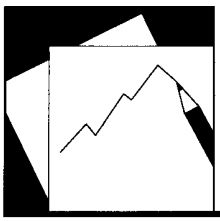

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Exchange Rates and Wages in an Integrated World

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Exchange Rates and Wages in an Integrated World

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Abstract

We analyze how the pass-through from exchange rate to domestic wages depends on the degree of integration between domestic and foreign labor markets. Using data from 66 countries over the period 1981–2005, we find that the elasticity of domestic wages to real exchange rate is 0.1 after a year for countries with high barriers to external labor mobility, but about 0.4 in countries with low barriers to mobility. The results are robust to the inclusion of various controls, different measures of exchange rates, and concepts of labor market integration. These findings call for including labor mobility in macro models of external adjustment.

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I. INTRODUCTION

"Weak pound has Poles eyeing homeland. A survey by Britain's largest Polish-speaking radio station at the end of last year reported that almost 40 per cent of migrant Polish workers would seriously consider returning home if the exchange rate fell to four zlotys to the pound" (Financial Times, May 25, 2008).

"Exchange rate keeps Filipinos from working abroad. The monthly pay of most of the Middle East jobs is measly – US dollars 250 for hotel workers or dollars 300 for laborers. But, because of the weak US dollar, the peso value of their salaries has been eroded by 20–25 percent since 2000 and that has had a big impact on one of the world's biggest exporters of labor" (Financial Times, November 16, 2007).

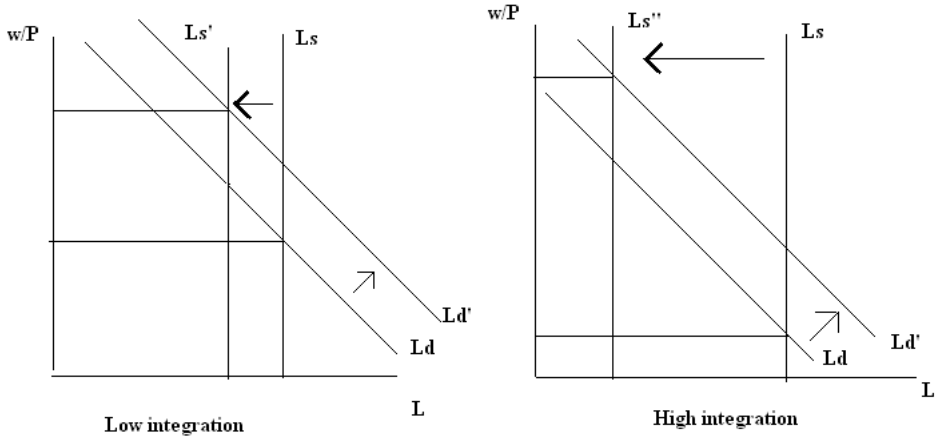
These two quotes illustrate how modern migrants are sensitive to exchange rate fluctuations. By increasing the value of wages in domestic currency that a migrant can get by working abroad and raising the reservation wage of domestic workers, a devaluation can have a direct impact on domestic labor supply. Population and labor supply, which are usually considered fixed in the short-run within a country, may in reality change in response to exchange rate fluctuations. The supply channel, however, operates only if workers can migrate (or threaten to migrate). This paper analyzes how and under which conditions labor supply—and in particular, wages—respond to exchange rate fluctuations.

Exchange rate movements may have an impact on wages through different channels apart from the labor supply channel, which is the focus of this paper. First, as in standard macro models, depreciation of the exchange rate can make imported goods more expensive, increase the consumer price index and reduce the real wages (at unchanged nominal wages). Second, exchange rate depreciation is associated with enhanced competitiveness, which can lead to an expansion in local production and, therefore, to higher labor demand and to a rise in real wages in the economy (Campa and Goldberg, 2001; Goldberg and Tracey, 2003). Third, by raising the costs of imported capital and intermediate goods, and technology, which are often complements to domestic labor, exchange rate depreciation may reduce the demand and the real wage for workers (Robertson, 2003). Finally, exchange rate fluctuations may also influence inflation expectations and so enter in the wage setting mechanism; in fact, in some countries wages are indexed also to foreign currency. The main challenge of this paper is to identify the labor supply channel. Identifying the effect of exchange rate on domestic wages through the labor supply channel is challenging because many factors including external and internal shocks and policies, are correlated with both exchange rate movements and wages.

This paper proposes a new empirical strategy to identify the effect of exchange rates on wages by exploiting variation across countries in the degree of integration between domestic and international labor markets. The identification strategy is based on the following reasoning. The effect of a devaluation on wages is larger if:1) the cost of migrating abroad is low; 2) workers have information about outside options; and 3) it is easy to transfer remittances given that workers can consume part of their wages at home through remittances

or return migration. In a country with a history of migration, the cost of moving and the information on outside options is low because the existing networks provide assistance and lower the cost of communication.[2] This paper uses the fact that the pass-through of exchange rate to wages depends on these conditions to identify the effect of a devaluation on wages. The more integrated the labor market is, the easier it is for workers to move; a given exchange rate depreciation is likely to be associated with a larger increase in wages (see Figure 1). In order to control for shifts in labor demand, we control for import and exports, which clearly influence labor demand.[3] Note that we do not assume that labor demand is not affected by exchange rate movements, we only assume that shifts in labor demand in response to a devaluation are uncorrelated with the degree of labor market integration after controlling for exports and imports.

Figure 1. Depreciation of Exchange Rate and Wages



What are good proxies for labor market integration? Following the intuition above, labor market integration is defined in terms of the costs of moving abroad. Moving abroad can be less costly if there is a large network of nationals living abroad or families have a large receipt of remittances.[4] It also may be easier to move if potential migrants speak the same language as in major destination countries, if there are long historical ties between countries of origin and possible destination countries, or if possible destination countries are geographically close. We use these concepts to construct various measures of labor market integration.

[2] See Carrington, Detragiache, and Vishwanath (1996) for empirical evidence on how information on the destination countries is key to labor mobility.

[3] See Goldberg and Tracey (2003) for a survey.

[4] There is a vast literature, both in sociology and economics, which establishes the importance of networks in explaining migration (e.g., Massey and Espinoza, 1997, Munshi, 2003).

The empirical and theoretical literature have so far ignored the fact that exchange rate fluctuations may have an impact on domestic wages via migration. This paper is the first attempt to examine the implications of labor mobility for real effects of exchange rates. Why has the previous literature ignored the response of labor supply to exchange rate fluctuations? The lack of investigation of this question in the literature is due to several reasons. First, the size of migration was less in the past. According to the United Nations' Population Division, only 75 million (2.3 percent of total population) lived and worked outside their country of birth in 1965 while this number increased to 175 million—that is 2.9 percent of the world population—in 2001. Second, the pool of potential emigrants was considered relatively small with respect to the size of domestic labor market so that migration could not be large enough to have an impact on domestic wages. However, this is not true considering the large size of modern day migration; even in a large country such as Mexico, migration has a noticeable impact on domestic wages (Mishra, 2007; Aydemir and Borjas, 2007). Third, it was considered that potential migrants do not respond fast enough to exchange rate fluctuations. However, Hanson and Spilimbergo (1999) have shown that the effect of a devaluation on illegal migration is quite fast for Mexico; mobility is even easier in some Eastern European countries, which are new members of the European Union.[5] Fourth, until recently communication was difficult so that potential migrants were informed of job opportunities only through the network of other immigrants, which, by nature, are slow and imperfect. However, recent research has shown that modern communication has a sizeable impact on migration decision (Braga, 2008). Fifth, there was much less scope for sending remittances home. Nowadays, workers can send home remittances relatively freely.[6] In sum, the changes that occurred in the world in the past twenty years suggest that we need to update our framework on labor supply.

