

# WHY DO MIGRANTS RETURN TO POOR COUNTRIES? EVIDENCE FROM PHILIPPINE MIGRANTS' RESPONSES TO EXCHANGE RATE SHOCKS

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*Abstract*—This paper distinguishes between *target-earnings* and *life cycle* motivations for return migration by examining how Philippine migrants' return decisions respond to major, unexpected exchange rate changes in their overseas locations (due to the Asian financial crisis). Overall, the evidence favors the life cycle explanation: more favorable exchange rate shocks lead to fewer migrant returns. A 10% improvement in the exchange rate reduces the 12-month return rate by 1.4 percentage points. However, some migrants appear motivated by target-earnings considerations: in households with intermediate foreign earnings, favorable exchange rate shocks have the least effect on return migration, but lead to increases in household investment.

## I. Introduction

BETWEEN 1975 and 2000, the number of individuals living outside their countries of birth more than doubled to 175 million, or 2.9% of world population (United Nations, 2002).<sup>1</sup> Although migration flows from poor to rich countries gain the most attention, return flows of migrants to their countries of origin are substantial. Borjas and Bratsberg (1996) estimate that 17.5% of immigrants who arrived in the United States between January 1, 1975 and April 1, 1980 had left the country by the end of that period. Jasso and Rosenzweig (1982) estimate an upper bound of 50% for the remigration rate of the 1971 U.S. immigrant cohort by January 1979.<sup>2</sup>

Why would migrant workers in rich countries ever return to poorer countries of origin? In the face of substantial wage differentials, return migration is a puzzle for exclusively income-maximizing models of migration [as in Sjastaad (1962) and Harris and Todaro (1970)]. Return migration becomes sensible in the context of household utility maximization over a finite horizon, when migrants prefer consumption in the home country to consumption overseas [as in Hill (1987) and Djajic and Milbourne (1988)]. Temporary stays overseas are used to accumulate resources for later use in the home country, either for consumption or for investment.

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<sup>1</sup> By contrast, world population grew by just 49% over the same time period (U.S. Bureau of the Census, 2002).

<sup>2</sup> Outflows of migrants from Europe have also been large (see Dustmann, 1996). Return migration is not just a recent phenomenon: U.S. departure statistics indicate that almost one-third (4.8 million) of the 15.7 million U.S. immigrants who arrived between 1907 and 1957 had departed by the latter year (LaLonde and Topel, 1997). Chiswick and Hatton (2003) note that return migration exceeded immigration to the United States during the 1930s.

In current research on return migration, there is so far no consensus on the extent to which the durations of migrants' stays overseas are determined primarily by straightforward *life cycle* considerations, as opposed to being driven by the need to reach *target-earnings* levels. By life cycle considerations, I mean simply that households choose the length of stay overseas that balances the marginal benefit from higher savings overseas (and thus higher lifetime consumption) against the marginal utility cost of overseas work [as in Stark, Helmenstein, and Yegorov (1997) and Dustmann (2003)]. On the other hand, when households face borrowing constraints and minimum investment levels, lengths of stay overseas can be determined by the amount of time needed to accumulate a target-earnings level, as in Piore (1979) and Mesnard (2004).<sup>3</sup>

Distinguishing between the two alternative motivations for return migration is important, because the return decisions of life cycle migrants and target earners can respond very differently to changes in overseas economic conditions. For life cycle migrants, improved economic conditions in host countries—say, increased wages—can lead to longer overseas stays (as long as substitution effects dominate any income effects).<sup>4</sup> For target earners, on the other hand, improved economic conditions should lead to *shorter* overseas stays, as migrants reach their earnings goals more quickly.

This paper begins by discussing migration and household investment in theory. When households face borrowing constraints and minimum investment thresholds, both potential reasons for return migration emerge. The main theoretical prediction is that life cycle migrants are those at the lowest and highest ends of the foreign wage distribution, and migrants with intermediate foreign wages are target earners. In essence, target earners are those for whom the minimum investment threshold is *just* binding: they prefer investing at the minimum threshold to not investing at all, but if possible would have preferred lower investment levels (and shorter stays overseas). They therefore stay overseas only until their savings reach the minimum investment threshold. By contrast, the foreign wages of life cycle migrants are either too low to ever consider investing, or high enough that they choose above-minimum investment levels.

Empirically, attempts to distinguish between the two alternatives typically examine the correlation between return migration and migrants' overseas earnings. The evi-

<sup>3</sup> Empirical tests of target-earnings models of intertemporal labor supply in the United States include Camerer et al. (1997) and Farber (2003).

<sup>4</sup> Stark et al. (1997) and Dustmann (2003) discuss the opposing substitution and income effects of foreign wage changes.

dence has been inconclusive. Borjas (1989) finds among the foreign-born in the United States that higher earnings are associated with less return migration. By contrast, Dustmann (2003) documents, among immigrants in Germany, that higher migrant wages (instrumented by parental education) are associated with more return migration (shorter overseas stays). Constant and Massey (2002) find no statistically significant relationship between earnings and migrant returns in the same German data set, although migrants who are unemployed or marginally employed are more likely to return.<sup>5</sup>

Other studies have sought evidence that migrants are target earners by examining correlations among migrant earnings, return migration, and entrepreneurship. In a sample of Tunisian return migrants, Mesnard (2004) documents that migrants were more likely to become entrepreneurs upon return if they had accumulated higher savings overseas. Dustmann and Kirchkamp (2002) find that higher migrant earnings are associated with shorter migration durations for Turkish migrants who become entrepreneurs upon return.

A central methodological concern with existing empirical work on this topic is that the independent variable of interest—foreign earnings—is not randomly assigned across migrants, so any observed relationship between foreign earnings and return migration may simply be caused by unobserved third factors. For example, a finding that migrants with higher earnings have shorter lengths of stay overseas need not imply that higher earnings *cause* shorter migration durations. Rather, higher-wage migrants could simply have other characteristics that make early return attractive (such as better job prospects at home, or stronger family ties).<sup>6</sup>

This paper exploits a unique quasi experiment that generated sudden changes in migrants' economic conditions, making possible a causal estimate of the effect of those conditions on return migration. In so doing, it also sheds light on the relative importance of life cycle versus target-earnings explanations for return migration.

In June 1997, 6% 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 due to 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 June 1998, the U.S. dollar and currencies in the Middle Eastern destinations of Filipino workers rose 40% in value against the Philippine peso. Over the same time period, by contrast, the currencies of Taiwan, Singapore, and Japan rose by only 22%, 24%, and 27%, and those of Malaysia and Korea actually fell slightly against the peso.<sup>7</sup>

The size of exchange rate shocks across different migrant location countries was unexpected, and so the causal impact of the exchange rate shock on return migration is identified. I use panel household survey data on Philippine households with members working overseas, and examine migrant returns to these households over a 12-month window immediately following the Asian financial crisis.

The first main finding of this paper is that, on the whole, more favorable exchange rate shocks lead to fewer migrant returns. The regression analysis indicates that a 10% improvement in the exchange rate reduces the 12-month return rate by 1.4 percentage points.<sup>8</sup> Figure 1 illustrates the bivariate relationship, displaying the 12-month migrant return rate for households experiencing different exchange rate shocks (higher values of the shock variable are “better”). Although the exchange rate shocks can reasonably be taken as exogenous, I present additional tests confirming that the results are not driven either by preexisting differences in return rates from different countries, or by heterogeneity in the impact of the postcrisis economic downturn on households in the Philippines that might be correlated with precrisis migrant locations. In addition, there is little indication that the results are being driven by job terminations correlated with the exchange rate shocks.

Overall, the finding that more favorable exchange rate shocks lead to fewer migrant returns supports the life cycle explanation for return migration. A positive exchange rate shock raises the marginal benefit of staying overseas (by raising the domestic-currency value of foreign wages), and leads to less return migration on the margin.

The second main finding of this paper is that—even though life cycle considerations seem to dominate on the whole—migrants from a subset of households appear to be target earners. The effect of the exchange rate shock on returns is greatest for households with the lowest and highest values of a foreign wage index, and lowest for those with intermediate values of the index. In households with intermediate values of the foreign wage index, the exchange rate shocks lead to increases in variables associated with household investment. These results are consistent with the theoretical prediction that the migrants most likely to be target earners are those in the middle of the foreign wage

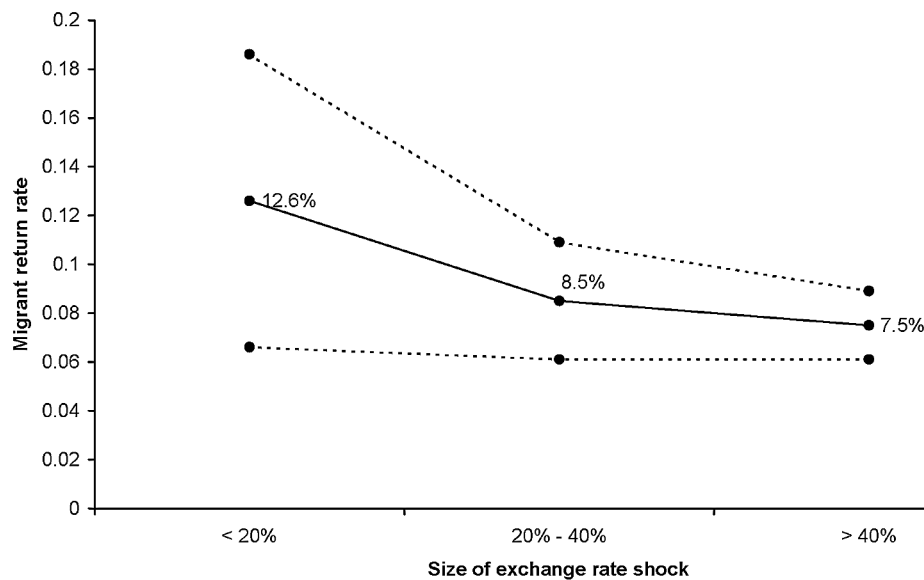
<sup>5</sup> Other work on the correlates of return migration includes DaVanzo (1983), Merkle and Zimmermann (1992), and Borjas and Bratsberg (1996). Fox and Stark (1987) use retrospective data in the Mexican Migration Project data set for 1982–1983 to document a positive correlation between hours worked by Mexicans in the United States (conditional on being in the United States) and the U.S.–Mexican exchange rate, but do not examine return migration.

