta Y_{ikt} = \beta_0 + \beta_1 (\text{SHOCK}_{ik}) + \delta' (\mathbf{X}_{it-1}) + \varepsilon_{ikt} \tag{3.8}$$

$\mathbf{X}_{it-1}$ includes a range of precrisis household and head-of-household characteristics. Household-level controls are as follows: income variables as reported in January through June 1997 (log of per capita household income; indicators for being in the second, third, and top quartile of the sample distribution of household per capita income), and an indicator for urban location. Other controls include demographic and occupational variables as reported in July 1997: number of household members (including overseas members); five indicators for the household head's highest level of education completed (elementary, some high school, high school, some college, and college or more; less than elementary omitted); the household head's age; an indicator for whether "household head's marital status is single"; and six indicators for the household head's occupation (professional, clerical, service, production, other, not working; agricultural omitted).

It is possible to use more control variables for migrant households than for nonmigrant households. First of all, the exchange rate shock varies within regions for migrant households, so for these households it is possible to include 16 indicators for Philippine regions and their interactions with the indicator for urban location as controls.[18]

In addition, for migrant households, it is possible to control for characteristics of the household's migrants. The migrant controls are means of the following variables across a household's overseas workers who were away in June 1997: indicators for months away as of June 1997 (12–23, 24–35, 36–47, 48 or more; 0–11 omitted); indicators for highest education level completed (high school, some college, college or more; less than high school omitted); occupation indicators (domestic servant, ship's officer or crew, professional, clerical, other service, other occupation; production omitted); relationship to household head indicators (female household head or spouse of household head, daughter, son, other relation; male household head omitted); indicator for single marital status; and age.

Inclusion of the vector $\mathbf{X}_{it-1}$ controls for changes in outcome variables related to households' precrisis characteristics. Examining whether coefficient estimates on the exchange rate shock variable change when the precrisis household characteristics are included in the regression can shed light on whether changes in the

outcome variables related to these characteristics are correlated with households' exchange rate shocks, constituting a partial test of the parallel-trend identification assumption.

In addition, to the extent that $\mathbf{X}_{it-1}$ includes variables that explain changes in outcomes but that are themselves uncorrelated with the exchange rate shocks, their inclusion can reduce residual variation and lead to more precise coefficient estimates. Therefore, in most results tables, we present regression results without and with the vector of controls for precrisis household characteristics, $\mathbf{X}_{it-1}$ (equations 3.7 and 3.8). As it turns out, for many outcome variables, inclusion of this vector of precrisis characteristics control variables makes the results stronger. It does this by making coefficient estimates higher in absolute value, by reducing standard error estimates, or both.

A final identification worry might be that the coefficient β_1 is biased because of a correlation between SHOCK_{ik} and changes in other time-varying characteristics of regions. Of particular concern is the variation in local-level rainfall driven by El Niño (the weather phenomenon), which began in mid-1997 (nearly coincident with the onset of the Asian financial crisis). So we also present regression results that include controls for local-level rainfall shocks in the wet and dry seasons.

Spatial correlation among households sharing similar shocks is likely to bias ordinary least squares (OLS) standard error estimates downward (Moulton 1986). The concern is a correlation among error terms of households experiencing similar exchange rate shocks, so we allow for an arbitrary variance-covariance structure among observations experiencing similar shocks. For the migrant household regressions, standard errors are clustered according to the June 1997 location of the household's overseas worker.[19] For the nonmigrant household regressions, standard errors are clustered at the level of 16 regions (REGSHOCK_i varies at this level).

Regression Results[20]

We now turn to an analysis of the impact of the migrant exchange rate shocks on migrant households and nonmigrant households.

Impact on migrant households. It is natural to examine the reduced-form impact of household-level migrant exchange rate shocks (ERSHOCK_i) on poverty and other outcomes within the migrants' origin households. At the end of this section, we will turn to instrumental variables estimates of the impact of remittances on poverty, using the exchange rate shock as an instrument.

Table 3.5 presents descriptive statistics and reduced-form regression results for migrant households. The first two columns provide descriptive statistics for the

initial (January through June 1997) values of the outcome variables and the change in these variables from 1997 to 1998. Regression column 1 provides coefficient estimates (standard errors in parentheses) on $ERSHOCK_i$ from estimation of equation 3.7 via OLS. Regression column 2 estimates equation 3.8, including controls for household and migrant characteristics before the Asian financial crisis. Regression column 3 augments equation 3.8 with controls for the wet and dry season rainfall shocks, to help control for bias caused by any correlation between local rainfall shocks and migrant exchange rate shocks.

Panel A of the table presents results for the three poverty measures. The initial (January through June 1997) mean of the poverty indicator represents the poverty rate among migrant households in the initial period, 0.09. Analogously, the mean change in the poverty indicator is the change in the poverty rate among these households: at 0.041, this a substantial increase in the poverty rate from its initial level.

The coefficient estimates on the exchange rate shock in regression columns 1 through 3 indicate that improvements in the exchange rates faced by a household's migrants lead to reductions in the incidence of household poverty: coefficient estimates in all three columns are negative. Inclusion of controls for initial household and migrant characteristics (column 2) and for local rainfall shocks (column 3) has little impact on the estimates: the coefficient in column 3 is −0.060, while the coefficient estimate in column 1 is −0.061.

The coefficient estimates in columns 1 and 3 are statistically significant at the 10 percent level. The coefficient estimate in column 3 (−0.060) indicates that a one-standard-deviation increase in the size of the exchange rate shock (0.16, a favorable change) leads to a 1 percentage point decline in the likelihood a household is in poverty. This is a large effect, relative to the mean change in poverty incidence over the time period (4.1 percentage points) and the initial poverty rate at the start of the period (9 percent).

Consistent with the negative impact on the incidence of poverty, the exchange rate shocks are also associated with reductions in the two poverty gap measures (second and third rows of panel A): coefficient estimates for those outcomes are all negative in sign, large in magnitude, and stable in the face of the inclusion of additional control variables. However, these coefficients are also imprecisely estimated, and this should only be taken as suggestive evidence that exchange rate shocks also reduce the depth of poverty in migrant households.