This paper is related to at least three strands of literature. A vast empirical literature considers the impact of exchange rate movements on wages through their effects on labor demand (Campa and Goldberg, 2001; Goldberg and Tracy, 2003). The literature uses either individual or industry-level data and primarily exploits variation across industries in the degree of exposure to international trade, with focus on the U.S. or G7 countries. The literature finds evidence that the elasticity of wages to exchange rates is higher for industries with higher exposure to trade. We contribute to this literature by proposing a new channel through which exchange rate movements are related to wages.

The second strand of literature to which this paper is related provides direct evidence on exchange rates and labor mobility. For example, Hanson and Spilimbergo (1999) find that a devaluation of the Mexican peso by 10 percent vis-à-vis the U.S. dollar, increases, ceteris paribus, the border apprehensions by 6 to 8 percent. In a similar vein, Yang (2006) and Yang (2008) consider the relationship between exchange rate shocks, return migration and

[5] Borjas and Fisher (2001) show that the flow of illegal immigrants from Mexico to the United States is more volatile during periods of fixed exchange rate regimes in Mexico.

[6] The cost of sending remittances to Mexico has declined from 15 percent of the amount sent to about 5 percent between 1990 and 2003. (IMF, 2005).

remittances of households in Philippines. Yang (2008) finds that a 10 percent increase in the peso/$ exchange rate increases remittance receipts in pesos by 6 percent. Yang (2006) finds that households with larger exchange rate shocks had lower return rate.[7]

Finally, the third strand of literature directly looks at labor market integration and wages in source countries. Mishra (2007) and Aydemir and Borjas (2007) estimate that a 10 percent migration from Mexico to the United States increases Mexican wages by about 4 percent. Thus, the existing evidence supports the proposed hypothesis in this paper that exchange rate movements can affect wages via labor supply.

The main result is that the elasticity of domestic wages to real exchange rate is 0.1 after one year in countries with high barriers to external labor mobility while it is four times higher (about 0.4 percent) in countries with low barriers to mobility, where labor market integration is defined in terms of past migration rates.[8] Our results are robust to the inclusion of country- and time-fixed effects, and of country-time varying controls such as trade flows, measures of crisis in origin country of migrants, unemployment, FDI, measures of labor-market institutions and foreign wages and prices. The results are also robust to using (i) alternative definition of exchange rates—e.g., migration weighted exchange rate, (ii) alternative measures of integration—e.g., remittances to GDP and past emigration stocks, and (iii) different sample of countries—developing vs. developed.

We also test the plausibility of our identification strategy by looking at wages of immigrants in recipient countries. We analyze specifically if the sensitivity of wages of immigrants in the U.S. (the primary receiving country in our sample) to devaluation depends on the degree of labor market integration.[9] The hypothesis is that a given exchange rate depreciation in the origin country brings about a larger decline (or a smaller increase) in real wages of immigrants in the U.S., the more integrated a country's labor market is with the United States. A depreciation of the Mexican peso triggers labor mobility (or threat of mobility) of Mexican workers to the U.S., and as a result puts a downward pressure on wages of Mexican immigrants in the U.S. A similar depreciation of the currency in a country that is poorly integrated with the U.S. (let's say Latvia) should not have any effect on the wages of Latvian workers in the U.S. under the plausible assumption that workers from different countries are imperfect substitutes in the U.S. We find strong empirical evidence for this phenomenon.

Finally, we also find evidence for a direct relationship between exchange rates and emigration (and remittances). The estimates suggest that exchange rate depreciations are

[7] This is consistent with life-cycle motive of return migrants (neoclassical maximizers choose length of stay based on comparing marginal benefit to marginal utility cost of extra stay); favorable exchange rate shock implies that the migrant reduce their return rate to accumulate savings to increase future consumption.

[8] Countries with high and low barriers to labor mobility are defined respectively by emigration rates being less than the 10th percentile and greater than the 90th percentile in the sample.

[9] On average over 1980–2005, about 36 percent of all the migrants to the OECD end up in the U.S.

significantly associated with higher emigration rates and remittances to GDP, after controlling for various push and pull factors in source and destination countries.

These pieces of complementary evidence on the wages in sending and receiving countries and on the direct impact of exchange rates on emigration point consistently to the same finding that the degree of labor market integration is a crucial variable to explain the labor market effects of a devaluation.

These findings call for including labor mobility in macro models of external adjustment and for reconsidering the welfare effects of devaluation. While capital mobility is usually taken into consideration in macro models of external adjustments, labor mobility is not considered in general. This is a grave limitation because labor mobility has several important implications on the analysis of adjustment. First, welfare calculations for effects of devaluation can change substantially in the presence of labor mobility, and second, the optimal speed of adjustment can be different in the presence of labor mobility.

The paper is organized as follows. Section 2 outlines a simple theoretical framework to analyze the effects of labor mobility on wages. Section 3 presents the empirical implementation of the reduced form of the framework of section 2. Section 4 presents the data with a particular focus on the measures of labor market integration. Section 5 presents the empirical evidence looking at the effect of migration in sending countries. Section 6 looks at the "mirror" evidence in the U.S., the main recipient country. Section 7 examines the evidence on how migration rates and remittances are sensitive to exchange rate movements. Section 8 concludes.

II. EXCHANGE RATES AND LABOR MOBILITY: THEORETICAL FRAMEWORK

The paper starts by developing a simple model of labor demand and supply to motivate the empirical analysis. Consider two countries, Home (H) and Foreign (F). Assume that domestic and foreign workers are imperfect substitutes. All variables in H and F will be denoted without and with an asterisk (*) respectively. A subscript t in all variables is dropped for simplicity as we assume that all adjustments happen immediately: In the empirical section, we allow for lagged responses.

Labor demand in an integrated world

$$L^d = (\frac{w}{P})^{-\alpha} E(\frac{eP*}{P}) M(\frac{eP*}{P}) D \quad (1)$$

Where L^d is the domestic labor demand, w is the nominal wage, P is the domestic price index, $P*$ is the foreign price index, E and M are the value of exports and imports respectively and e is the nominal exchange rate in home currency units per unit of the foreign currency. E and M capture the channels through which labor demand is exposed to goods market integration.[10] Finally, D represents other factors that affect labor demand. In

[10] Note that equation (1) could be easily expanded adding a term for imports of capital goods. Given our focus, we prefer to keep the model parsimonious.

specifying the labor demand, we assume that exchange rate affects labor demand only through trade, which is consistent with the previous literature (e.g., see Campa and Goldberg, 2001). Finally, we assume that there is only one foreign labor market; if there is more than one foreign labor market, the term $\frac{eP*}{P}$ should become the real exchange rate defined as $\frac{\prod_j \left(e_j P_j *\right)^{w_j}}{P}$ where j is the indicator for foreign country j, and w_j are weights usually calculated as a function of trade flows.