<sup>6</sup> Conducting the analysis in a panel setting—where *changes* in foreign earnings can be related to changes in migration duration—should do better at controlling for unobserved heterogeneity, but concerns about causality still arise. For example, family events at home (say, worsening parental health) may lead to shorter overseas stays, and also lead migrants to increase their earnings in the time they have remaining overseas.

<sup>7</sup> I describe the exchange rate index below.

<sup>8</sup> An increase in the exchange rate simultaneously raises the Philippine-currency value of foreign wages *and* of accumulated savings held overseas. If increases in overseas savings raise return rates (a wealth effect), the negative estimated effect of exchange rate shocks on return rates understates the impact of pure foreign wage changes on return rates.

FIGURE 1.—MEAN RETURN RATE OF MIGRANTS FROM PHILIPPINE HOUSEHOLDS, BY SIZE OF EXCHANGE RATE SHOCK (JULY 1997–JUNE 1998)



Unit of observation is a household. Sample includes 1,614 Philippine households with a migrant working overseas in June 1997 (see appendix A for details on sample construction). Solid line is migrant return rate; dotted lines indicate 95% confidence intervals (standard errors clustered by location of household's eldest overseas worker). "Exchange rate shock" is change in number of Philippine pesos per currency unit where overseas worker was located in Jun 1997. Change is average of 12 months leading to June 1998 minus average of 12 months leading to June 1997, divided by the latter (e.g., 10% increase is 0.1). If household had more than one overseas worker in June 1997, exchange rate shock variable is average change in exchange rate across household's overseas workers. "Migrant return rate" is number of household's migrant workers who returned between July 1997 and June 1998 divided by number of household members working overseas in June 1997.

distribution: positive exchange rate shocks make target earners more likely to return home *and* to invest (because they become more likely to have reached the minimum investment threshold).

Aside from contributing to research on international migration, this paper is also related to an important body of research that examines the effect of financial market imperfections on entrepreneurship in developing countries.<sup>9</sup> This paper's finding that some migrants are target earners suggests that credit constraints in developing countries have effects far beyond their borders.

This paper is organized as follows. Section II discusses return migration in theory. Section III provides an overview of international labor migration from the Philippines, and describes the post-Asian-crisis exchange rate shocks. Section IV outlines the data used and the empirical strategy, and presents the empirical results. Section V concludes.

## II. Return Migration in Theory

What does economic theory tell us about the determinants of migration durations? How can a quasi experiment—such as migrants' exchange rate shocks—be used to shed light on the relative importance of potentially diverse reasons for return? I outline here a theoretical model of migration and household investment, and highlight the theoretical impact of favorable exchange rate shocks. The model and results

are described qualitatively in this section; the model is formally presented in a theory appendix (available from the author on request or on the author's Web site).<sup>10</sup> The model has basic similarities with Stark et al. (1997), Dustmann (2003), and Mesnard (2004). It is closest to Mesnard (2004), the primary differences being that I assume a minimum investment level instead of a sunk investment cost, and allow the period of migration to differ from the period of savings prior to enterprise investment.

Assume that households with finite planning horizons each have two members, one of whom has the option of working overseas for a wage higher than the domestic wage. Households also may invest in an enterprise that allows higher domestic earnings, but face borrowing constraints and a minimum investment threshold. Households prefer consumption at home to consumption overseas, so overseas work is purely intended to accumulate resources for future investment and/or consumption. The only source of heterogeneity across households is their foreign wage per period overseas. Households choose the number of periods they work overseas, the number of periods they save before investing, and savings rates in each period. The model is solved via numerical simulation, assuming a specific parameterization of the model.

Two types of migrants emerge, differentiated on the basis of the primary motivation for return migration. Table 1 provides an overview of the types and their characteristics.

<sup>9</sup> For example, Aghion and Bolton (1997), Banerjee and Newman (1993), and Paulson and Townsend (2001). In the developed-country context, Evans and Jovanovic (1989) and Blanchflower and Oswald (1998) are also relevant.

<sup>10</sup> The theory appendix can be downloaded from the Internet at [http://www.umich.edu/~deanyang/papers/returnmig/returnmig\\_theory.pdf](http://www.umich.edu/~deanyang/papers/returnmig/returnmig_theory.pdf).

TABLE 1.—TYPES OF MIGRANTS GENERATED BY THEORETICAL MODEL

Migrant Characteristic	Migrant Type		
	Life Cycle Migrant		Target Earner
	Unconstrained Investor	Noninvestor	
Level of foreign wage	High	Low	Intermediate
Timing of investment	Before return migration	(No investment)	Simultaneous with return migration
How accumulated savings are used upon return	Consumption	Consumption	Investment
Effect of positive exchange rate shock on return migration	Negative*	Negative*	Positive

\*Assuming substitution effect dominates income effect.

First, there are what might be called *life cycle migrants*, who make their return decisions on an essentially neoclassical basis: they simply choose the length of stay overseas that balances the marginal benefit from higher savings overseas (and thus higher lifetime consumption) against the marginal utility cost of overseas work. Life cycle migrants are divided into two subtypes, which I call *unconstrained investors* and *noninvestors*. Unconstrained investors are households whose migrants have the *highest* foreign wages. Their lifetime earnings are high enough that entrepreneurial investment occurs relatively early in the lifetime. After the investment is made, these migrants may continue to accumulate savings overseas for some time. Noninvestors, on the other hand, have lifetime earnings that are too low to ever contemplate making a household entrepreneurial investment (because of the minimum investment threshold). These are households whose migrants have the *lowest* values of the foreign wage. What unconstrained investors and noninvestors have in common is that they both are staying overseas on the margin solely to accumulate savings that help raise future consumption levels. In other words, life cycle migrants return in order to *consume*.

The second general type of migrant is the *target earner*. Target earners are migrants who choose to make an entrepreneurial investment at the minimum investment level. In a neoclassical world without a minimum investment level, these migrants would have preferred shorter migration durations and smaller entrepreneurial investments, but they prefer investing at the minimum investment level to not investing at all. Target earners work overseas only until they have saved the minimum investment level, after which they return immediately and the household invests in the entrepreneurial enterprise (return migration and entrepreneurial investment are simultaneous). These households have migrants with *intermediate* values of foreign earnings: if their foreign earnings were much lower, they would choose not to invest at all (and be noninvestors), and at substantially higher foreign earnings they would invest more than the minimum (and be unconstrained investors). Unlike life cycle migrants, therefore, target earners return in order to *invest*.

The model predicts that the impact of a favorable exchange rate shock (effectively, a simultaneous increase in the foreign wage and the value of savings held overseas) can differ for life cycle migrants and target earners. A favorable exchange rate shock *reduces* return rates for life cycle migrants: migrants from both unconstrained-investor and noninvestor households remain overseas on the margin purely to accumulate savings for future consumption, and the exchange rate shock raises the marginal value of staying overseas.<sup>11</sup> But favorable exchange rate shocks *increase* return rates for target earners, because the exchange rate shock can lead them to reach their target earnings level more quickly.

A positive exchange rate shock also has the highest positive impact on household investment for target earners. Target earners respond this way to the shock because their migration and investment decisions are linked: they remain overseas only until they have accumulated the minimum investment threshold, and then simultaneously return home and invest.

In terms of the empirical analysis, these theoretical predictions suggest that the *overall* impact of the exchange rate shock on migrant return rates can shed light on the relative importance of life cycle versus target-earnings motivations for return migration. If more favorable exchange rate shocks *reduce* return migration, this will be evidence that life cycle motivations dominate on the whole. On the other hand, a finding that such shocks *raise* return migration will suggest that target-earnings motivations are more important on average.

It is worth mentioning that the estimated overall impact of the exchange rate shock on return rates should be *more positive* than the impact of a similar-size pure foreign wage change. The exchange rate shock is a joint shock to the domestic-currency value of the foreign wage and to over-

<sup>11</sup> Of course, the substitution effect of the effective foreign wage increase must dominate the income effect, which is the case in the parameterization used in the numerical simulation. In a more general model the income effect could dominate the substitution effect, so that exchange rate shocks could raise return migration for life cycle migrants [as in Dustmann (2003) and Stark et al. (1997)].

seas savings. The positive wealth shock associated with the increase in the domestic-currency value of overseas savings should *raise* households' demand for migrant returns (a wealth effect), so that the estimated impact of the exchange rate shock should be more positive than that of a similar-size pure wage shock (one that is not accompanied by a change in assets).<sup>12</sup>

The second implication of the theory for the empirical analysis is that, when preshock foreign wages are heterogeneous across migrants, the impact of a favorable exchange rate shock: (1) is most negative on migrant return rates for households with the lowest and highest foreign wages (life cycle migrants), and (2) is most positive on household investment rates for households with intermediate foreign wages (target earners). In practice, these predictions mean that the impact of favorable exchange rate shocks on migrant return rates and on household investment should be inverted-U shapes in the foreign wage.

The theoretical predictions contrast sharply with those of a model that relaxes the credit constraint and allows households to borrow for investment. In such a model, the impact of a favorable exchange rate shock: (1) is most negative on migrant return rates for households with the lowest foreign wages, with the effect declining in absolute value as the foreign wage increases, and (2) is zero on household investment rates for all households.

### III. International Labor Migration from the Philippines

To help 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 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.<sup>13</sup> Today, the government authorizes some 1,300 private recruitment agencies to place Filipinos in overseas jobs (Diamond, 2002).

Contracts for most overseas positions are typically of two years' initial duration, and are usually open to renewal. For

<sup>12</sup> To anticipate the empirical results, positive exchange rate movements have a negative impact on return rates on average. Therefore, the impact of proportional foreign wage changes on returns is likely to be more negative than the estimated impact of exchange rate shocks.

<sup>13</sup> 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 (see, for example, Cariño, 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.