How do these reductions in poverty come about? Panel B examines the impact of exchange rate shocks on two likely channels through which the shocks affect household poverty. The first row presents results for which the outcome variable is the change in remittance receipts (expressed as a fraction of initial household income).[21] The initial (January through June 1997) mean of this outcome variable

TABLE 3.5 Impact of Migrant Exchange Rate Shocks, 1997–8

	Initial mean of outcome	Mean (std.dev.) of change in outcome	Coefficient on exchange rate shock (OLS)			Coefficient on remittance receipts (IV)
			(1)	(2)	(3)	
Panel A: Poverty measures						
Poverty indicator	0.09	0.041 (0.008)	− 0.061 (0.031)*	−0.054 (0.035)	−0.06 (0.034)*	−0.278 (0.138)**
Poverty gap (pesos)	1,671	1,594 (270)	−1,992 (1,284)	−1,611 (1,490)	−1,853 (1,492)	−8,505 (6,684)
Poverty gap (fraction of poverty line)	0.023	0.018 (0.004)	−0.02 (0.017)	−0.017 (0.018)	−0.02 (0.018)	−0.093 (0.073)
Panel B: Remittances, household income						
Remittance receipts	0.395	0.099 (0.021)	0.152 (0.112)	0.220 (0.079)***	0.218 (0.081)***	
Household income	1.000	0.131 (0.027)	0.232 (0.144)	0.238 (0.114)**	0.236 (0.113)**	1.083 (0.332)***
Panel C: Gifts						
Gifts to other households (a)	0.007	0.001 (0.001)	0.012 (0.004)**	0.01 (0.004)**	0.01 (0.004)**	0.047 (0.021)**
Gifts received (b)	0.046	−0.029 (0.002)	−0.023 (0.010)**	−0.013 (0.014)	−0.012 (0.014)	−0.056 (0.076)
Net gifts (a − b)	−0.039	0.03 (0.003)	0.034 (0.012)***	0.023 (0.016)	0.022 (0.016)	0.103 (0.092)

Specification:						
Region*Urban controls			N	Y	Y	Y
Controls for pre-crisis household and migrant characteristics			N	Y	Y	Y
Rainfall shock controls			N	N	Y	Y
Number of observations in all regressions	1,646					

Notes: Standard errors in parentheses, clustered by location country of household's eldest overseas worker. All dependent variables are first-differenced variables. For remittance and income variables, change is between Jan-Jun 1997 and Apr-Sep 1998 reporting periods, expressed as fraction of initial (Jan-Jun 1997) household income. Poverty variables based on income per capita in household (excluding overseas members), using poverty lines specific to urban and rural areas by province. Gifts changes are between Jan-Jun 1997 and Apr-Sep 1998 reporting periods, expressed as fractions of initial (Jan-Jun 1997) expenditures. (Expenditures are only for current consumption, and do not include purchases of durable goods.) See Table 3.3 for notes on sample definition and definition of exchange rate shock.

Region*Urban controls are 16 indicators for regions within the Philippines and their interactions with an indicator for urban location. Household-level controls are as follows. Income variables as reported in Jan-Jun 1997: log of per capita household income; indicators for being in 2nd, 3rd, and top quartile of sample distribution of household per capita income. Demographic and occupational variables as reported in July 1997: number of household members (including overseas members); five indicators for head's highest level of education completed (elementary, some high school, high school, some college, and college or more; less than elementary omitted); head's age; indicator for "head's marital status is single"; six indicators for head's occupation (professional, clerical, service, production, other, not working; agricultural omitted).

Migrant controls are means of the following variables across HH's overseas workers away in June 1997: indicators for months away (12-23, 24-35, 36-47, 48 or more; 0-11 omitted); indicators for highest education level completed (high school, some college, college or more; less than high school omitted); occupation indicators (domestic servant, ship's officer or crew, professional, clerical, other service, other occupation; production omitted); relationship to HH head indicators (female head or spouse of head, daughter, son, other relation; male head omitted); indicator for single marital status; years of age. Rainfall shocks are changes in wet and dry season rainfall between first and second period.

* significant at 10%; ** significant at 5%; *** significant at 1%

is 0.395. Remittance receipts increased, on average, over the time period: the mean change is 0.099 (or 9.9 percent of initial household income). The coefficient estimates indicate that improvements in the exchange rate faced by migrant household members lead to substantial increases in household remittance receipts. Coefficient estimates become larger in magnitude and achieve statistical significance (at the 1 percent level) upon inclusion of the initial household and migrant characteristics control variables, and are robust to the inclusion of the rainfall shock controls. The coefficient estimate in column 3 indicates that a one-standard-deviation increase in the size of the exchange rate shock (0.16) leads to an increase in remittances amounting to 3.5 percent of initial household income.

Coefficient estimates in regressions where the outcome variable is the change in household income (as a fraction of initial household income) are similar in magnitude and statistical significance to the coefficient estimates for the change in remittances (second row of panel B). This suggests that the increase in household income comes directly as a result of the increase in remittances, rather than via second-order effects on entrepreneurial income (at least over this 15-month time frame).[22]

We are also interested in examining spillovers to nonmigrant households of the shocks experienced in migrant households. One potentially important channel through which migrant households might affect poverty in nonmigrant households is gifts (transfers). Panel C examines the impact of the exchange rate shocks on gift-giving, gift receipt, and net gifts (gifts given minus gifts received), expressed as fractions of initial household expenditures. (The gifts variables do not include remittances.)

The strongest result is for changes in gifts to other households, shown in the first row of panel C. The coefficient on the exchange rate shock is positive and statistically significantly different from zero in all specifications, and is highly robust to the inclusion of control variables and the rainfall shocks. The coefficient in column 3 (0.01) indicates that a one-standard-deviation increase in the size of the exchange rate shock (0.16) leads to an increase in gifts to other households, which amounts to 0.16 percent of initial household expenditures.