Labor supply in an integrated world

In a world where factor markets are integrated, labor supply depends on both the domestic and foreign wages.

$$L^s = \left[\frac{w}{P}\right]^{\gamma} \left[\frac{e^{\beta} w*}{P^{\beta} P*^{1-\beta}}\right]^{-\phi I} S \tag{2}$$

Where L^s is the domestic labor supply and $w*$ is the foreign wage. S is a term that reflects country-specific historical determinants of labor participation, including demographic structure and female labor force participation. The key innovation in this paper is to introduce I, which is a measure of the degree of labor market integration. If a country is completely closed to international labor markets, $I = 0$ and in that case, labor supply depends only on domestic wages; this is the case in the standard labor supply curves, which do not take into account the opportunity of working abroad. The parameter β denotes the fraction of wages a migrant consumes at home even if he works abroad, either through remittances or through temporary or permanent return migration. In the extreme case, if a migrant consumes the entire fraction of wages at home i.e., $\beta = 1$, then foreign wages are deflated only by domestic prices.

We assume $\phi > 0$, i.e., given a certain level of foreign wages, an increase in the real exchange rate reduces the domestic labor supply owing to emigration. Moreover, higher is the degree of integration of the labor market, a given increase in the real exchange rate leads to a bigger reduction in labor supply. In equilibrium,

$$L^s = L^d \tag{3}$$

Taking logs of (3):

$$\ln \frac{w}{P} = a_1 I \ln \frac{e}{P} + a_2 \ln E + a_2 \ln M + a_2 \ln X + a_3 I \ln w* + a_4 I \ln P* \tag{4}$$

Where $a_1 = \frac{\beta\phi}{\alpha+\gamma}; a_2 = \frac{1}{\alpha+\gamma}; a_3 = \frac{\phi}{\alpha+\gamma}; a_4 = -\frac{\phi(1-\beta)}{\alpha+\gamma}; X = D - S$

Equation (4) forms the basis of our empirical specification. $a_3 > 0$, which implies that the higher the degree of labor market integration, the larger is the impact of change in the real exchange rate on real wages. Equation (4) is the reduced form for the real wage in the sending countries.

Effects on receiving countries

The previous section focused on the effects of integration and labor mobility on sending countries; this section focuses on the "mirror" issue of the effects of integration and labor mobility on recipient countries. We use the same framework as above to derive the reduced form for wages of immigrants in receiving countries. To make the model more realistic, we assume that the labor market in recipient countries is segmented according to the nationality of immigrants. Because of data limitations, we also restrict our sample to the U.S. as the destination country. The resulting equation (derived in detail in the appendix) is as follows:

$$\ln \frac{w_i^{US}}{P^{US}} = -f(I_{i,US}) * \ln \frac{e_i}{P_i} + x^{US} + x^i \qquad (5)$$

The subscript *i* indicates that the variable refers to the origin country of migrants. $I_{i,US}$ is a measure of labor market integration with the U.S. $f(I_{i,US})$ is positive and is an increasing function of $I_{i,US}$. w_i^{US} is the wage that migrants from country i earn in the U.S. and P^{US} is the price index in the U.S. x^{US} and x^i are control variables in the U.S. and origin country i respectively that affect real wages of migrants in the U.S. Equation (5) implies that the effect of a devaluation in country i on wages of immigrants from *i* should be different according to the degree of integration of country i with the United States. In particular, (i) a devaluation in the origin country depresses the wage of immigrants in the U.S. from that origin country, and (ii) higher the degree of labor market integration with the U.S., a given exchange rate depreciation leads to a larger decline in wages. We test this implication in Section 6.

III. EMPIRICAL SPECIFICATION

Some adjustments to the model are necessary to make it econometrically estimable. First, we allow for country-specific fixed effects in order to account for all possible country-specific and time-invariant factors that affect wages. For example, country-fixed effects control for time-invariant institutional factors that affect domestic labor supply. Second, we also introduce year- fixed effects to account for the fact that world-wide factors may have had an impact on domestic and foreign labor demands, so generating spurious correlations. Third, we introduce the labor market integration variables and exchange rate as separate regressors in addition to their interaction. This more flexible specification allows checking if integration and/or exchange rate have a direct impact in addition to the mechanism analyzed in this paper. Fourth, we drop foreign wages from the benchmark specifications. This is basically because, by introducing time dummies we are already controlling for time varying factors (that do not vary across source countries of migrants), which include labor market conditions in recipient countries. Sixth, labor markets take some time to react to changes in the exchange rate, especially when migration is involved; to take this into account we lag the explanatory variables by one year. Finally, as suggested by the theoretical framework, we estimate the model in levels.[11] After these adjustments, equation (4) becomes:

[11] In order to test for the presence of unit root in real wages and real exchange rates we perform panel unit root tests using the tests suggested by Pedroni (2001). The results reported in Table A4 suggest that there is little evidence of unit roots. Therefore, we stick to the specification in level suggested by our theoretical section.

$$\ln(\frac{w}{P})_{it} = I_{it-1} + \ln\frac{e_{it-1}}{P_{it-1}} + \beta(I_{it-1} * \ln\frac{e_{it-1}}{P_{it-1}}) + \theta X_{it-1} + s_i + v_t + \varepsilon_{it} \quad (6)$$

Where i denotes the origin country, t denotes year, X_{it-1} are the lagged controls (discussed below); s_i and v_t are country and year fixed effects respectively.

IV. DATA

We analyze how the pass-through from nominal exchange rate to wages depends on the degree of labor market integration using data from 66 countries over the period 1981–2005.

Wages in sending countries

The dependent variable in the empirical analysis is the average real wage earned in manufacturing per hour. The main source of data on nominal wages is the Labor Statistics database available from the International Labor Organization (http://laborsta.ilo.org/). The data are provided in local currency terms and we have deflated the wage data using the consumer price index (CPI) from the International Financial Statistics (IMF, various years). (For details on the wage data, see Appendix).

In most countries, the statistics on wages refer to "wages and salaries," which include direct wages and salaries, bonuses and gratuities, etc., whereas in some countries they refer to "earnings," which include, more broadly, all compensation such as paid leave, pension and insurance schemes. We convert these total wage payments to hourly wage payments by dividing by the total number of hours worked, data for which was obtained from the ILO.

We use two alternative sources of data on wages to check the robustness of the results. The first source is the International Financial Statistics (IMF, various years, line 65). The data are wage indices (with 2000=100) and represent wage rates or earnings per worker employed per specified time period, typically in the manufacturing sector. The data on earnings typically include payments in kind and family allowances and that cover salaried employees as well as wage earners. The data are as reported directly to the Fund, or drawn from the publications of statistical offices of various countries. The second source of information on wages is from the Freeman and Oostendorp database of Occupational Wages around the World. The data are based on the October inquiry of the ILO, have been standardized and are disaggregated by occupations. The coverage of the alternative sources of wage data is very limited, and our analysis using these covers at most 30 countries.

Wages in the U.S. by nationality of immigrants

In addition to data on wages in origin countries, we also obtain data on wages of immigrants in the United States. The data are obtained from the Integrated Public Use Microdata Series - Current Population Survey (IPUMS-CPS) for the years between 1994 and 2005. The IPUMS-CPS data set is based on the March Annual Demographic File and Income Supplement to the Current Population Survey (CPS). The data are restricted to foreign-born individuals aged 18–64 who participate in the civilian labor force.[12] The individual data are

[12] Note that beginning 1994, the CPS included a question on the country of birth of individuals.

averaged to construct the mean hourly wage for immigrants in the U.S. from various origin countries. The average wage is constructed using sampling weights as recommended by the IPUMS-CPS. Finally, the wage is adjusted for inflation using CPI in the origin countries.