TABLE 2.—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	29.1	0.40
Hong Kong, China	210	11.7	0.40
Taiwan	148	8.3	0.22
Singapore	124	6.9	0.24
Japan	116	6.5	0.27
United States	116	6.5	0.40
Malaysia	65	3.6	−0.01
Italy	52	2.9	0.27
Kuwait	51	2.8	0.38
United Arab Emirates	49	2.7	0.40
Greece	44	2.5	0.21
Korea, Rep.	36	2.0	−0.02
Northern Mariana Islands	30	1.7	0.40
Canada	29	1.6	0.35
Brunei	22	1.2	0.24
United Kingdom	15	0.8	0.42
Norway	14	0.8	0.25
Australia	14	0.8	0.21
Bahrain	13	0.7	0.40
Indonesia	10	0.6	−0.39
Other	114	6.4	
Total	1,793	100.0	

Data are from October 1997 Survey on Overseas Filipinos. "Other" includes 31 additional countries. Overseas workers in table are those in households included in sample for empirical analysis (see appendix A for details on sample definition). Exchange rate shock: Change in Philippine pesos per currency unit where overseas worker was located in June 1997. Change is average of 12 months leading to June 1998 minus average of 12 months leading to June 1997, divided by the latter (e.g., 10% increase is 0.1).

the vast majority of positions, overseas workers cannot bring family members with them, and must go alone.

The central role in Philippine migration of temporary, legal contract work makes it distinctive. Migration for temporary contract work is a type of international labor flow that is likely to become more and more important in coming years.

In June 1997 (immediately prior to the Asian financial crisis), 5.9% of Philippine households had one or more household members overseas, in a wide variety of foreign countries.<sup>14</sup> Table 2 displays the distribution of household members working overseas by country in that month.<sup>15</sup> Filipino workers are remarkably dispersed worldwide. Saudi Arabia is the largest single destination, with 29% of the total, and Hong Kong comes in second with roughly 12%. But no other destination accounts for more than 10% of the total. The only other countries accounting for 6% or

<sup>14</sup> This statistic and those in the following two paragraphs are as reported in the 1997 Survey on Overseas Filipinos and 1997 Labor Force Survey. I describe these surveys below.

<sup>15</sup> For 90% of individuals in the Survey on Overseas Filipinos (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 appendix A for the procedure used to determine the locations of overseas Filipinos in the SOF. Tables 2 and 3 include the exact migrants whose households were included in the empirical analysis, and so a small number of migrants were excluded due to lack of complete data on all variables used in the analysis. This exclusion makes next to no difference to the summary statistics.

TABLE 3.—CHARACTERISTICS OF OVERSEAS WORKERS FROM SAMPLE HOUSEHOLDS

	Mean	Std. Dev.	10th Pctile.	Median	90th Pctile.
Age	34.44	8.95	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	0.31				
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 (indicators):					
Less than high school	0.15				
High school	0.24				
Some college	0.31				
College or more	0.30				
Position 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 June 1997 (indicators):					
0–11	0.30				
12–23	0.24				
24–35	0.15				
36–47	0.15				
48 or more	0.16				
Per capita income in location country (U.S.\$)	16,955	10,769	6,935	15,132	28,341
12-month migrant return rate in location, 1996–97	0.10	0.06	0.02	0.09	0.15
Immigration destination (indicator)	0.19				

Number of individuals: 1,793.

Data source is October 1997 Survey on Overseas Filipinos, National Statistics Office of the Philippines. "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 appendix A for details on sample definition). "Per capita income in location country" is for 1996 (source: World Development Indicators 2002, in 1995 U.S. dollars). "12-month migrant return rate in location, 1996–97" is fraction of migrants away in July 1996 in the migrant's overseas location who returned home by June 1997. "Immigration destination" is a country where permanent immigration by Filipinos is common: Japan, Germany, United Kingdom, United States (including Pacific trust territories), Canada, and Australia.

more are Taiwan, Singapore, Japan, and the United States. The top twenty destinations listed in the table account for 93.6% of overseas Filipino workers; the remainder are distributed among 31 other countries.

Table 3 displays summary statistics on the characteristics of overseas Filipino workers in the same survey. 1793 overseas workers were overseas in June 1997 in the households included in the empirical analysis (see appendix A for details on the construction of the household sample). The overseas workers have a mean age of 34.4 years. Thirty-eight percent are single, and 53% are male. "Production and related workers" and "domestic servants" are the largest two occupational categories, each accounting for 31% of the total. Thirty percent of overseas workers in the sample have achieved some college education, and a further 31% have a college degree. With regard to position in the household, the most common categories are male heads of household and daughters of the head, each accounting for 28% of overseas workers; sons of head account for 15%, female heads or spouses of heads 12%, and other relations 16% of overseas

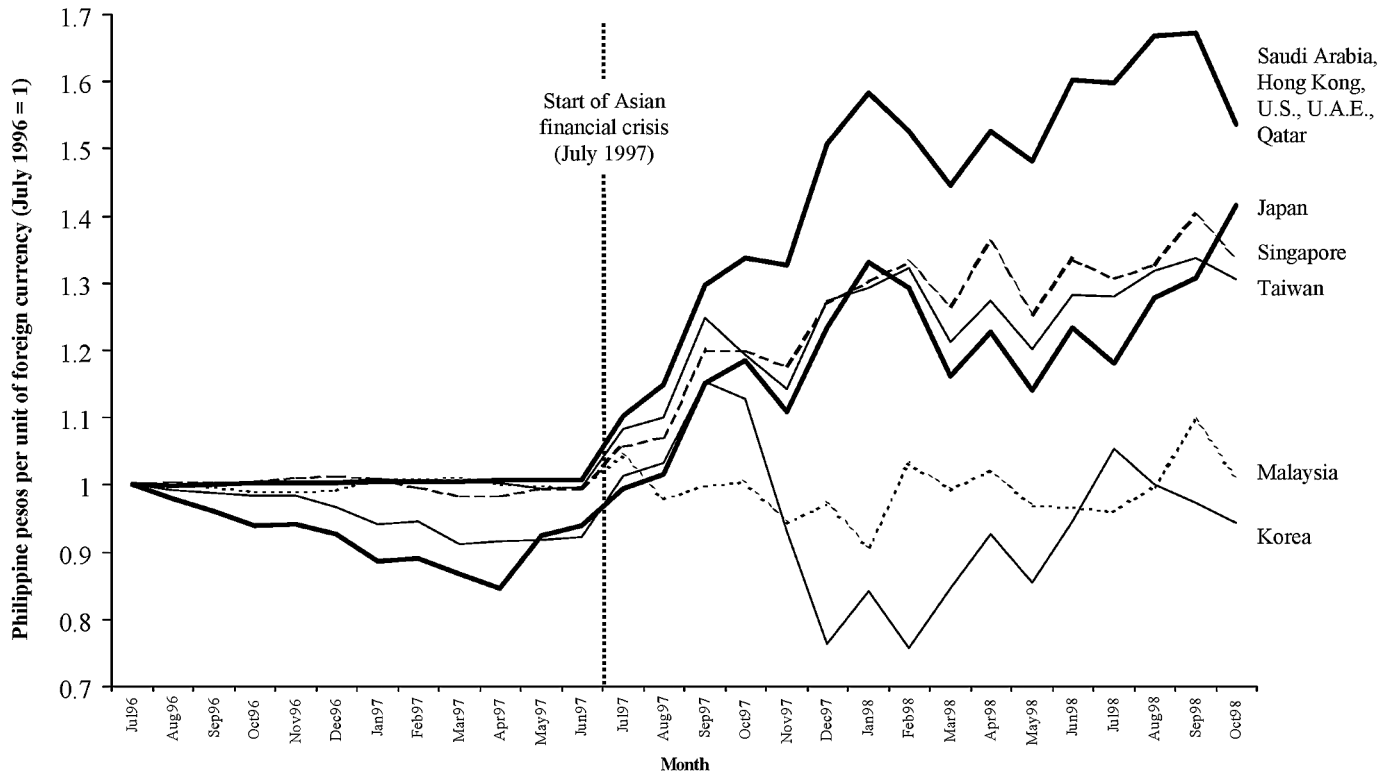
workers. As of June 1997, the bulk of overseas workers had been away for short periods: 30% had been overseas for just 0–11 months, 24% for 12–23 months, and 15% for 24–35 months, 15% for 36–47 months, and 16% for 48 months or more.

Unsurprisingly, migrants are typically located in countries substantially richer than the Philippines: the mean 1996 per capita income of migrants' location countries is \$16,955.<sup>16</sup> 19% of overseas workers were located in countries that are considered *immigration destinations*: Japan, the United States (including Pacific territories such as Guam, the Marshall Islands, and the Northern Marianas Islands), Canada, Australia, the United Kingdom, and Germany.<sup>17</sup>

<sup>16</sup> Figures are in 1995 U.S. dollars, and are as reported by World Development Indicators 2002. In comparison, Philippine per capita GDP in 1996 was \$1,122.

<sup>17</sup> Immigration destinations are defined as countries with 5,000 or more permanent Philippine residents in 1997, as tabulated by the Philippine government's Commission on Filipinos Overseas (CFO).

FIGURE 2.—EXCHANGE RATES IN SELECTED LOCATIONS OF OVERSEAS FILIPINOS, JULY 1996 TO OCTOBER 1998



Exchange rates are as of last day of each month. Data source is Bloomberg L.P.

A. Shocks Generated by the Asian Financial Crisis

The geographic dispersion of overseas Filipinos meant that there was considerable variety in the shocks they experienced in the wake of the Asian financial crisis, starting in July 1997. The devaluation of the Thai baht in that month set off a wave of speculative attacks on national currencies, primarily (but not exclusively) in East and Southeast Asia.

Figure 2 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).<sup>18</sup> 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. (As noted in the theoretical section, positive exchange rate shocks raise the domestic-currency value of both households' foreign earnings and overseas savings.)

For each country  $j$ , I construct the following measure of the exchange rate change between the year preceding July 1997 and the year preceding June 1998:

$$ERCHANGE_j = \frac{\text{Average country-}j \text{ exchange rate from July 1997 to June 1998}}{\text{Average country-}j \text{ exchange rate from July 1996 to June 1997}} - 1. \quad (1)$$

A 10% improvement would be expressed as 0.1, a 10% decline as  $-0.1$ . Exchange rate changes for the 20 major destinations of Filipino workers are listed in the last column of table 2. The changes for the United States, Hong Kong, and Middle Eastern countries were all at least 0.40. By contrast, the exchange rate shocks for Taiwan, Singapore, and Japan were 0.22, 0.24, and 0.27, and for Malaysia and Korea they were actually negative:  $-0.01$  and  $-0.02$ , respectively. Among workers in the sample, those in Indonesia experienced the worst exchange rate change over the period ( $-0.39$ ), and those in Syria experienced the most favorable change (0.43).