The coefficient estimates in regressions where gifts received and net gifts are the dependent variables are in the last two rows, and are consistent with the results for gifts given. Gifts received decline and net gifts rise in households experiencing more favorable migrant exchange rate shocks. That said, the coefficient estimates for these outcome variables are not statistically significantly different from zero when initial household and migrant characteristics control variables are added to the regression (columns 2 and 3). However, the coefficient for net gifts in column 3 is marginally statistically significant, with a t-statistic of 1.39 and a p-value of 0.170.

We now turn to instrumental variables estimates of the impact of remittance receipts on the various outcome variables in table 3.5, in which the exchange rate shock is used as an instrument for remittance receipts. This analysis seems workable, first of all, because the impact of the exchange rate shock on remittance receipts is strong. The F-statistic on the test of the significance of the exchange rate shock in column 3 when remittances are the outcome variable is 7.29 (with a p-value of 0.0092). Equally important, it is plausible that the IV exclusion restriction is satisfied: the impact of the exchange rate shock on the various outcomes can be reasonably assumed to work primarily via the change in remittance receipts.

The results are presented in column 4 of table 3.5, using the most inclusive list of control variables. The first result of interest is simply the impact of instrumented remittances on total household income (second row of panel B). The coefficient of 1.08 is highly statistically significant and essentially indicates a one-for-one effect of remittance receipts on household income.

Turning to the poverty results, the coefficient on the poverty indicator (−0.278) is negative and statistically significant. A 10 percentage point increase in remittance receipts (as a fraction of initial household income) leads to a reduction of 2.8 percentage points in the household's likelihood of being in poverty. The coefficients on the two poverty gap measures also are negative, although neither is statistically significantly different from zero.

Finally, the impact of instrumented remittances on the gifts measures corresponds to the findings in the reduced-form results in columns 1 through 3. There is a positive and statistically significant effect on gifts to other households. A 10 percentage point increase in remittance receipts (as a fraction of initial household income) leads to a 0.5 percentage point increase in gifts to other households. The impact of remittances on gifts received and on net gifts is negative and positive, respectively, but neither of these results are statistically significant.

Impact on nonmigrant households. Did the exchange rate shocks, which lead to increased remittances, higher incomes, and reductions in poverty in migrant households, also have effects on nonmigrant households? Potential channels for any potential spillover effects to nonmigrant households include general increases in economic activity (driven by increased expenditures by migrant households), as well as direct transfers from migrant households to nonmigrant households.

Table 3.6 presents descriptive statistics and regression results for estimates of the impact of region-level migrant exchange rate shocks—REGSHOCK_k, as defined in equation 3.3—on nonmigrant households. The format of the table is identical to the format of table 3.5, except that the shock variable is now REGSHOCK_k instead of ERSHOCK_i.

The three poverty measures (in panel A) indicate increases in poverty in the period following the financial crisis. The initial (January through June 1997) poverty rate among nonmigrant households is 0.307, and this figure increases by 0.102 (roughly one-third) over the study period. Likewise, the measures of the depth of poverty also show substantial increases.

The coefficient estimates for the poverty measures indicate that increases (favorable changes) in the mean exchange rate shock across a region's migrants lead to declines in the incidence and depth of poverty. In the first row of panel A, the coefficient estimates on REGSHOCK_k are all negative, and become more negative and statistically significantly different from zero in the specifications that include initial household controls and the rainfall shocks.[23] In the third row of the panel (where poverty gap as a share of the poverty line is the outcome variable), coefficient estimates on REGSHOCK_k are also negative and again are statistically significantly different from zero in columns 2 and 3. The results for the poverty gap in pesos (second row of panel A) are consistent with the results for the other two poverty outcomes in terms of sign (that is, negative), but for this outcome, the coefficient estimates are not statistically significantly different from zero.

It is also worth noting the robustness of the coefficient estimates to inclusion of the rainfall shocks controls (comparing results in columns 2 and 3). The similarity of coefficient estimates across the two columns suggests that the rainfall shocks and regional exchange rate shocks are not highly correlated, providing little reason to be concerned that the coincidental timing of El Niño with the Asian financial crisis leads to substantial bias.

The size of the estimated impacts on poverty is not extremely large, but neither are they insignificant. The coefficient estimate in column 3 of panel A indicates that a one-standard-deviation increase in the size of the region-level migrant exchange rate shock (0.03) leads to a 1.4 percentage point reduction in the incidence of poverty (compare this with an initial level of 30.7 percent and an aggregate change between 1997 and 1998 of 10.2 percentage points). Such a shock also leads to a modest reduction in the depth of poverty, as measured by the poverty gap as a fraction of the poverty line, of 0.7 percentage points (compared with an initial level of 9.8 percent and a change between 1997 and 1998 of 5.2 percentage points).

The obvious question is how exchange rate shocks in migrant households translate into reductions in poverty in nonmigrant households. Regression estimates in panels B and C attempt to address this question by examining the impact of the region-level migrant exchange rate shocks on changes in remittances, household income, and gifts in nonmigrant households.

The first row of panel B presents results for which the outcome variable is the change in remittance receipts (expressed as a fraction of initial household income).

In households without migrant members, the initial (January through June 1997) mean of this outcome variable is low (0.023). Remittance receipts actually declined on average over the time period, with a mean change of −0.006. The coefficient estimates indicate that improvements in $REGSHOCK_k$ do not have an important effect on remittance receipts in nonmigrant households: the coefficient estimates are inconsistently signed, close to zero, and are not statistically significantly different from zero. Changes in remittance receipts from overseas do not help explain the reductions in poverty in nonmigrant households.

It is important to check whether reductions in poverty in nonmigrant households are accompanied by increases in their household income. The second row of panel B does so, presenting results for which the outcome variable is the change in household income (expressed as a fraction of initial household income). The coefficient on $REGSHOCK_k$ is positive in all three specifications, and it becomes substantially larger in magnitude when control variables are added in columns 2 and 3. The coefficient in column 3 (0.992) suggests that a one-standard-deviation increase in the size of the region-level migrant exchange rate shock (0.03) leads to a 3 percentage point increase in household income (as a share of initial income). However, this coefficient is imprecisely estimated, with a standard error of 0.767 (the t-statistic is 1.29, p-value 0.216). This should therefore be taken as merely suggestive evidence that household incomes increase between 1997 and 1998 in regions with more positive values of $REGSHOCK_k$.