Migration

Data on migration comes from the International Migration Statistics (IMS) dataset for OECD countries (OECD, 2006), and is available through SourceOECD, an online database. Immigrants in the OECD are defined by nationality and/or country of birth. For the main analysis, we use the information on immigrants defined by nationality given the broader coverage of the data (see appendix for details on the migration data).[13] Except Australia, Canada, Mexico and New Zealand, all other OECD countries record data on migrants by nationality. IMS also has information on migrants in the U.S. by nationality for 1990; whereas the information on immigrants by birth is available for 1980, 1990 and from 1995–2001. The correlation between the two sets of data is very high (0.95), and the results in the paper are qualitatively similar if we use the definition of migrants based on country of birth (see Table 6). Table A1 provides information on the top five destination OECD countries of migrants for countries in the sample for which data is available in the IMS. It corresponds to the year in the period 1981–2005 with the maximum number of destination countries. Not surprisingly, United States is the top destination country for about half of the origin countries of migrants in the sample. On average, about 36 percent of all the migrants to the OECD end up in the U.S., relative to 22 percent in Europe.

The bilateral stocks of migrants are aggregated for all destination countries to obtain the emigrant stock in the OECD for each origin country in the sample. Furthermore, the stock of migrants is normalized by the population in each origin country to derive the emigration rates. One-year lagged emigration rates are used as the principal measure of labor market integration.[14]

Exchange rates

Data on exchange rates are taken from the International Financial Statistics (IMF, various issues). Exchange rates are expressed in nominal currency per U.S. dollar, and deflated by CPI. We also construct a migration-weighted measure of exchange rates by weighting the bilateral exchange rates with the share of migrants in different destination countries.

$$e_{ct} = \sum_{c'} e_{cc'} \frac{M_{cc'}}{M_c} \tag{7}$$

Where $$e_{cc'} = \frac{e_{cUS}}{e_{c'US}} \tag{8}$$

$M_{cc'}$ is the total stock of emigrants from *c* to *c'* and M_c is the total number of emigrants from *c*. The migration-weighted measure is also deflated by CPI. The correlation between the

[13] The data on stock of immigrants defined by nationality is available for 185 source countries for 26 years vis-à-vis 179 countries for 16 years for the data on immigrants defined by country of birth.

[14] The main results in the paper are unchanged if we use two or three-year lagged emigration rates as measures of labor market integration (results available upon request).

real exchange rate vis-à-vis dollar and the migration-weighted measure is high (0.98). Given that the exchange rate vis-à-vis dollar is relatively more exogenous to wages, we use it as our primary measure of exchange rate.

Other measures of labor market integration
We use information on worker remittances as another measure of labor market integration. Worker remittances are defined as the value of monetary transfers sent to the origin countries by workers who have been abroad for more than one year. These are recorded under "current transfers" in the current account of the IMF's Balance of Payments Statistics Yearbook. Workers remittances are normalized by GDP from the IMF (IMF, various issues).

Composite index of integration—super-integration
Finally, we also construct a composite measure of integration that is based on common official language (at least 10 percent of the population has an official language with any of the top five destination countries), common border (whether the origin country shares a common border with any of the top five destinations) and colonial linkages (whether the origin country was ever a colony of any of the top five destination countries). Information on these variables are derived from a new dataset compiled by CEPII.[15] The top five destination countries are chosen based on their shares of migrants (shown in Table A1). A country is defined as integrated if all the three conditions are satisfied. In other words, this is a very demanding measure, or a measure of super-integration.

Control variables
The data on trade are taken from the United Nations Statistical Division Commodity Trade (COMTRADE) database accessible through the World Integrated Trade Solution (WITS). We extract data on value of exports and imports (in U.S. dollars), and deflate them by GDP in U.S. dollars from the IMF (IMF, various issues). Data on unemployment rate and foreign direct investment (FDI as a ratio of GDP) are taken from the International Financial Statistics (IMF, various issues). Episodes of crisis are defined by negative growth in real GDP per capita from the World Development Indicators. Data on tax wedge, which is an indicator of labor market institutions, is taken from the IMF database on structural reforms (IMF, 2008).

V. RESULTS FOR SENDING COUNTRIES

Before evaluating equation 6, we establish a strong and significant correlation between real wages and real exchange rate. The first column of Table 1 reports the correlation between real wages and real exchange rates, controlling for time and country-fixed effects. This correlation is robust even after including imports and exports (as share of GDP). However, this specification does not control for the degree of integration.

Table 2 presents our main specification based on equation (6); the first column is the basic model while columns [2]–[6] present regressions with additional control variables. The pass-through from real exchange rate to wages is large: 28 percent of a devaluation feeds into

[15] The data are available are http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

wages within one year. Crucially, the effect is significantly larger in countries with integrated labor market, confirming the prediction of our model. In addition, countries with higher emigration rates (lagged) have higher wages. This confirms the evidence from individual country studies in the prior literature (e.g., Mishra, 2007; Aydemir and Borjas, 2007).

Table 1. Effect of Exchange Rates on Wages

Dependent variable: ln(real wage)		
	[1]	[2]
Ln real exchange rate$_{t-1}$	0.312***	0.336**
	(0.102)	(0.139)
Ln (exports/GDP)$_{t-1}$		0.046
		(0.120)
Ln (imports/GDP)$_{t-1}$		-0.434***
		(0.106)
Country fixed effects	Y	Y
Year fixed effects	Y	Y
Observations	801	740
Number of countries	66	66
R-squared	0.97	0.97

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants.

Changes in the real exchange rate happen in connection with other changes in the economy, creating a potential problem of omitted variable in our basic specification. In particular, abrupt changes in real exchange rates are associated with economic crises, which are, in turn, correlated with changes in wages. Conversely, a high level of exchange rate is often associated with economic booms and high wages. These associations could generate the correlation that we observe in the first specification. In order to control for the existence of a possible spurious correlation, we control for the occurrence of an economic crisis, which are defined as negative growth in real GDP per capita, in specification (2). Even in this case, our main result—namely, that the elasticity of wages to exchange rate depends on the degree of integration—goes through.

Columns [3]–[6] of Table 2 present various specifications that include several variables, which could be correlated with exchange rates and labor mobility, and also potentially influence wages in source countries of emigrants. In particular, we include unemployment rates (with higher unemployment rates proxying for push factors suggesting poor economic conditions in source countries); labor market institutions in source countries (as proxied by tax wedge); FDI as a share of GDP in source countries (to capture the fact that exchange rate movements could influence firms to move instead of workers); and average wages and prices in the OECD (which capture pull factors for migrants to the OECD). Given that prices and wages in the OECD have only a time dimension, we cannot control for year-fixed effects. The specification in column (5) is more general than the specification in column (6) because, by putting year dummies, we are agnostic about the impact of labor market outcomes in receiving countries while we impose a specific structure in column (6). In other words, specification (5) uses only cross-country and over time variation to identify the effects of exchange rate on wages while specification (6) models explicitly the variables that influence

Table 2. Effect of Exchange Rates on Wages-Interaction with Labor Market Integration