Unfortunately, the survey data to be used in the empirical analysis only allow migrants' origin households (not individual migrants) to be tracked over panel years. So the empirical analysis examines migration return rates at the household level. I therefore construct a household-level exchange rate shock variable as follows. Let the countries in the world where overseas Filipinos work be indexed by  $j \in \{1, 2, \dots, J\}$ . Let  $n_{ij}$  indicate the number of overseas work-

<sup>18</sup> The exchange rates are as of the end of each month, and were obtained from Bloomberg L.P.

ers 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

$$ERSHOCK_i = \frac{\sum_{j=1}^J n_{ij} ERCHANGE_j}{\sum_{j=1}^J n_{ij}}. \quad (2)$$

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 weighted by the number of household workers in that country.<sup>19</sup> Because the question of interest is the impact of shocks experienced by migrants on return migration, the sample for analysis is restricted to households with one or more members working overseas prior to the Asian financial crisis (in June 1997).

In addition, the Philippine economy experienced a decline in economic growth after the onset of the crisis. Annual real GDP contracted by 0.8% in 1998, as compared to growth of 5.2% in 1997 and 5.8% in 1996 (World Bank, 2002). The urban unemployment rate (unemployed as a share of the total labor force) rose from 9.5% to 10.8% between 1997 and 1998, while the rural unemployment rate went from 5.2% to 6.9% (*Philippine Yearbook 2001*, table 15.1). Any effects of the domestic economic downturn common to all sample households (as well as effects of the crisis that differ according to households' observed precrisis characteristics) will be taken account of in the empirical analysis, as described in the next section.

#### IV. Impact of Exchange Rate Shocks on Return Migration

The primary goal of the empirical analysis is to determine whether migrant return rates are positively or negatively associated with the exchange rate shock. Positive exchange rate shocks should lead to lower return rates if life cycle migrants predominate. On the other hand, exchange rate shocks should lead to higher return rates if migrants are primarily target earners. In addition, the empirical analysis will test specific implications of the model of migration and household investment.

In the following subsections, I describe the data and sample construction, the characteristics of sample households, the regression specification, and some empirical issues, and then present empirical results.

<sup>19</sup> Of the 1,615 households included in the analysis, 1,455 (90.1%) had just one member working overseas in June 1997, 139 households (8.6%) had two, 18 households (1.1%) had three, and three households (0.2%) had four.

#### A. Data and Sample Construction

The empirical analysis uses data from four 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, and the other three surveys are administered with lower frequency 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, so that 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 paper takes advantage of this fortuitous postponement of the rotation schedule to examine changes in households between 1997 and 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.<sup>20</sup> Households are included in the sample for empirical analysis only if they reported having one or more members overseas in June 1997 (immediately prior to the Asian financial crisis). See appendix A for details regarding the contents of the surveys and the construction of the sample for analysis.

#### B. Characteristics of Sample Households

Table 4 presents summary statistics for the 1,614 households used in the empirical analysis. The top row displays summary statistics for the exchange rate shock. The mean change in the shock index was 0.32, with a standard deviation of 0.13.

The main dependent variable in the analysis is the *12-month migrant return rate*, the number of household migrant workers who returned between July 1997 and June 1998 divided by the number of household members working overseas in June 1997. The mean of this variable is 0.08.

The mean number of household overseas workers in June 1997 is 1.11. The median cash receipt from overseas is 25,000 pesos (U.S.\$962) in January–June 1997.<sup>21</sup> Precrisis cash receipts from overseas are substantial as a share of household income, with a median of 0.37.

Compared to other Philippine households, households in the sample tend to have higher initial (January–June 1997)

<sup>20</sup> As discussed in Yang (2006), there is no evidence that attrition from the sample between 1997 and 1998 is correlated with a household's exchange rate shock.

<sup>21</sup> Philippine pesos are converted to U.S. dollars at the first-half 1997 exchange rate of roughly 26 pesos per dollar.



TABLE 4.—SUMMARY STATISTICS FOR SAMPLE HOUSEHOLDS (HHs)

	Mean	Std. Dev.	10th Pctile.	Median	90th Pctile.
Exchange rate shock	0.32	0.13	0.21	0.40	0.40
12-month migrant return rate	0.08	0.27			
HH financial statistics (January–June 1997):					
Total expenditures	73,400	66,701	24,507	57,496	132,600
Total income	94,051	93,313	27,917	70,389	174,526
Income per capita in (HH)	20,153	21,492	5,504	15,197	39,076
Cash receipts from overseas	35,950	47,004	0	25,000	86,000
Cash receipts from overseas (as share of HH income)	0.39	0.31	0.00	0.37	0.85
Real property purchases (as share of HH income)	0.01	0.07	0.00	0.00	0.00
Number of HH members working overseas in June 1997	1.11	0.37	1.00	1.00	1.00
HH size (including overseas members, July 1997)	6.17	2.42	3	6	9
Located in urban area	0.68				
Owens a vehicle (indicator)	0.13				
HH position in national income per capita distribution, January–June 1997 (indicators):					
Top quartile	0.51				
3rd quartile	0.28				
2nd quartile	0.14				
Bottom quartile	0.07				
HH income sources (January–June 1997):					
Entrepreneurial income, as share of total	0.17	0.25	0.00	0.00	0.58
Indicator: nonzero entrepreneurial income	0.50				
HH head characteristics (July 1997):					
Age	50.0	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 single (indicator)	0.03				

Number of observations: 1,614.

Data source: National Statistics Office, the Philippines. Surveys used: Labor Force Survey (July 1997 and October 1998), Survey on Overseas Filipinos (October 1997 and October 1998), 1997 Family Income and Expenditures Survey (for January–June 1997 income and expenditures), and 1998 Annual Poverty Indicators Survey (for April–September 1998 income and expenditures). Currency unit: Expenditure, income, and cash receipts from abroad are in Philippine pesos (26 per U.S. dollar in January–June 1997).

Sample definition: Households with a member working overseas in June 1996 (according to October 1997 Survey of Overseas Filipinos) and that also appear in 1998 Annual Poverty Indicators Survey, and excluding households with incomplete data (see appendix A for details). Variable definitions: “Exchange rate shock” is change in Philippine pesos per currency unit where overseas worker was located in June 1997. Change is average of 12 months leading to June 1998 minus average of 12 months leading to June 1997, divided by the latter (e.g., 10% increase is 0.1). If household had more than one overseas worker in June 1997, exchange rate shock variable is average change in exchange rate across household’s overseas workers. “Migrant return rate” is number of household’s migrant workers who returned between July 1997 and June 1998 divided by number of household members working overseas in June 1997. “Owens a vehicle” indicator is as of January 1998.

income per capita. Fifty-one percent of sample households are in the top quartile of the national household income per capita distribution, and 28% are in the next-highest quartile. Median precrisis income per capita in the household is 15,197 pesos (U.S.\$584). The mean precrisis household size is 6.17 members (including overseas members).<sup>22</sup> Sixty-eight percent of sample households are urban, compared to the national figure of 59%.

<sup>22</sup> The corresponding precrisis (January–June 1997) national median of income per capita for all households is 7,944 pesos. The national mean household size in July 1997 was 5.27.

### C. Regression specification

In investigating the impact of exchange rate shocks on changes in the migrant return rate between 1997 and 1998, the basic regression equation is

$$RET_{it} = \beta_0 + \beta_1 ERSHOCK_{it} + \epsilon_{it}. \quad (3)$$

Let  $t = 1998$ . For household  $i$ ,  $RET_{it}$  is the migrant return rate in the 12 months leading up to June 1998.  $ERSHOCK_{it}$  is the exchange rate shock for household  $i$  in the year leading up to June 1998, as defined above in equation (2).  $\epsilon_{it}$

is a mean-zero error term. Standard errors are clustered according to the June 1997 location of the household's overseas worker(s).<sup>23</sup>

The constant term,  $\beta_0$ , equals the average change in outcomes across all households in the sample. This represents the shared impact on migrant returns of the decline in Philippine economic growth after the onset of the crisis.

The coefficient of interest is  $\beta_1$ , the impact of the exchange rate shock on the migrant return rate. The identification assumption is that if exchange rates in the locations of overseas Filipino workers had remained unchanged from 1997 through 1998, then migrant return rates would not have varied systematically across households on the basis of their overseas workers' locations. Though this identification assumption cannot be tested directly, it is possible to conduct partial tests for different types of violations of the identification assumption (potential threats to causal inference).

A first potential violation of the identification assumption would be if migrant return rates *prior* to the Asian financial crisis were correlated with the *future* exchange rate shocks that were to occur in their overseas location countries after July 1997. For example, if countries that were to experience the most favorable exchange rate shocks in the wake of the Asian crisis (such as the United States, Hong Kong, and the Gulf states) in general always had the lowest migrant return rates (even *prior* to the crisis), the coefficient on  $ERSHOCK_{it}$  in equation (3) would be biased in a negative direction. Differences in the survey rotation schedule in prior years make it impossible to calculate analogous return rates in years prior to 1997 (household panels cannot be constructed that span successive rounds of the Survey on Overseas Filipinos). However, an imperfect (but likely still informative) return rate from 1996 to 1997 can be constructed using retrospective questions on migrant locations in the October 1997 round of the SOF (described in the Empirical Appendix). Define  $RET9697_i$  as the observed return rate between July 1996 and June 1997 in the overseas location of household  $i$ 's migrant(s).<sup>24</sup>

I use 1996–1997 return rates in two complementary ways. First, I include the 1996–1997 return rate (at the country level) in the regression equation for the 1997–1998 return rate. If the crisis-induced exchange rate changes happen to be correlated with precrisis return rates, inclusion of the precrisis return rates in the regression should change the estimated coefficient on the exchange rate shock. Second, I directly examine the relationship between the exchange rate shock and precrisis return probabilities. Appendix B describes this exercise, and finds no evidence that return probabilities in the immediately prior 12-month period (July

1996–June 1997) are correlated with *future* exchange rate shocks occurring after July 1997.