Additionally, there is evidence that gift receipts by nonmigrant households rise in regions that experience more positive changes in the mean migrant exchange rate shock. $REGSHOCK_k$ has little relationship to gifts given to other households by nonmigrant households, as evidenced by the small size and the lack of statistical significance of the coefficient estimates in the first row of panel C. However, region-level migrant exchange rate shocks do lead to larger gift receipts: the coefficients in the second row of panel C are all positive, and the coefficient in column 3 is statistically significantly different from zero. The impact of $REGSHOCK_k$ on net gifts is negative and also statistically significant in column 3.

The coefficient on gifts received in column 3 of panel C indicates that a one-standard-deviation increase in the size of the region-level migrant exchange rate shock (0.03) leads to a 0.26 percentage point increase in gifts received (as a share of initial household expenditures).

In sum, more favorable region-level migrant exchange rate shocks lead to reductions in the incidence and depth of poverty, increases in receipt of gifts, and (possibly) increases in household income levels. The magnitude of the response of gift receipts does not appear large enough to explain the reductions in poverty, so it is likely that general increases in economic activity (translating into higher incomes for the poor) also play a role.

TABLE 3.6 Impact of Region-Level Migrant Exchange Rate Shocks on Non-Migrant Households, 1997–8

	Initial mean of outcome	Mean (std.dev.) of change in outcome	Regressions		
			(1)	(2)	(3)
Panel A: Poverty measures					
Poverty indicator	0.307	0.102 (0.009)	−0.412 (0.358)	−0.481 (0.241)*	−0.475 (0.248)*
Poverty gap (pesos)	6,188	4,325 (444)	−4,587 (15,674)	−4,913 (12,128)	−3,483 (10,923)
Poverty gap (fraction of poverty line)	0.098	0.052 (0.006)	−0.272 (0.192)	−0.244 (0.130)*	−0.233 (0.120)*
Panel B: Remittances, household income					
Remittance receipts	0.023	−0.006 (0.002)	−0.026 (0.038)	0.029 (0.055)	0.024 (0.054)
Household income	1.000	0.027 (0.016)	0.036 (0.876)	0.817 (0.875)	0.992 (0.767)
Panel C: Gifts					
Gifts to other households (a)	0.007	−0.001 0.000	−0.008 (0.014)	−0.005 (0.013)	(0.013)
Gifts received (b)	0.037	−0.021 (0.001)	0.044 (0.038)	0.07 (0.051)	0.086 (0.042)**

Net gifts (a −b)	−0.030	0.02	−0.052	−0.074	−0.091
		(0.002)	(0.044)	(0.054)	(0.045)**
Specification:					
Controls for pre-crisis characteristics			N	Y	Y
Rainfall shock controls			N	N	Y
Num. of observations in all regressions	26,121				

Notes: Each cell in regression columns 1–3 presents coefficient estimate on exchange rate shock in a separate OLS regression. Standard errors in parentheses, clustered by location country of household's eldest overseas worker. All dependent variables are first-differenced variables. Controls for pre-crisis characteristics are: household characteristics as in table 3.5, indicator for urban location, and fraction of households in province with a migrant member. See table 3.5 for other notes.

* significant at 10%; ** significant at 5%; *** significant at 1%

Region-Level Analysis

To examine region-level inequality measures, we collapse the data to the level of the Philippines' 16 regions. The outcome variables of interest are changes in three measures of inequality at the region level: the Gini index, the 90–10 percentile ratio, and the 75–25 percentile ratio. These measures are constructed on the basis of household per capita income (calculated excluding overseas members), making use of survey weights. To confirm the robustness of the household-level results in tables 3.5 and 3.6, we also examine poverty measures at the regional level that are analogous to the household-level poverty measures previously used: the regional poverty rate (the mean across households of POV_{it}) and the regional means of the two poverty gap measures ($POVGAP_{it}$ and $POVGAPFR_{it}$).

The regression equation is as follows.

$$\Delta INEQ_{jt} = \alpha_0 + \alpha_1 REGSHOCK_j + \varepsilon_{jt} \tag{3.9}$$

where $\Delta INEQ_{jt}$ is the change between January and June 1997 and April and September 1998 in a measure of income inequality. $REGSHOCK_j$ is as defined above in equation 3.3. ε_{jt} is a mean-zero error term. Each region-level regression will therefore have just 16 observations.

The first two columns of table 3.7 provide descriptive statistics for the initial (January through June 1997) values of the outcome variables and the change in these variables from 1997 to 1998. Regression column 1 provides coefficient estimates (standard errors in parentheses) on $REGSHOCK_j$ from estimation of equation 3.9 via OLS. Regression column 2 augments equation 3.9 with controls for the mean of the wet and dry season rainfall shocks across households within the region, to help control for bias caused by any correlation between the rainfall shocks and the regional exchange rate shocks.

Panel A of the table provides results for which the poverty measures are the dependent variables. The mean poverty rate across regions is 0.349 in the initial period. Poverty rates increased over the study period, with a mean change across regions of 0.106. The coefficient estimate on $REGSHOCK_j$ for this outcome in column 1 is negative (−0.546) and statistically significant at the 10 percent level. Inclusion of the rainfall shock controls (column 2) makes the coefficient slightly more negative (−0.582), and it maintains its level of statistical significance.

How large is this effect on the poverty rate? A one-standard-deviation increase in the region-level migrant exchange rate shock (0.03) leads to a 1.8 percentage point reduction in the poverty rate. Reassuringly, this estimate is quite similar to the 1.4 percentage point estimated effect of a 0.03 region-level exchange rate shock in the household regression in table 3.6.