Dependent variable: ln(real wage)						
	[1]	[2]	[3]	[4]	[5]	[6]
Ln real exchange rate$_{t-1}$	0.307**	0.142	0.275	0.34	0.207	0.19
	(0.152)	(0.140)	(0.177)	(0.280)	(0.274)	(0.167)
Ln real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$	**0.044*** **	**0.044*** **	**0.050** **	**0.070*** **	**0.093*** **	**0.092*** **
	(0.014)	**(0.016)**	**(0.020)**	**(0.026)**	**(0.035)**	**(0.033)**
Ln emigration rate$_{t-1}$	0.120***	0.137***	0.146***	0.187***	0.239***	0.234***
	(0.036)	(0.037)	(0.046)	(0.054)	(0.072)	(0.068)
Ln (exports/GDP)$_{t-1}$	0.029	-0.063	0.028	-0.035	0.142	0.156
	(0.115)	(0.097)	(0.165)	(0.252)	(0.266)	(0.250)
Ln (imports/GDP)$_{t-1}$	-0.421***	-0.288***	-0.350**	-0.271	-0.341	-0.274
	(0.106)	(0.094)	(0.170)	(0.228)	(0.242)	(0.251)
Dummy for crisis$_{t-1}$		-0.15	-0.151	-0.007	0.024	0.051
		(0.101)	(0.127)	(0.088)	(0.099)	(0.101)
Ln unemployment rate$_{t-1}$			-0.086*	-0.07	-0.086	-0.111
			(0.044)	(0.071)	(0.077)	(0.067)
Ln tax wedge$_{t-1}$				-0.294**	-0.312**	-0.332***
				(0.120)	(0.129)	(0.12)
Ln (FDI/GDP)$_{t-1}$					0.043	0.045
					(0.028)	(0.028)
Ln average OECD wage$_{t-1}$						0.085
						(0.155)
Ln average OECD price$_{t-1}$						0.334**
						(0.164)
Country fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	N
Observations	740	710	574	419	393	393
Number of countries	66	66	58	47	44	44
R-squared	0.97	0.98	0.97	0.97	0.97	0.97

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses.
All variables refer to the origin country of migrants except wages and prices in OECD.

the labor market in recipient countries. The results of specifications [3]–[6] confirm the results of our previous specifications.[16]

The rest of the empirical section tests several assumptions, which are used in Table 2: the appropriateness of the definition of real exchange rate (vis-à-vis U.S. dollar); different measures of labor market integration; alternative sources of data on wages; homogeneity of developing and developed countries with respect to labor mobility; alternative definition of

[16] For robustness, we also introduce as additional controls, interactions between various determinants of labor demand in Table 2 in sending countries (exports, imports, crisis indicator and FDI) and exchange rates; the main results (available upon request) are identical to Table 2. The interaction between exports to GDP ratio (lagged) and exchange rates (lagged) is positive and statistically significant in most specifications; providing additional support for the central hypothesis in Campa and Goldberg (2001) using cross-country evidence; the larger is the exposure to trade, a given exchange rate depreciation is associated with a larger increase in wages.

migrants; inclusion of the composition of trade in the framework; and differential effects on high and low-skill wages.

Alternative measures of exchange rates

The exchange rates used in Table 2 are the real exchange rates vis-à-vis the U.S. dollar. To study labor mobility, it may be more relevant to use the exchange rates vis-à-vis potential destination countries. For this reason, we construct a new exchange rate measure, which is defined as a weighted average of bilateral exchange rates in various destination countries, where the weights are the shares of migrants in different destination countries.[17] This measure, however, could be endogenous since the share of migrants to different destination countries is influenced by wages in destination countries; hence we use the real exchange rates vis-à-vis the U.S. dollar as the primary measure. The correlation between the two measures is very high (around 0.98). As an alternative measure, we also use real trade-weighted exchange rates.

Table 3 presents the results using the alternative measures of exchange rates. Columns [1]–[4] use the migration-weighted exchange rates, whereas the last four columns use the trade-weighted exchange rates. Our core results on the interaction between exchange rates and labor market integration hold using these alternative exchange rate measures.

Alternative measures of labor market integration

Our principal measure of labor market integration is based on past migration rates on the assumption that past migration rates are a good proxy for how easy it is to move between countries. While this measure captures an important feature of the labor market integration, stock of migrants or remittances are also plausible measures of labor market integration. Columns [1], [2] and [3], [4] of Table 4 present our preferred specifications (columns 5 and 6 of Table 2) using emigration stocks and remittances as a proxy for labor market integrations. The results are qualitatively similar; in particular, the coefficients on the interaction between exchange rate and the measure of integration are always statistically significant (at the 1 percent level) and positive.

The last two columns of Table 4 present the results using the index of "super-integration" as described in the data section. The interaction between exchange rates and the measure of super-integration continues to be positive, and strongly significant.

Developing vs. developed countries

The results described so far do not distinguish between developed and developing countries. After all, from a theoretical point of view, it should not matter whether the sending countries are rich or poor. However, in practice, labor markets work very differently in many developed countries, where there are well-established systems of social protection, and in developing countries, where the informal sector plays an important role. This could have important implication for the response of wages to exchange rate shocks.

[17] Note that using migrants in destination countries to construct weights is only an approximation of the potential future destination countries.

Table 3. Effect of Exchange Rates on Wages-Interaction with Labor Market Integration: Alternative Measures of Exchange Rates

Dependent variable: ln(real wage)

	Migration-weighted real exchange rate				Trade-weighted real exchange rate			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Ln migration-wt exchange rate$_{t-1}$	0.107***	0.075**	0.206***	0.204***				
	(0.035)	(0.033)	(0.072)	(0.067)				
Ln migration-wt real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$	0.022***	0.018**	0.053***	0.051***				
	(0.007)	(0.008)	(0.016)	(0.015)				
Ln real trade-wt exchange rate$_{t-1}$					0.192***	0.077	-0.127**	-0.129**
					(0.033)	(0.053)	(0.057)	(0.057)
Ln real trade-wt exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$					0.061***	0.068***	0.082**	0.080**
					(0.018)	(0.021)	(0.034)	(0.033)
Ln emigration rate$_{t-1}$	0.075***	0.079***	0.150***	0.139***	-0.044**	-0.031	-0.048	-0.053
	(0.022)	(0.022)	(0.037)	(0.033)	(0.022)	(0.025)	(0.056)	(0.055)
Ln (exports/GDP)$_{t-1}$	0.112	-0.017	0.283	0.303	-0.006	-0.063	0.354	0.376*
	(0.115)	(0.096)	(0.226)	(0.206)	(0.101)	(0.096)	(0.222)	(0.197)
Ln (imports/GDP)$_{t-1}$	-0.445***	-0.301***	-0.478**	-0.397*	-0.147	-0.240***	-0.714***	-0.638***
	(0.110)	(0.098)	(0.238)	(0.229)	(0.100)	(0.082)	(0.242)	(0.224)
Dummy for crisis$_{t-1}$		-0.16	0.012	0.037		-0.138	0.054	0.088
		(0.101)	(0.100)	(0.099)		(0.086)	(0.107)	(0.106)
Ln unemployment rate$_{t-1}$			-0.141*	-0.168**			-0.146*	-0.167**
			(0.079)	(0.068)			(0.080)	(0.071)
Ln tax wedge$_{t-1}$			-0.223*	-0.253**			-0.234	-0.264*
			(0.134)	(0.122)			(0.146)	(0.138)
Ln (FDI/GDP)$_{t-1}$			0.036	0.033			0.041	0.039
			(0.027)	(0.026)			(0.028)	(0.029)
Ln average OECD wage$_{t-1}$				0.096				0.052
				(0.157)				(0.150)
Ln average OECD price$_{t-1}$				0.316*				0.005
				(0.166)				(0.180)
Country fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	N	Y	Y	Y	N
Observations	740	710	393	393	719	689	393	393
Number of countries	66	66	44	44	63	63	44	44
R-squared	0.97	0.98	0.97	0.97	0.98	0.98	0.97	0.97

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

Table 4. Effect of Exchange Rates on Wages-Interaction with Other Measures of Integration

Dependent variable: ln(real wage)