The second potential violation of the identification assumption is an omitted variable problem: variation in post-Asian crisis migrant returns could be driven by changes in migrant *job termination* in the countries affected by the Asian financial crisis (which are likely to be correlated with the exchange rate shocks), and not by the exchange rate shocks *per se*. If so, the regression results would not necessarily shed light on the theoretical model of return migration, in which migrants decide for themselves when to return home.

A third potential violation of the identification assumption is the possibility that the domestic Philippine economic downturn in 1997–1998 had heterogeneous effects on households in the Philippines in a manner correlated with the locations of their overseas members (also an omitted variable problem). This is a potential concern because households whose migrants experienced more favorable exchange rate shocks do differ along a number of *precrisis* characteristics from households whose migrants experienced less-favorable shocks. Appendix table C1 presents coefficient estimates from a regression of the household's exchange rate shock on a number of *precrisis* characteristics of households and their overseas workers. Several individual variables are statistically significantly different from 0, indicating that households experienced more favorable exchange rate shocks if they had fewer members, heads who were more educated, less educated migrants, and migrants who had been away for longer periods prior to the crisis.<sup>25</sup> If these *precrisis* characteristics also help predict the impact of the *domestic* 1997–1998 Philippine economic downturn on households, there may be an omitted variable problem: migrant return rates may be responding to changes in the domestic economic conditions of their origin households, and not the exchange rate shocks they experience overseas.

Tests for the second and third types of potential violations of the identification assumption involve checking whether the coefficient  $\beta_1$  on the exchange rate shock changes when one includes two types of right-side control variables in the regression equation. First,  $MIGSHOCK_{it}$  is an indicator variable equal to 1 if the household reports that an overseas worker from the household experienced a job loss in the year preceding October 1998, and 0 otherwise.<sup>26</sup> Inclusion of  $MIGSHOCK_{it}$  in the regression controls for changes in migrant return rates due to job termination. Second, the vector  $\mathbf{X}_{i,t-1}$  includes household geographic indicators and a

<sup>23</sup> Households that had more than one overseas worker overseas in June 1997 are clustered according to the location of the *eldest* overseas worker. This results in 50 clusters.

<sup>24</sup> For households with migrants in different location countries, the 1996–1997 return rate variable is simply the mean return rate over that period across the household's migrants.

<sup>25</sup> Also,  $F$ -tests reject the null that some subgroups of variables are jointly equal to 0: indicators for household per capita income percentiles; indicators for household head's education level; indicators for household geographic location in the Philippines; overseas workers' months-away variables; overseas workers' education variables; and overseas workers' occupation variables.

<sup>26</sup> As reported in the Annual Poverty Indicators Survey of October 1998. This variable was not collected in prior years.

TABLE 5.—IMPACT OF EXCHANGE RATE SHOCK ON RETURN MIGRATION AND NEW DEPARTURES, 1997–1998

Independent Variable	Spec. (1)	(2)	(3)	(4)
Exchange rate shock	-0.156 (0.071)**	-0.155 (0.058)***	-0.154 (0.059)**	-0.141 (0.061)**
12-month migrant return rate in location, 1996–97			0.041 (0.128)	0.037 (0.122)
Migrant job loss in 1998 (indicator)				0.154 (0.051)***
Other included independent variables:				
Region indicators, region × urban	—	Y	Y	Y
Controls for precrisis household and migrant characteristics	—	Y	Y	Y
R-squared	0.01	0.06	0.06	0.09
Number of observations	1,614	1,614	1,614	1,614

Dependent variable: 12-month migrant return rate (July 1997 to June 1998).  
 \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

Each column is a separate OLS regression. Unit of observation is a household. Standard errors in parentheses, clustered by location country of household’s eldest overseas worker. See table 4 for notes on sample definition and definitions of exchange rate shock and migrant return rate. “12-month migrant return rate in location, 1996–97” is fraction of migrants away in July 1996 in the migrant’s overseas location who returned home by June 1997. “Migrant job loss in 1998” is an indicator for household reporting (in October 1998) that a migrant member suffered a job loss in the past year (8% of households report such a loss).

Region indicators are for 16 regions within the country. Region × urban variables are region indicators interacted with an indicator for urban location. Household-level controls are as follows. Income variables as reported in January–June 1997: log of per capita household income; indicators for being in second, third, 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 household head’s 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); relation to household head (female head or spouse of head, daughter, son, other relation; male head omitted); indicator for single marital status; years of age; indicator for location in immigration destination (see note to table 3 for list of countries); log of 1996 per capita GDP in migrant’s location country (1995 U.S. dollars).

range of precrisis household and migrant characteristics.<sup>27</sup> Inclusion of  $\mathbf{X}_{i,t-1}$  controls for variation in migrant return rates explained by households’ precrisis characteristics, and should indirectly allow for heterogeneity in the impact of the domestic 1997–1998 Philippine economic downturn across households (to the extent that the latter type of heterogeneity is related to the same set  $\mathbf{X}_{i,t-1}$  of variables).<sup>28</sup>

With additional controls, the expanded regression equation is

$$RET_{it} = \beta_0 + \beta_1(ERSHOCK_{it}) + \beta_2(RET9697_{it}) + \beta_3(MIGSHOCK_{it}) + \delta'(\mathbf{X}_{i,t-1}) + \epsilon_{it}. \tag{4}$$

<sup>27</sup> Household geographic 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 January–June 1997: log of per capita household income; indicators for being in second, third, and top quartile of the 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 household’s overseas workers 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 (female head or spouse of head, daughter, son, other relation; male head omitted); indicator for single marital status; years of age.

<sup>28</sup> In addition, to the extent that  $\mathbf{X}_{i,t-1}$  includes variables that explain return rates but that are themselves uncorrelated with the exchange rate shocks, their inclusion can reduce residual variation and lead to more precise coefficient estimates on the exchange rate shock.

D. Regression Results

This subsection describes the impact of exchange rate shocks on return migration at the household level. I first describe the mean impact of the exchange rate shocks across households. I then examine heterogeneity in the effect of the shock on return migration and on investment-related outcomes.

*Overall Impact of Exchange Rate Shock on Return Migration:* Table 5 presents coefficient estimates from equation (3) and versions of equation (4). Column (1) presents the coefficient estimate ( $\beta_1$ ) on the exchange rate shock when no other right-hand-side variables are included in the regression; column (2) includes household location indicators and the control variables for precrisis household and migrant characteristics. The coefficient estimates are almost exactly the same across the columns [−0.156 in column (1) and −0.155 in column (2)] and are both highly statistically significant (at the 1% level). Because the coefficient on the exchange rate shock is essentially unchanged when control variables are added to the regression in column (2), there is little reason to believe that any bias is being introduced by heterogeneity in the effect of the domestic economic downturn across households in the Philippines, or by any other unobserved heterogeneity correlated with the control variables.

Column (3) includes as a control variable the observed return rate between July 1996 and June 1997 in the overseas location of household  $i$ ’s migrant(s),  $RET9697_i$ . As it turns out, the precrisis return rate across locations has little relationship with postcrisis return probabilities: the coefficient is small in magnitude (0.041) and is not statistically significantly different from 0. The coefficient on the ex-

change rate shock ( $-0.154$ ) is essentially identical to the coefficient in the previous columns. There is no evidence that the estimated impact of the exchange rate shock on migrant returns is due to a spurious correlation between precrisis return rates and the exchange rate shock.

The fourth column of the table includes as a control variable the indicator for a migrant from the household having experienced an overseas job loss in the past year ( $MIGSHOCK_{it}$ ). As one might expect, the coefficient on  $MIGSHOCK_{it}$  is positive and highly statistically significant. A migrant job loss in the past year raises a household's return rate by 0.154.

Though migrant job losses do lead to higher migrant returns, including  $MIGSHOCK_{it}$  in the regression has only a very small effect on the coefficient on the exchange rate shock (reducing it in magnitude from  $-0.154$  to  $-0.141$ ). The coefficient on the exchange rate shock remains statistically significantly different from 0. There is therefore little indication that the exchange rate shock is having its effect primarily via migrant job losses (the second potential violation of the identification assumption described above).

The coefficient estimate in column (4) indicates that a 10% improvement (0.10) in the exchange rate is associated with a 0.0141 decline in the 12-month migrant return rate. This is a large effect, equal to nearly one-fifth of the mean 12-month return rate in the sample of 0.08.

In terms of the theoretical model, the fact that favorable exchange rate shocks lead to fewer migrant returns suggests that, on average, life-cycle considerations dominate target-earnings motivations for migrant returns.

Appendix table C2 presents regression coefficients on the full set of right-side variables from the regression in column (4) of table 5. Return rates are higher in households whose migrants have spent more months away. Return rates are lower in households whose migrants are in immigration destinations, and whose household heads are more educated.

*Heterogeneous Effect of Shock on Return Migration:* The theoretical model predicts that the effect of the exchange rate shock on return rates will be heterogeneous according to a migrant's foreign wage level. Although migrants' foreign wages are not reported in the data set, it is possible to construct a reasonable index of foreign wages: *predicted remittances*.

*Predicted remittances as an index of foreign earnings:* Start with the plausible assumption that foreign wages are positively correlated with remittances sent home. Remittances sent by the migrant to the sample household are reported in the data set, so one might consider using remittances directly as a proxy for foreign wages. But this approach would be subject to the following concern: remittances sent home are likely to be a very noisy proxy for the migrant's wages. For example, if remittances serve as insurance for migrants' origin households, they could fluctuate substantially from one period to the next, depending on

whether the origin household has experienced economic shocks, health shocks, and the like.<sup>29</sup> Households may also have intermittent cash requirements (say, for school tuition) that cause remittances to fluctuate from period to period.