TABLE 3.7 Impact of Region-Level Migrant Exchange Rate Shocks, 1997–8

	Initial mean of outcome	Mean (std.dev.) of change in outcome	Regressions	
			(1)	(2)
Panel A: Regional poverty measures				
Poverty rate	0.349	0.106 (0.010)	−0.546 (0.287)*	−0.582 (0.314)*
Mean poverty gap (pesos)	7,028	4,457 (431)	−4,508 (14,428)	−5,525 (16,126)
Mean poverty gap (fraction of poverty line)	0.115	0.056 (0.006)	−0.256 (0.195)	−0.267 (0.220)
Panel B: Regional inequality measures				
Gini coefficient	0.455	0.021 (0.003)	0.055 (0.111)	0.031 (0.104)
90–10 percentile ratio	7.274	0.73 (0.167)	−2.499 (5.584)	−3.363 (6.153)
75-25 percentile ratio	2.806	0.102 (0.051)	−2.584 (1.578)	−2.295 (1.736)
Specification:				
Rainfall shock controls			N	Y
Num. of obs. in all regressions:	16			

Notes: Each cell in regression columns 1–2 presents coefficient estimate on region-level exchange rate shock in a separate OLS regression. Units of analysis are 16 Philippine regions. Standard errors in parentheses. All dependent variables are in first-differences. Independent variable (region-level exchange rate shock) is mean exchange rate shock across migrants within region (mean 0.40, std. dev. 0.03). Construction of poverty and inequality variables uses sample weights.

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

The coefficient estimates of the region-level migrant exchange rate shock for the two poverty gap measures are negative in column 2 of panel A (and are consistent with the decline in the poverty rate), but they are not precisely estimated. The results on the depth of poverty must therefore be taken as suggestive in this analysis.

Descriptive statistics and regression results for the impact of region-level migrant exchange rate shocks on region-level inequality are presented in panel B of the table. All three measures of within-region income inequality rise modestly on average between 1997 and 1998: the Gini coefficient by 0.021 (from a base of 0.455), the 90–10 percentile ratio by 0.73 (from a base of 7.274), and the 75–25 percentile ratio by 0.102 (from a base of 2.806).

The coefficient estimates of the impact of $REGSHOCK_j$ on the inequality measures tell a somewhat inconclusive story. The coefficient estimates in regressions for which the Gini coefficient is the outcome variable are positive (indicating an increase in inequality). By contrast, the coefficient estimates in the regressions for the 90–10 and 75–25 percentile ratios are negative (indicating reductions in inequality). However, these coefficients are all quite small in magnitude; the coefficient in column 2 for the 90–10 percentile ratio indicates that a one-standard-deviation increase in $REGSHOCK_j$ would cause a mere 0.10 decline in this inequality measure (from a base of 7.274). What is more, none of the coefficients in the regressions for the inequality measures are statistically significantly different from zero.

In sum, this analysis confirms that region-level migrant exchange rate shocks lead to modest reductions in the region-level incidence of poverty. A 3 percent improvement in the mean exchange rate experienced by a region's migrants is associated with a 1.8 percentage point reduction in poverty (from a base of 0.349). However, there are no strong results regarding the impact of such shocks on the depth of poverty or on income inequality within regions.

Effects of Exchange Rate Shocks on Human Capital and Entrepreneurship

This chapter has concerned itself with the immediate impact of exchange rate shocks on poverty in migrants' origin households and home areas (via changes in remittances). An important question that arises is whether exchange rate shocks are likely to also have longer-term effects on the well-being of migrants' origin households. Yang (2004) addresses this question in detail, and examines the impact of migrants' exchange rate shocks on human capital investment and entrepreneurial activity in migrants' origin households, activities that are likely to have more persistent effects on household well-being and whose effects could last beyond migrant members' overseas stays.

If households have complete access to credit, transitory shocks should have no effect on household long-term investments, because borrowing allows households to make investments in advance of the future returns. But when households face credit constraints, and when household investments require fixed costs be paid in

advance of the investment returns, the timing of household investments may depend on current income realizations. In particular, households may raise investments when experiencing positive income shocks. In economic models of child labor, such as Baland and Robinson (2000) or Basu and Van (1998), temporary increases in household income can allow households to reduce child labor-force participation and raise child schooling. The effect of such positive income shocks on child schooling is magnified if schooling involves large fixed costs, such as tuition. Transitory income shocks can also affect household participation in entrepreneurial activities, if such activities are capital-intensive. Rosenzweig and Wolpin (1993) document how productive assets may play dual roles as savings mechanisms and income sources when credit and formal savings mechanisms are poor or nonexistent: accumulation and decumulation of productive assets in the face of positive and negative shocks (respectively) play a role analogous to accumulation and decumulation of savings. One might expect that households experiencing favorable exchange rate shocks would accumulate productive assets.

The relevant analyses in Yang (2004) involve estimating regressions analogous to equations 3.7 and 3.8, in which the dependent variables are the changes in several variables related to child human capital investment and entrepreneurial activity. Regression analyses are for exactly the same migrant households that are analyzed in the current chapter (whose summary statistics are given in table 3.3, and for whom poverty results are presented in table 3.5).

Table 3.8 reports some key results from Yang (2004) for five dependent variables. The results presented are for regressions analogous to equation 3.7. In columns 1 and 2, the dependent variables relate to child human capital investment, and the unit of analysis is a child followed from July 1997 to October 1998. Regressions are for children ages 10–17 in July 1997; the dependent variables are not recorded for children younger than 10.

More favorable exchange rate shocks are associated with improved human capital investment in children, because they lead to increases in schooling and declines in child labor. In the first column of the table 3.8, the outcome is the change in an indicator for the child's primary activity being reported as student. In the second column, the dependent variable is the change in total hours worked in the past week. More favorable exchange rate shocks are associated with differential increases in student status and declines in child labor. The coefficients in columns 1 and 2 indicate that one-standard-deviation increase in the size of the exchange rate shock (0.16) leads to a differential increase in student status of 1.7 percentage points, and to differential declines in child labor of 0.35 hours in the past week.[24]

In columns 3 through 5 of table 3.8, the dependent variables relate to entrepreneurial activity in migrants' origin households. The unit of analysis is a household.