	Emigration stocks		Remittances/ GDP		Composite Measure	
	[1]	[2]	[3]	[4]	[5]	[6]
Ln real exchange rate$_{t-1}$	-0.204	-0.242	0.019	0.229	0.315	0.208
	(0.302)	(0.245)	(0.203)	(0.172)	(0.242)	(0.163)
Ln real exchange rate$_{t-1}$ * Ln emigration stocks$_{t-1}$	0.084**	0.083***				
	(0.033)	(0.031)				
Ln emigration rate$_{t-1}$	0.213***	0.209***				
	(0.066)	(0.063)				
Ln real exchange rate$_{t-1}$ * ln (remittances / GDP)$_{t-1}$			0.093***	0.087***		
			(0.028)	(0.029)		
Ln remittances to GDP$_{t-1}$			0.058	0.071*		
			(0.046)	(0.041)		
Ln real exchange rate$_{t-1}$ * Ln composite emigration measure$_{t-1}$					0.416***	0.384***
					(0.150)	(0.130)
Ln (exports/GDP)$_{t-1}$	0.131	0.148	-0.32	-0.317	0.088	0.135
	(0.271)	(0.253)	(0.228)	(0.211)	(0.222)	(0.198)
Ln (imports/GDP)$_{t-1}$	-0.32	-0.259	-0.072	0.016	-0.386**	-0.352*
	(0.241)	(0.251)	(0.202)	(0.190)	(0.193)	(0.198)
Dummy for crisis$_{t-1}$	0.022	0.048	-0.119	-0.06	0.032	0.064
	(0.098)	(0.099)	(0.072)	(0.059)	(0.095)	(0.094)
Ln unemployment rate$_{t-1}$	-0.109	-0.130*	0.058	0.009	-0.094	-0.106*
	(0.080)	(0.069)	(0.079)	(0.062)	(0.070)	(0.061)
Ln tax wedge$_{t-1}$	-0.231*	-0.252**	0.156	0.16	-0.043	-0.083
	(0.128)	(0.117)	(0.175)	(0.154)	(0.138)	(0.122)
Ln (FDI/GDP)$_{t-1}$	0.038	0.039	0.070**	0.072**	0.036	0.043
	(0.027)	(0.027)	(0.032)	(0.035)	(0.025)	(0.028)
Ln average OECD wage$_{t-1}$		0.102		0.015		0.093
		(0.157)		(0.186)		(0.153)
Ln average OECD price$_{t-1}$		0.325*		0.596***		0.390**
		(0.166)		(0.212)		(0.162)
Country fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	N	Y	N	Y	N
Observations	393	393	333	333	441	441
Number of countries	44	44	40	40	45	45
R-squared	0.97	0.97	0.97	0.97	0.97	0.97

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD. Note that the composite measure of integration does not appear as a regressor, as it does not vary over time and is absorbed by the country fixed effects.

In order to test this hypothesis, Table 5 presents the same specifications (columns [1], [2], [5] and [6]) as Table 2 with the additional interaction term between real exchange rate, migration rates and the dummy for developing country to check if the results for developing countries differ systematically. This interaction term is positive and statistically significant (at the 5 percent level) in Columns [3] and [4], which provides evidence that the effect of exchange rates on wages through the labor supply channel is stronger for developing countries.

Alternative measure of migration—foreign-born

Finally, we test if our results hold when we use an alternative definition of immigrants defined as foreign-born.[18] Table 6 presents the specifications as in Table 2 (columns [1], [2], [5] and [6]) using a definition of a migrant in the OECD as a foreign-born individual. Australia, Canada, Mexico and New Zealand define immigrants only by country of birth; hence migrants to these countries are not included in Table 2. In this case, the interaction term between exchange rate and the measure of integration is positive, and significant at the 10 percent level in Columns [1]–[2]. The estimates turn statistically insignificant in Columns [3]–[4], though it is driven by a change in the sample, rather than adding additional controls (Table A5).

Control for composition of trade

Standard trade models predict that the composition of trade determines the movement of wages in a country. Labor-abundant developing countries have a comparative advantage in labor-intensive goods; the Stolper-Samuelson theorem predicts that increased trade would benefit labor relative to capital.[19] For our analysis, this would imply that controlling for exports and imports may not be sufficient without particular attention to the capital intensity of trade. In order to address this concern, we interact exports and imports with dummies for the share of capital-intensive exports and imports in overall respectively. The information on capital intensities is taken from the NBER-CES Manufacturing Industry Database and is averaged for each country across 4-digit products at the Standard Industrial Classification (SIC) level over the period 1986–97. Capital-intensive exports and imports are defined respectively by the top 100 products that rank the highest in capital intensities. [20]

The results are shown in Table 7. Controlling for the composition of trade does not alter our main result. The interaction between real exchange rate and labor market integration continues to be positive and statistically significant, with a magnitude being similar to Table 2. The interaction between capital intensity and trade is statistically insignificant in most of the specifications.[21]

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[18] Note that different OECD countries have different definition of immigrants. The number of observations decreases dramatically using the definition of foreign-born.

[19] For a recent overview of the impact of trade on wages, see Davis and Mishra (2007).

[20] In additional robustness check, we also use exports and imports with dummies for the share of K-intensive exports and imports in overall being larger than 50 percent; the results are unchanged (available upon request).

[21] In the theoretical framework, we assume that labor demand shifts identically between countries with low and high labor market integration. In order to relax assumption, we also introduce as additional controls, interactions

Table 5. Effect of Exchange Rates on Wages-Interactions-Developing Countries

Dependent variable: ln(real wage)

	[1]	[2]	[3]	[4]
Ln real exchange rate$_{t-1}$	0.307**	0.137	0.048	0.134
	(0.152)	(0.140)	(0.290)	(0.170)
Ln real exchange rate$_{t-1}$ * Ln emigration rate$_{t-1}$	0.041***	0.033***	0.050**	0.052**
	(0.011)	(0.012)	(0.022)	(0.021)
Ln real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$ * developing	0.005	0.017*	0.055**	0.053**
	(0.009)	(0.009)	(0.028)	(0.026)
Ln emigration rate$_{t-1}$	0.119***	0.134***	0.204***	0.198***
	(0.035)	(0.036)	(0.064)	(0.060)
Ln (exports/GDP)$_{t-1}$	0.033	-0.052	0.232	0.212
	(0.115)	(0.098)	(0.275)	(0.255)
Ln (imports/GDP)$_{t-1}$	-0.416***	-0.264***	-0.318	-0.251
	(0.108)	(0.095)	(0.248)	(0.254)
Dummy for crisis$_{t-1}$		-0.146	0.057	0.070
		(0.101)	(0.102)	(0.104)
Ln unemployment rate$_{t-1}$			-0.064	-0.091
			(0.075)	(0.066)
Ln tax wedge$_{t-1}$			-0.330**	-0.334***
			(0.130)	(0.119)
Ln (FDI/GDP)$_{t-1}$			0.044	0.042
			(0.028)	(0.027)
Ln average OECD wage$_{t-1}$				0.060
				(0.155)
Ln average OECD price$_{t-1}$				0.217
				(0.168)
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	N
Observations	740	710	393	393
Number of countries	66	66	44	44
R-squared	0.97	0.98	0.97	0.97