Ideally, then, one would capture the portion of remittances that is related to a migrant's usual foreign wages, and not to factors that fluctuate from one period to the next. A straightforward way to do this is to estimate the following auxiliary regression relating remittances sent home ( $R_{it-1}$ ) to household  $i$  in an initial period  $t - 1$  to variables that are determined prior to the period of analysis ( $Z_{it-1}$ ):

$$R_{it-1} = \alpha + \gamma Z_{it-1} + \epsilon_{it-1}. \quad (5)$$

The vector of predetermined characteristics  $Z_{it-1}$  includes variables that in principle should be correlated with foreign wage earnings of the household's migrants. Then, for each household one can construct predicted remittances  $\hat{R}_{it-1}$  implied by the auxiliary regression:

$$\hat{R}_{it-1} = \alpha + \gamma Z_{it-1}.$$

Appendix table C3 presents regression results from OLS estimation of equation (5). The dependent variable is total household remittance receipts prior to the crisis (from January to June 1997), in thousands of current Philippine pesos. Right-side variables are means of the following variables across the household's migrants away in June 1997: 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); indicator for "migrant is male"; indicator for location in immigration destination; log of 1996 per capita GDP in migrant's location country (1995 U.S. dollars). An additional independent variable included is the number of migrants away in June 1997, as this obviously affects total household remittance receipts. The coefficient estimates yield no surprises: households receive more remittances when their migrants are better educated, in professional occupations, male, and working in countries with higher per capita GDP. Households with more migrants also receive more remittances. Predicted remittances range from 6,563 (U.S.\$252) to 89,665 pesos (U.S.\$3,449). The mean is 35,943 (U.S.\$1,382), and the standard deviation is 15,609 (U.S.\$600).

*Heterogeneity in effect of exchange rate shock:* Predicted remittances  $\hat{R}_{it-1}$  from the regression in appendix table C3 are used as a foreign wage index in the analysis of heterogeneity in the effect of exchange rate shocks on migrant returns.

The theoretical model predicts that in the presence of borrowing constraints and a minimum investment threshold,

<sup>29</sup> For empirical evidence on the responses of remittances to negative shocks in migrant origin locations, see Yang (2005) and Yang and Choi (2005).

TABLE 6.—HETEROGENEITY IN IMPACT OF EXCHANGE RATE (ER) SHOCK ON RETURN MIGRATION AND HOUSEHOLD INVESTMENT, 1997–1998

Independent Variable	Dependent Variable:				
	12-month migrant return rate (1)	Change in vehicle ownership (2)	Change in real property purchases (3)	Change in entrepreneurial income (4)	First principal component of investment variables (5)
(ER shock) × (low foreign wage index)	−0.179 (0.105)*	0.086 (0.209)	0.011 (0.077)	−0.090 (0.214)	−0.027 (0.642)
(ER shock) × (intermediate foreign wage index)	0.011 (0.13)	0.340 (0.161)**	0.112 (0.088)	0.118 (0.101)	0.934 (0.365)**
(ER shock) × (high foreign wage index)	−0.412 (0.14)***	0.048 (0.217)	−0.101 (0.122)	−0.017 (0.133)	−0.135 (0.614)
(Migrant job loss) × (low foreign wage index)	0.098 (0.102)	0.073 (0.093)	−0.005 (0.012)	−0.098 (0.068)	−0.091 (0.165)
(Migrant job loss) × (intermediate foreign wage index)	0.219 (0.108)**	0.056 (0.058)	−0.003 (0.016)	−0.018 (0.06)	0.044 (0.144)
(Migrant job loss) × (high foreign wage index)	0.141 (0.071)**	0.009 (0.052)	−0.023 (0.02)	0.117 (0.051)**	0.202 (0.139)
Intermediate foreign wage index	−0.084 (0.061)	−0.082 (0.099)	−0.013 (0.04)	−0.060 (0.077)	−0.262 (0.259)
High foreign wage index	0.028 (0.059)	−0.008 (0.112)	0.064 (0.054)	−0.033 (0.1)	0.033 (0.315)
Other included independent variables:					
Region indicators, region × urban controls for precrisis household and migrant characteristics	Y	Y	Y	Y	Y
Number of observations	1614	1614	1614	1614	1614
R-squared	0.10	0.05	0.05	0.09	0.07

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

Each column displays coefficients (standard errors) from an OLS regression where dependent variable is 1997–1998 migrant return rate. Due to generated regressor, standard errors are bootstrapped with migrant location countries as clusters. Unit of observation is a household. See appendix table C3 for auxiliary regression used to create foreign wage index (predicted remittances). “Low foreign wage index” is indicator for below 30th percentile of foreign wage index; “intermediate” and “high” are indicators for 30th to 70th percentile and above 70th percentile of foreign wage index, respectively. See notes to tables 4 and 5 for definitions of exchange rate shock and right-side variables. Changes in entrepreneurial income and in real property purchases are between the January–June 1997 and April–September 1998 reporting periods, and are expressed as fractions of initial (January–June 1997) household income. “Change in vehicle ownership” is change in an indicator for ownership of any vehicles from January 1998 to October 1998 (takes on values of −1, 0, and 1).

the impact of the exchange rate shock on the return rate should be an inverted U in the foreign wage (largest for migrants with the lowest and highest foreign wages). It is therefore useful to create indicator variables that divide households into three groups on the basis of their foreign wage index: low, intermediate, and high. The *low* group comprises households below the 30th percentile of the distribution of predicted remittances, the *intermediate* group those whose predicted remittances are in the 30th to 70th percentiles, and the *high* group are those whose predicted remittances are above the 70th percentile.

To test the theoretical prediction, the regression equation (4) is reestimated when the exchange rate shock variable  $ERSHOCK_{it}$  is interacted with indicator variables for each of these groups ( $LOW_{it}$ ,  $INT_{it}$ , and  $HIGH_{it}$ , respectively). Main effects for  $INT_{it}$  and  $HIGH_{it}$  are also included in the regression.<sup>30</sup> To help ensure that the coefficients on the interaction terms do not reflect heterogeneity in the effect of migrant job losses correlated with the exchange rate shock, the regression also includes an interaction term between the  $MIGSHOCK_{it}$  variable and the foreign wage index indicators. Standard errors are bootstrapped to allow for the

<sup>30</sup> Due to collinearity among the foreign wage index group indicators, the main effect for  $LOW_{it}$  is excluded.

existence of generated regressors. The bootstrap sampling cluster is the location of the household’s eldest migrant.

Regression results are presented in column (1) of table 6. The coefficients on the interaction terms between the exchange rate shock and the foreign wage index group indicators are in the first three rows. The coefficients on the interaction terms for the lowest and highest levels of the foreign wage index are both negative and statistically significantly different from 0. For households with in the lowest group, the coefficient on the exchange rate is −0.179 and is significant at the 10% level. For households in the highest group, the coefficient on the exchange rate is −0.412 and is significant at the 1% level. By contrast, the coefficient on the exchange rate shock for households with intermediate levels of the foreign wage index (0.011) is actually positive, is very small in magnitude, and is not statistically significantly different from 0. In sum, the effect of the exchange rate shock on migrant returns is most negative for households with the lowest and highest levels of the foreign wage index.

The fact that the effect of the exchange rate shock on returns has an inverted-U-shaped relationship with a proxy for foreign wages (predicted remittances) confirms the first prediction of the theoretical model. There is also evidence

for the second prediction: that the impact of the exchange rate shock on *household investment* should also show an inverted-U-shaped relationship with the foreign wage proxy.

Household investments in entrepreneurial enterprises are not explicitly reported in the data set, so the analysis must focus on outcomes plausibly related to such investment activity. Several natural proxies for household entrepreneurial investment exist.

The next two columns of table 6 present regression results similar to those in column (1), but where the dependent variables are changes in ownership of certain assets. In column (2), the outcome variable is the change in an indicator for the household owning any vehicles (car, jeep, or motorcycle), which takes on the values  $-1$ ,  $0$ , and  $1$ .<sup>31</sup> In column 3, the dependent variable is the change in purchases of *real property* (land and buildings) from before to after the crisis (January–June 1997 to April–September 1998), divided by precrisis (January–June 1997) household income.<sup>32</sup> To the extent that vehicles and real property make up part of the starting capital of an entrepreneurial enterprise, these outcomes should also capture changes in household entrepreneurial investments.

The regression results indicate that the impact of exchange rate shocks on asset ownership is also an inverted U-shape in the foreign wage index. For both asset outcomes, the coefficient on the exchange rate shock interacted with the intermediate foreign wage index indicator is positive, whereas the coefficients on the low and high foreign wage index interaction terms are smaller in magnitude or negative.

For the change in vehicle ownership, the coefficient on the exchange rate shock for the intermediate group is statistically significantly different from 0 at the 5% level. A 10% improvement (0.10) in the exchange rate for households with intermediate levels of the foreign wage index is associated with a 3.4-percentage-point increase in vehicle ownership. This is a large effect, considering that only 13% of sample households owned vehicles in the initial period.

It is also sensible to examine heterogeneity in the impact of the exchange rate shocks on the change in household entrepreneurial income. Changes in entrepreneurial income should be reflective of underlying entrepreneurial investments to the extent that such investments are prerequisites for first-time entry into entrepreneurship, or entry into new types of entrepreneurship.

In column (4) of table 6, the dependent variable is the change in household entrepreneurial income from before to

after the crisis (from January–June 1997 to April–September 1998), divided by precrisis (January–June 1997) household income. Consistent with the results for the changes in assets in the previous two columns, the coefficient on the exchange rate shock interacted with the intermediate foreign wage index indicator is positive, whereas the interactions with the low and high foreign wage index indicators are both negative. However, the standard errors are large, so that none of the coefficients on interaction terms with the exchange rate shock are statistically significantly different from 0.

Each of the investment proxies used as outcome variables in columns (2) to (4) of table 6 is a noisy measure of household investment. To raise the signal-to-noise ratio, it is useful to consider as an outcome variable a linear combination of these proxies. A linear combination of the proxies should help raise the signal-to-noise ratio if measurement errors in the proxies are not completely positively correlated with one another.

A sensible linear combination of the three investment proxies is their first principal component: the single index that explains the largest share of variation in the proxies.<sup>33</sup> Following standard practice, I normalize each of the three investment proxies to have mean 0 and standard deviation 1 before determining the first principal component.<sup>34</sup>

In column (5) of table 6, this first principal component is the dependent variable in the regression. The coefficient on the exchange rate shock interacted with the indicator for the intermediate foreign wage index group is positive and statistically significantly different from 0 at the 5% level. A 10% improvement (0.10) in the exchange rate for households with intermediate levels of the foreign wage index is associated with a 0.093 increase in the investment index. This effect amounts to roughly one-tenth of a standard deviation of the investment index. By contrast, the interactions with the indicators for the low and high foreign wage index groups are both negative in sign, much smaller in magnitude, and not statistically significantly different from 0.