TABLE 3.8 Impact of Migrant Exchange Rate Shocks on Child Human Capital and Entrepreneurship, 1997–8

	Dependent variables				
	Change in student status (children aged 10–17)	Change in hours worked (children aged 10–17)	Entry into a new entrepreneurial activity	Net entry into "transportation and communication services" entrepreneurship	Net entry into "manufacturing" entrepreneurship
Coefficient on exchange rate shock	0.103 (0.041)**	−2.215 (0.905)**	0.140 (0.046)***	0.076 (0.031)**	0.058 (0.025)**
R-squared	0.27	0.15	0.06	0.04	0.06
Num. of observations	1,188	1,188	1,646	1,646	1,646

Source: Yang 2004.

Note: Each column is a separate OLS regression. Standard errors in parentheses, clustered by location country of household's eldest overseas worker. Entrepreneurial outcomes are household-level, and child outcomes are individual-level regressions. Changes between 1997 and 1998. Each regression includes household location fixed effects and controls for household and migrant characteristics (see notes to Table 3.5 for list). Regressions for child outcomes include controls for individual-level control variables (as reported in 1997): fixed effects for each year of age; gender indicator, indicator for marital status is single, indicator for primary activity is student, indicator for not in labor force, and five indicators for highest schooling level completed (elementary, some high school, high school, some college, and college or more).

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

In the third column, the outcome is an indicator for entry into a new entrepreneurial activity between 1997 and 1998. The coefficient is positive and statistically significant, indicating that households with more favorable exchange rate shocks were more likely to enter a new entrepreneurial activity over the study period. A one-standard-deviation increase in the size of the exchange rate shock (0.16) leads to a differential 2.2 percentage point increase in the likelihood of entry into a new entrepreneurial activity.

These new entries are concentrated in two subcategories of entrepreneurship: transportation and communication services, and manufacturing. In columns 4 and 5 of the table, the outcomes are net entry into these activities (the change between periods of an indicator for participation in the said activity). In both columns, the coefficients on the exchange rate shock are positive and statistically significantly different from zero.[25] It is sensible that new entries into entrepreneurship are concentrated in these activities, because they are likely to involve nontrivial fixed costs in vehicles and equipment that could become more affordable in the wake of positive exchange rate shocks. The results for transportation and communication services most likely reflect entry into transportation services, such as taxi and minibus operation, and are consistent with other results in Yang (2004)—that positive exchange rate shocks also raise vehicle ownership. Manufacturing activities include small activities such as mat weaving, tailoring, dressmaking, and food processing.

In sum, additional evidence in Yang (2004) indicates that the exchange rate shocks raised household investment in child human capital and capital-intensive entrepreneurial activities. The fact that the exchange rate shocks stimulated such investments suggests that the shocks are likely to have persistent and positive effects on household well-being over the long term, in addition to their leading to reductions in current poverty.

Conclusion

Millions of migrants worldwide send remittances to families back home. The potential poverty-reducing impact of remittances has been widely discussed, but until now empirical evidence on the topic has been scarce. This chapter helps fill this gap, by examining the impact of exogenous shocks to remittances on poverty rates in migrants' origin households, as well as in nonmigrant households in the same geographic region.

Filipino migrants work in a variety of foreign countries, and these migrants experienced sudden changes in exchange rates because of the 1997 Asian financial crisis. Appreciation of a migrant's currency against the Philippine peso leads to increases in household remittance receipts. In migrants' origin households, a 10

percent improvement in the exchange rate leads to a 0.6 percentage point decline in the poverty rate.

We also find evidence of spillovers to households without migrant members. Because of geographic variation within the Philippines in migrants' overseas locations, there was also variation in the region-level mean migrant exchange rate shock across regions of the country. In regions with a greater number of more favorable mean exchange rate shocks, poverty rates decline even in households without migrant members. There is, however, no strong evidence of effects on region-level inequality. This broader decline in poverty may be due to increases in economic activity driven by remittance flows, as well as by direct transfers from migrants' origin households to households that do not have migrant members.

It is important to note that the period studied in this chapter (1997–98) was one of substantial economic fluctuation in the Philippines, because of the Asian financial crisis and the drought caused by El Niño. Although there is no evidence that the estimates are confounded because of a cross-regional correlation between the region-level exchange rate shocks and other shocks, concern exists that the effects of exchange rate shock on poverty reduction might appear primarily during a crisis period, and not during periods free from economic fluctuations. In other words, in a time of general increases in poverty, remittances flowing into a region might prevent households from falling into poverty (or from falling deeper into poverty), but these remittances may not have the same effect in times of economic growth. An important area of future research would be to examine the impact of migrants' exchange rate shocks (or other determinants of remittances) on poverty in home areas when the home areas in question are not suffering general declines in economic conditions.

Annex 3.A. Household Data Set

Four linked household surveys were provided by the National Statistics Office of the Philippine government: the Labor Force Survey (LFS), the Survey on Overseas Filipinos (SOF), the Family Income and Expenditure Survey (FIES), and the Annual Poverty Indicators Survey (APIS).[26]

The LFS collects data on primary activity, hours worked in the past week, and demographic characteristics of household members age 10 or older. These data refer to the household members' activities in the week before the survey. The survey defines a household as a group of people who live under the same roof and share common food. The definition also includes people currently overseas if they lived with the household before departure.

The SOF is administered in October of each year to households reporting in the LFS that any members left for overseas within the last five years. The SOF collects

information on characteristics of the household's overseas members, their overseas locations and lengths of stay overseas, and the value of remittances received by the household from overseas in the last six months (April to September).

In the analysis, we use the July 1997 and October 1998 rounds of the LFS and the October 1997 and October 1998 rounds of the SOF. We obtain household income, expenditures, and gifts from the FIES for January through June 1997 and from the APIS for April through September 1998 (because no FIES was conducted in 1998). Remittance data are from the FIES for January through June 1997 and from the SOF for April through September 1998.

Data on remittances received from overseas in the second reporting period (April through September 1998) are available in both the APIS and the SOF (both conducted in October 1998). All analyses of remittances use data from the SOF for the second reporting period, because this source is likely to be more accurate (the SOF asks for information on amounts sent by each household member overseas, which are then added up to obtain total remittance receipts; by contrast, the APIS asks for total cash receipts from overseas). Total household income in April through September 1998 (obtained from the APIS) is adjusted so that the remittance component reflects data from the SOF.