Notes. significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

Table 6. Effect of Exchange Rates on Wages-Migrants Defined by Foreign-Born

Dependent variable: ln(real wage)				
	[1]	[2]	[3]	[4]
Ln real exchange rate$_{t-1}$	0.360**	0.198	0.091	0.240
	(0.170)	(0.155)	(0.323)	(0.212)
Ln real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$	0.043*	0.042*	0.032	0.024
	(0.025)	(0.025)	(0.030)	(0.029)
Ln emigration rate$_{t-1}$	0.009	0.004	0.005	0.026
	(0.017)	(0.016)	(0.047)	(0.040)
Ln (exports/GDP)$_{t-1}$	0.084	-0.010	0.427	0.356
	(0.125)	(0.101)	(0.307)	(0.269)
Ln (imports/GDP)$_{t-1}$	-0.447***	-0.321***	-0.660**	-0.541**
	(0.114)	(0.094)	(0.273)	(0.254)
Dummy for crisis$_{t-1}$		-0.145	0.031	0.067
		(0.097)	(0.097)	(0.096)
Ln unemployment rate$_{t-1}$			-0.238**	-0.239**
			(0.105)	(0.093)
Ln tax wedge$_{t-1}$			-0.134	-0.180
			(0.159)	(0.138)
Ln (FDI/GDP)$_{t-1}$			0.022	0.019
			(0.033)	(0.034)
Ln average OECD wage$_{t-1}$				0.048
				(0.182)
Ln average OECD price$_{t-1}$				0.283
				(0.214)
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	N
Observations	623	602	338	338
Number of countries	66	66	43	43
R-squared	0.97	0.98	0.97	0.96

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

Table 7. Effect of Exchange Rates on Wages-Interaction with Labor Market Integration - Control for Composition of Trade

	Dependent variable: ln(real wage)					
	[1]	[2]	[3]	[4]	[5]	[6]
Ln real exchange rate$_{t-1}$	0.312**	0.137	0.27	0.362	0.169	0.183
	(0.151)	(0.141)	(0.182)	(0.289)	(0.284)	(0.161)
Ln real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$	0.038**	0.042***	0.046**	0.065**	0.087**	0.085**
	(0.015)	(0.016)	(0.020)	(0.028)	(0.036)	(0.034)
Ln emigration rate$_{t-1}$	0.086**	0.124***	0.128***	0.168**	0.212***	0.204***
	(0.039)	(0.041)	(0.049)	(0.065)	(0.081)	(0.076)
Ln (exports/GDP)$_{t-1}$	-1.629	-2.395	-2.953	0.427	-1.404	-1.395
	(1.541)	(1.476)	(2.268)	(2.977)	(3.120)	(2.619)
Ln (imports/GDP)$_{t-1}$	-4.737***	-2.056	-1.711	-3.981**	-3.082	-3.201*
	(1.677)	(1.329)	(1.776)	(1.720)	(1.884)	(1.931)
Dummy for crisis$_{t-1}$		-0.15	-0.144	-0.011	0.028	0.053
		(0.096)	(0.114)	(0.087)	(0.098)	(0.099)
Ln unemployment rate$_{t-1}$			-0.071	-0.079	-0.092	-0.114*
			(0.045)	(0.072)	(0.078)	(0.068)
Ln tax wedge$_{t-1}$				-0.343***	-0.376***	-0.395***
				(0.117)	(0.127)	(0.116)
Ln (FDI/GDP)$_{t-1}$					0.049*	0.050*
					(0.029)	(0.028)
Ln average OECD wage$_{t-1}$						0.082
						(0.154)
Ln average OECD price$_{t-1}$						0.322**
						(0.164)
Ln (exports/GDP)$_{t-1}$*Share of capital-intensive exports	0.425	0.607	0.783	-0.121	0.407	0.404
	(0.391)	(0.376)	(0.583)	(0.772)	(0.814)	(0.671)
Ln (imports/GDP)$_{t-1}$*Share of capital-intensive imports	1.141***	0.469	0.359	0.974**	0.727	0.779
	(0.432)	(0.349)	(0.465)	(0.433)	(0.485)	(0.491)
Country fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	N
Observations	740	710	574	419	393	393
Number of countries	66	66	58	47	44	44
R-squared	0.97	0.98	0.97	0.97	0.97	0.97

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

Alternative sources of data on wages

We so far have used average manufacturing wages from the ILO, which cover many countries but are quite noisy. To check if our results are valid also using different datasets, we look at two additional sources from the International Financial Statistics (IMF, various years) and the Freeman-Oostendorp database. The results are shown in Table 8. Columns [1]–[2] and [3]–[4] correspond to our preferred specifications in Columns [5]–[6] in Table 2. The data on wages from the Freeman-Oostendorp database are averaged across all occupations. The estimated effect of the interaction between real exchange rate and labor market integration on IFS wages is positive and statistically significant at the 10 percent level; and is positive and strongly significant at the 5 percent level on wages from Freeman-Oostendorp. The number of observations, however, are very limited relative to columns [5] and [6] in Table 2.

Skilled and unskilled wages

We use the information on occupations in the Freeman-Oostendorp database to categorize occupations into skilled and unskilled (Table A6)**.** Next, we take the average of wages in skilled and unskilled occupations to explore the effect of labor market integration on wages of skilled and unskilled workers separately. Table 9 shows the results. Columns [1]–[2], and [3]–[4] correspond to unskilled and skilled wages respectively. The effect of the interaction between labor market integration and real exchange rates is positively and statistically significant at the 5 percent level on both skilled and unskilled wages. Although the estimated magnitude of the interaction is higher for unskilled wages, the difference is not statistically significant. The results however, should be interpreted with caution given the limited coverage of the data.

VI. RESULTS FOR RECEIVING COUNTRY—THE CASE OF THE U.S.

We so far have focused on the effects of a devaluation on the wages in the sending countries. In order to test if labor market integration has also an impact on the wages of immigrants in the receiving countries, we analyze how labor market integration has an impact on the immigrants in the U.S.[22] We chose the U.S. because it absorbs a large fraction of migrants in the world (on average 36 percent between 1980 and 2001) and because of data availability on wages of immigrants.[23] We estimate the following equation:[24]

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of exports and imports (as a share of GDP) with measures of labor market integration. The main results (available upon request) are unchanged. The estimated coefficients on the interaction between measures of labor market integration and trade are insignificant in most specifications.

[22] Note that also Hanson, Robertson, and Spilimbergo (2002) analyze the effects on sending (Mexico) and receiving (U.S.) countries at the same time when there are impediments to labor mobility (in that case a shock to enforcement).

[23] See data section for a description of wages in the U.S. by country of birth of immigrants.

[24] See the appendix for how this equation can be derived from standard demand and supply functions for immigrant workers in the U.S.