## V. Conclusion

This paper takes advantage of an unusual quasi experiment—large exchange rate shocks generated by the Asian financial crisis—to shed light on the economics of return migration. Overall, Philippine migrants are less likely to return home when they experience more positive exchange rate shocks, suggesting that straightforward life cycle mo-

<sup>31</sup> As described in appendix A, vehicle ownership data were not recorded in July 1997, so the change in this ownership indicator is between January 1998 and October 1998. If vehicle ownership changed by January 1998 in response to the July–December 1997 exchange rate shocks, the coefficient estimates should be lower bounds on the true effects.

<sup>32</sup> Dividing by precrisis household income allows coefficient estimates to be interpreted as fractions of initial household income. This specification is preferred to the change in *log* real property purchases because many households report zero real property purchases in one of the two periods.

<sup>33</sup> This approach is analogous to the procedure used to construct indices of intelligence (*g*) from several separate test scores (as in Cawley et al., 1996) or to construct an index of crack cocaine from several separate proxies (Fryer et al., 2005).

<sup>34</sup> The loadings on each proxy are 0.653 for the change in entrepreneurial income, 0.609 for the change in vehicle ownership, and 0.451 for the change in real property purchases. The first principal component is then simply the weighted average of the normalized variables, where the weight on each variable is the square of the loading. The resulting investment index also has zero mean and unit standard deviation.

tivations dominate target-earnings explanations for return migration. However, a subset of migrants are likely to be target earners: for households with intermediate levels of a foreign earnings index, more favorable exchange rate shocks have the least effect on return migration, while leading to increases in proxies for household investment. These empirical results are consistent with a model where migration helps households accumulate resources for investment, in the face of credit constraints and minimum investment levels.

On average, a 10% improvement in the exchange rate reduces the 12-month migrant return rate by 1.4 percentage points. This is a large effect, amounting to nearly one-fifth of the mean 12-month return rate in the sample. Positive exchange rate shocks for migrants simultaneously raise the Philippine-currency value of foreign wages and of accumulated savings held overseas. If increases in overseas savings lead to higher return rates (a wealth effect), the negative estimated effect of exchange rate shocks on return rates is likely to understate the impact of pure foreign wage changes on return rates.

For these results to have implications for the design of policies encouraging return migration from developed countries, the question of generalizability must be considered. This paper has examined the economics of return migration for a particular type of international labor flow: temporary labor migration by Filipinos, most of which is likely to be formal and in accordance with the immigration laws of host countries. This type of international migration has become a large phenomenon in the post-World War II period, when European countries established guest-worker programs and oil-rich Gulf states initiated massive labor importation (Chiswick & Hatton, 2003). Recognition of the potential benefits for developing countries motivates current WTO negotiations on liberalization of temporary labor movement (Winters et al., 2002) and other proposals for developed countries to provide temporary labor permits to workers from developing countries (such as Birdsall, Rodrik, & Subramanian, 2005).<sup>35</sup> The success of such initiatives hinges on migrants eventually returning to their origin countries, but past attempts to explicitly encourage return migration have had mixed outcomes (see Zimmermann, 1994). This paper's results therefore apply to a particular but increasingly prominent type of international labor flow.

In combination with a companion paper, Yang (2006), this paper also demonstrates the possibility of exploring the effect of international migration on households in developing countries using existing data sets collected by national governments. The Philippines is not likely to be the only country whose national household survey includes questions on international migration, and so valuable future work could seek evidence in other countries of the impacts of economic shocks faced by migrants on return migration,

entrepreneurship, and other outcomes in the migrants' source households.

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<sup>35</sup> The Bush administration also recently proposed to provide temporary employment visas to undocumented U.S. workers (Bumiller, 2004).

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period (April–September 1998) from the October 1998 APIS. Unfortunately, data on vehicle ownership in the precrisis period are unavailable in the July 1997 round of the FIES; these data were only recorded in the January 1998 survey. So analyses of changes in vehicle ownership examine changes from January 1998 (from the FIES) to October 1998 (from the APIS).

Monthly exchange rate data (used in constructing the exchange rate shock variable) were obtained from Bloomberg L.P.

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

1. *The household is inferred to have one or more members working overseas in June 1997.* Using the October 1997 SOF, I identify households that had one or more members working overseas in June 1997, and identify the locations of these overseas members. (See the next subsection for the exact procedure.)
2. *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.
3. *The same household has occupied the dwelling between July 1997 and October 1998.* This criterion is necessary because the Labor Force Survey 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.
4. *The household has complete data on precrisis control and outcome variables (recorded July 1997).*
5. *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 2), 28,152 (91.6%) contained the same household continuously over that period (criterion 3). Of these households, 27,715 (98.4%) had complete data for all variables used in the analysis (criteria 4 and 5). And of these 27,715 households, 1,614 (5.8%) had a member overseas in June 1997 (criterion 1). These 1,614 households are the sample used in the empirical analysis.

Constructing the sample on the basis of criteria 1, 2, and 4 does not threaten the validity of the empirical estimate of the impact of the migrant economic shocks on households. Criteria 1 and 4 are based on preshock characteristics of the surveyed households, and criterion 2 comes from the predetermined rotation schedule established by the National Statistics Office.

It is important to check whether sample selection on the basis of criterion 3 or 5 may have been affected by the independent variable of interest (shocks experienced by migrant members), because households' propensities to change dwellings or to misreport information in the survey may have been affected by the shocks. Attrition from the household sample due to these criteria should not generate biased coefficient estimates if such attrition is uncorrelated with the shocks. Yang (2004), which uses essentially the same sample for analysis, finds no evidence that attrition due to criterion 3 or 5 is associated with the exchange rate shocks, and so allowing these criteria play a role in determining the sample for analysis should not threaten the internal validity of the estimates.

## 2. Determining Locations of Overseas Household Members

The main outcome variable in the empirical analysis is the 12-month migrant return rate: the number of household migrant workers who returned between July 1997 and June 1998 divided by the number of household members working overseas in June 1997. In this subsection I describe the rules used to determine if a particular individual in the October 1997 Survey on Overseas Filipinos was overseas in June 1997, and if so, what country the person was in. Among other questions, the SOF asks:

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

## APPENDIX A

### Data Appendix

#### 1. Data Sets

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).

The LFS collects data on primary activity and demographic characteristics of household members aged 10 or above. These data refer to the household members' activities in the week prior to 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, I use the July 1997 and October 1998 rounds of the LFS and the October 1997 and October 1998 rounds of the SOF. Because 1997 remittances in the SOF refer to an April–September reporting period, the SOF remittance data cannot be used to determine a household's level of remittances prior to the July 1997 Asian financial crisis. So I obtain initial (January–June 1997) remittance receipts from the July 1997 round of the FIES.

Data on total household income, real property purchases, and entrepreneurial income are available for the precrisis period (January–June 1997) from the July 1997 FIES. Data on real property purchases, entrepreneurial income, and vehicle ownership are available for the postcrisis



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 have not yet returned). Unfortunately, the survey does not collect information on stays overseas *prior* to the most recent one. So 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:

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

Using this question, two reasonable assumptions allow me to proceed. First, assume all stays overseas are continuous (except for vacations home in the midst of a stay overseas). Second, assume no household member moves between countries overseas. On making 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 4 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.

89.8% of individuals identified as being away in June 1997 (and their overseas locations) were classified as such using just questions 1 to 3 above. The remaining 10.2% of individuals identified as being away in June 1997 (and their locations) relied on question 4 above and the two allocation assumptions just described.

## APPENDIX B

### Empirical Appendix

It is important to investigate whether the empirical results may be biased by preexisting differences in migrant return rates across households whose migrants are in different countries (as discussed in section IV C). The test described here involves checking whether migrant return rates *prior* to the Asian financial crisis are correlated with the (*future*) exchange rate shocks that were to occur in their overseas location countries after July 1997. In years leading up to 1997, it is not possible to track households between successive waves of the annual Survey on Overseas Filipinos (SOF), because the Labor Force Survey (within which the SOF is administered) followed a faster household rotation schedule prior to July 1997. Therefore, it is not possible to calculate migrant return rates as in the main analysis above (the number of migrants who returned between July of year  $t$  and June of year  $t + 1$ , divided by the number of migrants who were overseas in June of year  $t$ ).

However, one can use the cross-sectional SOF to carry out an (admittedly imperfect) analysis of return rates, in the following manner. It is possible to construct migrant return rates using retrospective questions on migrants' previous departures and returns from variables that are included

in the cross-sectional SOF. Migrant return rates constructed in this way are imperfect because the questions in the SOF in some cases do not allow a migrant's past location to be known with certainty, especially for time periods more than a few months in the past.

To make the test comparable to that in the main analysis above, the locations of individual migrants observed in, say, the October 1997 SOF must be inferred for June 1996. An indicator variable is then constructed that takes the value of 1 if the migrant returned over the subsequent 12-month period, and 0 otherwise. The procedure is identical to that described in the appendix A. The unit of observation is the migrant (rather than the household), and regressions analogous to equations (3) and (4) are estimated.

The approach of using the retrospective questions in the cross-sectional SOF to construct a return indicator has some other drawbacks. Initial (prereturn) characteristics of migrants and their origin households are not known, only the characteristics at the time of the October SOF. Therefore, only variables that can be considered relatively immutable are used as right-side controls.<sup>36</sup> In addition, with this approach it is impossible to examine changes in variables associated with household investment, which require household panel data.

Appendix table C4 presents regression results. First, panel A shows that this alternative approach does generate the negative effect of the exchange rate shock on migrant returns in the postcrisis period (July 1997–June 1998). In the first column, no independent variables other than the exchange rate shock are included in the regression; the second column includes controls for migrant and household characteristics. Both coefficients are negative, they are roughly the same size, and they are statistically significantly different from 0. The coefficients are slightly larger than those in the corresponding columns (1 and 2) of table 5, but remain well within 95% confidence intervals.