The sample used in the empirical analysis consists of all households meeting the following criteria:

- The household's dwelling was also included in the October 1998 LFS/SOF. As mentioned above, one-quarter of households in the sample in July 1997 had just been rotated out of the sample in October 1998.
- The same household has occupied the dwelling between July 1997 and October 1998. This criterion is necessary because the LFS does not attempt to interview households that have changed dwellings. Usefully, the LFS data set contains a field noting whether the household currently living in the dwelling is the same as the household surveyed in the previous round.
- The household has complete data on precrisis control and outcome variables (recorded July 1997).
- The household has complete data on postcrisis outcome variables (recorded October 1998).

Of 30,744 dwellings that the National Statistics Office did not rotate out of the sample between July 1997 and October 1998 (criterion 1), 28,152 (91.6 percent) contained the same household continuously over that period (criterion 2). Of these households, 27,767 had complete data for all variables used in the empirical analysis (criteria 3 and 4).

Determining Precrisis Location of Overseas Household Members

In this subsection, we describe the rules used to determine whether a particular individual in the October 1997 SOF was overseas in June 1997, and if so, what country the person was in at that time. Among other questions, the SOF asks the following:

- Question 1. When did the family member last leave for overseas?
- Question 2. In what country did the family member intend to stay when he/she last left?
- Question 3. When did the family member return home from his/her last departure (if at all)?

These questions unambiguously identify individuals as being away in June 1997 (and their overseas locations) if they left for overseas in or before that month and returned afterward (or are still overseas). Unfortunately, the survey does not collect information on stays overseas before the most recent stay. Thus, there are individuals who most recently left for overseas between June 1997 and the survey date in October 1997, but who were likely to have been overseas before then as well. Fortunately, there is an additional question in the SOF that is of use:

- Question 4. How many months has the family member worked/been working abroad during the last five years?

Using this question, two reasonable assumptions allow us to proceed. First, assume all stays overseas are continuous (except for vacations home in the middle of a stay overseas). Second, assume no household member moves between countries overseas. With these two assumptions, the questions asked on the SOF are sufficient to identify whether a household had a member in a particular country in June 1997.

For example, a household surveyed in October 1997 might have a household member who last left for Saudi Arabia in July 1997 and had not yet returned from that stay overseas. If that household member is reported as having worked overseas for four months or more, the first assumption implies the person first left for overseas in or before June 1997. The second assumption implies that the person was in Saudi Arabia.

Using questions 1 and 3, 89.8 percent of individuals identified as being away in June 1997 (and their overseas locations) were classified as such. The remaining

10.2 percent of individuals identified as being away in June 1997 (and their locations) relied on question 4 and the two allocation assumptions just described.

Endnotes

1. Estimates of the number of individuals living outside their countries of birth are from United Nations (2002), while data on world population are from U.S. Bureau of the Census (2002).

2. The remittance figure is the sum of the "workers' remittances," "compensation of employees," and "migrants' transfers" items in the International Monetary Fund's International Financial Statistics database for all countries not listed as "high income" in the World Bank's country groupings. All dollars are U.S. dollars.

3. Aid and foreign direct investment (FDI) figures are from World Bank (2004). While the figures for official development aid and FDI are likely to be accurate, by most accounts (for example, Ratha 2003) national statistics on remittance receipts are considerably underreported. So the remittance figure may be taken as a lower bound.

4. Borjas (1999) argues that the investigation of benefits accruing to migrants' source countries is an important and virtually unexplored area in research on migration.

5. We describe the exchange rate index in the following section.

6. See, for example, Stark, Taylor, and Yitzhaki (1986); Taylor (1992); Ahlburg (1996); and Rodriguez (1998).

7. Examples of this approach include Adams (1989), Barham and Boucher (1998), and Adams (2004).

8. The source for these data is *Philippine Yearbook* (2001), table 15.4. These figures do not include Filipinos who go overseas without the help of government-authorized recruitment agencies. By all accounts (for example, Cariño and others 1998), there was a dramatic rise in the number of Filipinos going overseas in this period, so the figures should not reflect merely the collection of new data on previously undocumented worker departures.

9. For 90 percent of individuals in the SOF, their location overseas in that month is reported explicitly. For the remainder, a few reasonable assumptions must be made to determine their June 1997 location. See the annex A for the procedure used to determine the locations of overseas Filipinos in the SOF.

10. The exchange rates are as of the end of each month, and were obtained from Bloomberg L.P.

11. Of the 1,646 households included in the analysis, 1,485 (90.2 percent) had just one member working overseas in June 1997; 140 households (8.5 percent) had two, 18 households (1.1 percent) had three, and 3 households (0.2 percent) had four members working overseas in that month.

12. We use the National Statistics Office of the Philippines' region definitions as of July 1996 (version 4). The regions are the National Capital Region (NCR), Ilocos, Cagayan Valley, Central Luzon, Southern Tagalog, Bicol, Western Visayas, Central Visayas, Eastern Visayas, Western Mindanao, Northern Mindanao, Southern Mindanao, Central Mindanao, Cordillera Administrative Region (CAR), Autonomous Region of Muslim Mindanao (ARMM), and Caraga.

13. These data are available online at http://www.nscb.gov.ph/poverty/2000/povertyprov.asp. For 1997, the poverty lines were constructed separately for urban and rural areas within 83 disaggregated localities (provinces). In 1998, poverty lines were not constructed at this disaggregated level, and they are only available at the level of 16 regions.

14. Per capita figures exclude overseas members. U.S. dollars are converted from Philippine pesos based on the first-half 1997 exchange rate of roughly 26 pesos per US$1.

15. Note that gifts do not include remittances.

16. After the onset of the crisis, annual real gross domestic product (GDP) contracted by 0.8 percent in 1998, as compared with growth of 5.2 percent in 1997 and 5.8 percent in 1996 (World Bank 2004). The urban unemployment rate (unemployed as a share of total labor force) rose from 9.5 percent

to 10.8 percent between 1997 and 1998, while the rural unemployment rate went from 5.2 percent to 6.9 percent over the same period (*Philippine Yearbook* 2001, table 15.1).

17. See appendix table 1 in Yang 2004.

18. Inclusion of such controls for nonmigrant households would absorb all variation in the $REGSHOCK_k$ variable, which only varies at the region level.

19. For households that had more than one overseas worker in June 1997, the household is clustered according to the location of the eldest overseas worker. This results in 55 clusters.

20. The empirical results are subject to some limitations which may or may not have a bearing on the results. These include (a) the use of the nominal exchange rate between each destination country's currency and the Filipino peso, adjusted for Filipino inflation but not for inflation in the destination country, although the latter could also affect the decision of how much to remit; (b) the lack of information regarding the currency that is relevant for sea-based migrants, and which might be the U.S. dollar—assuming many of them are paid in that currency, rather than the currency of the country where the ship is registered; and (c) the fact that the coverage of the Filipino migrants is incomplete.

21. Dividing by precrisis household income achieves something similar to taking the log of an outcome: normalizing to take account of the fact that households in the sample have a wide range of income levels, and allowing coefficient estimates to be interpreted as fractions of initial household income.

22. Yang (2004) finds that favorable exchange rate shocks raise entrepreneurial activity and entrepreneurial investments in these same households, but they do not have strong effects on entrepreneurial income. It may be that entrepreneurial investments need more than 15 months to yield income improvements.

23. Because none of these households have migrant members initially, columns 2 and 3 do not include controls for migrant characteristics, only household characteristics.

24. Additional results presented in Yang (2004) indicate that during the 1997-98 period, child schooling declined and child labor increased, on average, across all migrant households. So these results indicate that households with a greater number of more favorable migrant exchange rate shocks saw a smaller decline in student status and a smaller increase in child labor.

25. There are no statistically significant effects of the exchange rate shock on net entry into the remaining nine categories of entrepreneurship; see Yang (2004) for details.

26. Use of the data requires a user fee, and the data sets remain the property of the Philippine government.

References

Adams, Richard H. Jr. 1989. "Worker Remittances and Inequality in Rural Egypt." *Economic Development and Cultural Change* 38(1): 45–71.

———. 2004. "Remittances and Poverty in Guatemala." World Bank Policy Research Working Paper, no. 3418, September. World Bank, Washington, DC.

Ahlburg, Dennis A. 1996. "Remittances and the Income Distribution in Tonga." *Population Research and Policy Review* 15(August): 391–400.

Baland, Jean-Marie, and James A. Robinson. 2000. "Is Child Labor Inefficient?" *Journal of Political Economy* 108(4): 663–79.

Barham, Bradford, and Stephen Boucher. 1998. "Migration, Remittances and Inequality: Estimating the Net Effects of Migration on Income Distribution." *Journal of Development Economics* 55: 307–31.

Basu, Kaushik, and Pham Hoang Van. 1998. "The Economics of Child Labor." *American Economic Review* 88(3): 412–27.

Bhagwati, Jagdish. 2003. "Borders Beyond Control." *Foreign Affairs* 82(1): 98–104.

Borjas, George. 1999. "The Economic Analysis of Immigration." In *Handbook of Labor Economics*, ed. Orley Ashenfelter and David Card, vol. 3A, 1,697–760. North-Holland.

Cariño, Benjamin. 1998. "Introduction." In *Filipino Workers on the Move: Trends, Dilemmas, and Policy Options*, ed. Benjamin Cariño. Manila: Philippine Migration Research Network.

Diamond, David. 2002. "One Nation, Overseas." *Wired Magazine.* Issue 10.06.

Moulton, Brent. 1986. "Random Group Effects and the Precision of Regression Estimates." *Journal of Econometrics* 32(3): 385–97.

Philippine Yearbook. 2001. Manila: National Statistics Office.

Ratha, Dilip. 2003. "Workers' Remittances: An Important and Stable Source of External Development Finance." In *Global Development Finance 2003: Striving for Stability in Development Finance*, 157–75. Washington, DC: International Monetary Fund.

Rodriguez, Edgard R. 1998. "International Migration and Income Distribution in the Philippines." *Economic Development and Cultural Change* 46(2): 329–50.

Rodrik, Dani. 2002. "Feasible Globalizations." NBER Working Paper, no. 9129, August. National Bureau of Economic Research, Washington, DC.

Rosenzweig, Mark, and Kenneth Wolpin. 1993. "Credit Market Constraints, Consumption Smoothing and the Accumulation of Durable Production Assets in Low-Income Countries: Investments in Bullocks in India." *Journal of Political Economy* 101: 223–44.

Stark, Oded, J. Edward Taylor, and Shlomo Yitzhaki. 1986. "Remittances and Inequality." *Economic Journal* 96(383): 722–40.

Taylor, J. Edward. 1992. "Remittances and Inequality Reconsidered: Direct, Indirect, and Intertemporal Effects." *Journal of Policy Modelling* 14(2): 187–208.

United Nations. 2002. *International Migration Report 2002.* New York: UN Population Division.

U.S. Bureau of the Census. 2002. *International Data Base.* Washington, DC.

Virola, Romulo A., Redencion M. Ignacio, Glenita V. Amoranto, and Bernadette B. Balamban. 2005. "Official Poverty Statistics in the Philippines: Methodology and 2003 Estimates." *National Statistical Coordination Board Technical Papers*, TP-200504-SS1-01, Government of the Philippines, March 4.

World Bank. 2004. *World Development Indicators on CD-ROM 2004.* Washington, DC.

Yang, Dean. 2004. "International Migration, Human Capital, and Entrepreneurship: Evidence from Philippine Migrants' Exchange Rate Shocks." Ford School of Public Policy Working Paper Series, no. 02-011. University of Michigan, Ann Arbor.

Yang, Dean, and HwaJung Choi. 2005. "Are Remittances Insurance? Evidence from Rainfall Shocks in the Philippines." Ford School of Public Policy Working Paper Series, no. 2005-005. University of Michigan, Ann Arbor.