Panel B reports analogous regression results, but where instead the outcome variable is an indicator for migrant return in the 12 months up to June 1997. In each regression the coefficients are smaller in magnitude, and in neither are the coefficients statistically significantly different from 0. Both coefficients are only one-quarter the size (around  $-0.05$ ) of the coefficients in panel A. In sum, this analysis provides no evidence that preexisting variation in migrant return rates correlated with *future* exchange rate shocks is a likely source of bias in the regression estimates of table 4.

## APPENDIX C

<sup>36</sup> These variables are: indicators for migrant's months away as of June of previous year (12–23, 24–35, 36–47, 48 or more; 0–11 omitted); indicators for migrant's highest education level completed (high school, some college, college or more; less than high school omitted); relationship to household head (female head or spouse of head, daughter, son, other relation; male head omitted); years of age; indicator for location in immigration destination; log of 1996 per capita income in migrant's location country; five indicators for household head's highest level of education completed (elementary, some high school, high school, some college, and college or more; less than elementary omitted).

TABLE C1.—DETERMINANTS OF EXCHANGE RATE SHOCK (JULY 1997 TO JUNE 1998)

Migrant Characteristics		Household Characteristics	
Return rate in location, 1996–1997	–0.118 (0.209)	Head has elementary education	0.016 (0.008)*
Away 12–23 months	0.011 (0.009)	Head has some high school education	0.016 (0.015)
Away 24–35 months	0.022 (0.008)***	Head has high school education	0.03 (0.011)***
Away 36–47 months	0.021 (0.008)**	Head has some postsecondary education	0.032 (0.019)
Away 48 months or more	0.022 (0.013)	Head has college education or more	0.036 (0.021)
Female head or spouse of head	–0.019 (0.024)	log(per capita income in household)	–0.002 (0.010)
Daughter of head	–0.006 (0.025)	2nd quartile of sample pc income	0.023 (0.012)*
Son of head	0.001 (0.015)	3rd quartile of sample pc income	0.007 (0.013)
Other relation to head	0.002 (0.016)	Top quartile of sample pc income	–0.004 (0.017)
Has high school education	–0.008 (0.010)	Head is professional	0.003 (0.011)
Has some postsecondary education	–0.025 (0.017)	Head is clerical	0.002 (0.009)
Has college education or more	–0.012 (0.017)	Head is service worker	–0.011 (0.018)
Age	0.001 (0.001)	Head is production worker	–0.005 (0.008)
Marital status is single	0.006 (0.009)	Head has other occupation	0.001 (0.008)
Immigration destination	0.007 (0.052)	Head does not work	0.05 (0.041)
Per capita income in location	0.024 (0.041)	Head's age	0 (0.000)
Domestic servant	0.022 (0.034)	Head has single marital status	0.012 (0.011)
Ship's officer or crew	–0.062 (0.032)*	Household size	–0.004 (0.002)*
Professional	–0.005 (0.025)	Region indicators, region × urban	Y
Clerical	0.028 (0.029)	Number of observations	1614
Other service occupation	0.011 (0.015)	R-squared	0.11
Other occupation	–0.052 (0.035)		

Coefficients from OLS regression.

Dependent variable: Exchange rate shock (July 97 to June 98).

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

Table displays coefficients (standard errors) from a single OLS regression. Standard errors in parentheses, clustered by location country. Unit of observation is a household. Other included independent variables are region indicators and region × urban interactions (coefficients not shown). All independent variables are recorded in July 1997 or before. See notes to tables 3 and 4 for definitions of exchange rate shock and right-side variables. Omitted indicator variables are: migrant away 0–11 months, migrant is male head of household, migrant has less than high school education, migrant is production worker, household head has less than elementary education, household is in 1st quartile of sample per capita (pc) income, household head is agricultural worker.

TABLE C2.—DETERMINANTS OF MIGRANT RETURNS, JULY 1997–JUNE 1998

Migrant Characteristics		Household Characteristics	
Exchange rate shock	-0.141 (0.061)**		
Return rate in location, 1996–1997	0.037 (0.122)		
Migrant job loss in 1998	0.154 (0.051)***		
Away 12–23 months	0.033 (0.012)***	Head has elementary education	-0.019 (0.015)
Away 24–35 months	-0.004 (0.017)	Head has some high school education	-0.006 (0.017)
Away 36–47 months	0.035 (0.017)**	Head has high school education	-0.013 (0.020)
Away 48 months or more	0.045 (0.018)**	Head has some postsecondary education	-0.048 (0.019)**
Female head or spouse of head	-0.027 (0.022)	Head has college education or more	-0.038 (0.020)*
Daughter of head	-0.04 (0.033)	log(per capita income in household)	-0.012 (0.019)
Son of head	-0.046 (0.034)	2nd quartile of sample pc income	0.014 (0.026)
Other relation to head	-0.064 (0.027)**	3rd quartile of sample pc income	0.051 (0.034)
Has high school education	0.035 (0.020)*	Top quartile of sample pc income	0.037 (0.039)
Has some postsecondary education	0.015 (0.018)	Head is professional	0.047 (0.029)
Has college education or more	0.019 (0.019)	Head is clerical	0.057 (0.021)***
Age	0 (0.001)	Head is service worker	-0.012 (0.034)
Marital status is single	0.002 (0.014)	Head is production worker	0.011 (0.024)
Immigration destination	-0.05 (0.019)***	Head has other occupation	0.011 (0.018)
log(per capita GDP) in location	0.005 (0.013)	Head does not work	0.164 (0.080)**
Domestic servant	-0.025 (0.017)	Head's age	0 (0.001)
Ship's officer or crew	0.025 (0.021)	Head has single marital status	0.028 (0.027)
Professional	-0.021 (0.026)	Household size	-0.003 (0.003)
Clerical	-0.052 (0.022)**	Region indicators, region × urban	Y
Other service occupation	-0.015 (0.023)	Number of observations	1614
Other occupation	-0.08 (0.030)**	R-squared	0.09

Coefficients from OLS regression.

Dependent variable: 12-month migrant return rate (July 1997 to June 1998).

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

Table displays coefficients (standard errors) from a single OLS regression. Standard errors in parentheses, clustered by location country. Unit of observation is a household. Other included independent variables are region indicators and region × urban interactions (coefficients not shown). All independent variables are recorded in July 1997 or before (except "Migrant job loss in 1998" indicator). See notes to tables 3 and 4 for definitions of independent variables.

TABLE C3.—DETERMINANTS OF REMITTANCES RECEIVED BY HOUSEHOLD  
(JANUARY–JUNE 1997)

Migrant Characteristics	
Has high school education	3.975 (3.679)
Has some postsecondary education	3.871 (3.606)
Has college education or more	11.972 (3.853)**
Domestic servant	-2.841 (4.286)
Ship's officer or crew	-2.806 (4.220)
Professional	11.676 (4.553)*
Clerical	2.485 (6.202)
Other service occupation	-5.446 (4.296)
Other occupation	6.941 (10.843)
Migrant is male	21.508 (3.651)**
Number of migrants away in June 1997	15.735 (3.037)**
Location Country Characteristics	
Immigration destination	4.980 (4.249)
1996 per capita GDP (000's of 1995 U.S.\$)	0.444 (0.153)**
Constant	-6.802 (5.997)
Number of observations	1627
R-squared	0.11

Coefficients from OLS regression.

Dependent variable: Total household remittance receipts from January to June 1997 (thousands of Philippine pesos).

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

Table displays coefficients (standard errors) from a single OLS regression. Standard errors in parentheses, clustered by location country. Unit of observation is a household. All independent variables are recorded in July 1997 or before. See notes to Tables 3 and 4 for definitions of exchange rate shock and right-side variables. Omitted migrant characteristics variables are "Has less than high school education" and "Production worker" occupation variable.

TABLE C4.—IMPACT OF EXCHANGE RATE SHOCK ON MIGRANT RETURNS, 1996–1997 AND 1997–1998 (USING RETROSPECTIVE DATA IN CROSS-SECTIONAL SURVEY ON OVERSEAS FILIPINOS, 1997 AND 1998)

A. July 1997–June 1998 Returns and Current Exchange Rate Shock		
Sample: Migrants overseas in June 1997		
Dependent variable: Indicator for migrant return by June 1998 (1 if returned, 0 otherwise)		
Independent Variable	Spec. (1)	(2)
Exchange rate shock (June 1997–June 1998)	–0.204 (0.091)**	–0.222 (0.086)***
Other included independent variables: Controls for migrant and household characteristics	—	Y
R-squared	0.01	0.05
Number of observations	2,197	
B. July 1996–June 1997 Returns and Future Exchange Rate Shock		
Sample: Migrants overseas in June 1996		
Dependent variable: Indicator for migrant return by June 1997 (1 if returned, 0 otherwise)		
Independent Variable	Spec. (1)	(2)
Exchange rate shock (June 1997–June 1998)	–0.055 (0.056)	–0.053 (0.050)
Other included independent variables: Controls for migrant and household characteristics	—	Y
R-squared	0.00	0.04
Number of observations	2,015	

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

Each column presents a coefficient estimate on exchange rate shock in a separate OLS regression. Standard errors in parentheses, clustered by location country. Unit of observation is an individual migrant inferred as having been overseas in June 1997 (panel A) or June 1996 (panel B), as reported in Survey on Overseas Filipinos (1998 and 1997 rounds, respectively); see appendix A for inference rule. Dependent variable equal to 1 if migrant returned from overseas within following 12 months, and 0 otherwise. (Means of dependent variables for 1997 and 1998 samples are 0.098 and 0.106, respectively.) Exchange rate shock is change in Philippine pesos per currency unit where overseas worker was located. Change is average of 12 months leading to June 1998 minus average of 12 months leading to June 1997, divided by the latter (e.g., 10% increase is 0.1).

“Controls for migrant and household characteristics” are: indicators for months away as of June of previous year (12–23, 24–35, 37 or more; 0–11 omitted); indicators for highest education level completed (high school, some college, college or more; less than high school omitted); relationship to household head (female head or spouse of head, daughter, son, other relation; male head omitted); years of age; indicator for location in immigration destination (see note to table 2 for list of countries); log of 1996 per capita income in migrant’s location country; five indicators for household head’s highest level of education completed (elementary, some high school, high school, some college, and college or more; less than elementary omitted).