Table 8. Effect of Exchange Rates on Wages-Alternative Sources of Data on Wages

Dependent variable: ln(real wage)

	IFS		Freeman-Oostendorp	
	[1]	[2]	[3]	[4]
Ln real exchange rate$_{t-1}$	-0.139***	-0.048	5.784***	4.775***
	(0.047)	(0.031)	(1.573)	(1.315)
Ln real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$	0.013*	0.016*	0.489**	0.532**
	(0.007)	(0.009)	(0.223)	(0.256)
Ln emigration rate$_{t-1}$	0.074***	0.067***	-0.598	-0.345
	(0.022)	(0.023)	(0.459)	(0.474)
Ln (exports/GDP)$_{t-1}$	0.061	0.000	-0.778	-0.639
	(0.050)	(0.052)	(1.206)	(0.948)
Ln (imports/GDP)$_{t-1}$	0.068	0.104**	-2.949	-2.841
	(0.048)	(0.052)	(1.836)	(1.714)
Dummy for crisis$_{t-1}$	-0.033	-0.023	0.058	0.414
	(0.022)	(0.022)	(0.541)	(0.563)
Ln unemployment rate$_{t-1}$	0.037**	0.021	-0.805**	-0.800**
	(0.015)	(0.013)	(0.386)	(0.361)
Ln tax wedge$_{t-1}$	-0.046	0.008	1.272	0.988
	(0.053)	(0.049)	(1.617)	(1.667)
Ln (FDI/GDP)$_{t-1}$	-0.008*	-0.013***	-0.455***	-0.328**
	(0.005)	(0.005)	(0.163)	(0.137)
Ln average OECD wage$_{t-1}$		-0.027***		3.548**
		(0.009)		(1.417)
Ln average OECD price$_{t-1}$		0.214***		0.848
		(0.041)		(1.243)
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Observations	211	211	149	149
Number of countries	26	26	30	30
R-squared	0.97	0.95	0.91	0.89

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

Table 9. Effect of Exchange Rates on Wages-Low and High Skill Wages

Dependent variable	ln(low-skill real wage)		ln(high-skill real wage)	
	[1]	[2]	[3]	[4]
Ln real exchange rate$_{t-1}$	5.725***	4.751***	5.780***	4.776***
	(1.589)	(1.338)	(1.528)	(1.267)
Ln real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$	0.514**	0.556**	0.496**	0.534**
	(0.223)	(0.255)	(0.216)	(0.250)
Ln emigration rate$_{t-1}$	-0.538	-0.286	-0.627	-0.376
	(0.470)	(0.479)	(0.444)	(0.460)
Ln (exports/GDP)$_{t-1}$	-0.638	-0.482	-0.773	-0.696
	(1.209)	(0.966)	(1.159)	(0.902)
Ln (imports/GDP)$_{t-1}$	-3.114*	-2.982*	-2.887	-2.799*
	(1.863)	(1.747)	(1.783)	(1.658)
Dummy for crisis$_{t-1}$	0.079	0.446	0.048	0.373
	(0.546)	(0.571)	(0.525)	(0.547)
Ln unemployment rate$_{t-1}$	-0.773*	-0.800**	-0.826**	-0.770**
	(0.393)	(0.368)	(0.374)	(0.351)
Ln tax wedge$_{t-1}$	1.218	0.907	1.095	0.866
	(1.645)	(1.694)	(1.559)	(1.601)
Ln (FDI/GDP)$_{t-1}$	-0.475***	-0.347**	-0.426***	-0.307**
	(0.166)	(0.140)	(0.159)	(0.132)
Ln average OECD wage$_{t-1}$		3.587**		3.577**
		('(1.437)		(1.380)
Ln average OECD price$_{t-1}$		0.821		0.706
		(1.261)		(1.199)
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	N	Y	N
Observations	149	149	149	149
Number of countries	30	30	30	30
R-squared	0.91	0.89	0.92	0.9

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

$$\ln \frac{w_i^{US}}{P^{US}} = I_{i,US} + I_{i,US} * \ln \frac{e_i}{P_i} + \ln \frac{e_i}{P_i} + x^{US} + x^i \qquad (9)$$

The dependent variable, $\frac{w_i^{US}}{P^{US}}$ is the real wage of immigrants from country i in the U.S. and $\frac{e_i}{P_i}$ is the real exchange rate between U.S. and country *i*. The main assumption of this specification is that immigrants from different countries are imperfect substitutes in the U.S. labor markets after controlling for observable characteristics. Table 10 reports the results. Column [1] presents the basic specification, whereas columns [2]–[4] include additional push and pull factors that could influence emigration to the U.S. The interaction between exchange

Table 10. Effect of Exchange Rates on U.S. Immigrant Wages-Interactions

Dependent variable: ln(real wage of immigrants in the U.S.)

	[1]	[2]	[3]	[4]
Ln real exchange rate$_{t-1}$	0.376	0.361	0.914**	0.751*
	(0.242)	(0.244)	(0.438)	(0.397)
Ln real exchange rate$_{t-1}$ * ln emigration rate to the US$_{t-1}$	-0.106**	-0.111**	-0.158*	-0.098
	(0.048)	(0.049)	(0.099)	(0.104)
Ln emigration rate to the US$_{t-1}$	-0.226	-0.213	-0.603**	-0.582*
	(0.142)	(0.144)	(0.293)	(0.311)
Ln (exports/GDP)$_{t-1}$	-0.152*	-0.144	-0.286	-0.206
	(0.089)	(0.090)	(0.220)	(0.214)
Ln (imports/GDP)$_{t-1}$	0.082	0.077	0.007	0.004
	(0.141)	(0.141)	(0.303)	(0.317)
Dummy for crisis$_{t-1}$		0.001	0.223	0.193
		(0.136)	(0.178)	(0.186)
Ln unemployment rate$_{t-1}$			-0.127	-0.149
			(0.151)	(0.154)
Ln tax wedge$_{t-1}$			-0.103	-0.031
			(0.332)	(0.356)
Ln (FDI/GDP)$_{t-1}$			-0.029	-0.037
			(0.063)	(0.065)
Ln average US wage$_{t-1}$				-1.561
				(2.924)
Ln average US price$_{t-1}$				2.192
				(3.635)
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	N
Observations	546	537	289	264
Number of countries	74	73	47	47
R-squared	0.32	0.32	0.34	0.36

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All explanatory variables refer to the origin country of migrants except wages and prices in the US.

rates in a country and labor market integration with the U.S. is negative and statistically significant (in columns [1], [2] and [3]), implying that a given exchange rate devaluation leads to a larger decline (or a smaller increase) in real wages of migrants in the U.S. from countries that are more integrated with the U.S.[25] For a country highly integrated with the U.S. (defined by the 99th percentile of emigration rates), a 1 percent depreciation of the real exchange rate of a country vis-à-vis the U.S. dollar is associated with a 0.03 percent increase in real wages of immigrants from that country in the U.S.; for a country that is poorly integrated with the U.S. (defined by the 1st percentile of emigration rates), real wages increase by ¾ percent.

[25] The estimates turn statistically insignificant in Column [4], though it is driven by a change in the sample, rather than adding additional controls (Table A7).

VII. EXCHANGE RATE AND MIGRATION

In theory, the threat of migration after devaluation alone could have an impact only on wages even in absence of migration. In practice, however, we do expect some migration after a devaluation. This effect, however, may be difficult to measure because high frequency data on migration are noisy.[26] In Table 11, we analyze the effect of exchange rates on emigration rates and remittances. The regressions control for standard push and pull factors, e.g., wages in the home and destination countries, indicators of crisis and country, and time effects. There is strong evidence that real exchange rate depreciations are associated with higher emigration rates, as well as higher remittances to GDP. A 1 percent depreciation of the real exchange rate is associated with a little over ½ percent increase in the emigration rate; and a more than ⅓ percent increase in remittances/GDP. These results support the main finding in the paper that exchange rate movements affect wages through the labor supply channel.

Table 11. Effect of Exchange Rates on Migration

Dependent variable:	ln(emigration rate)			ln(remittances / GDP)		
Variable	[1]	[2]	[3]	[4]	[5]	[6]
Ln real exchange rate$_{t-1}$	0.364***	1.161***	0.661***	0.118	0.245	0.372**
	(0.116)	(0.296)	(0.206)	(0.110)	(0.188)	(0.149)
Ln real wage$_{t-1}$		0.213	0.211		-0.143*	-0.131*
		(0.133)	(0.131)		(0.075)	(0.073)
Dummy for crisis$_{t-1}$		0.104	0.187		-0.180	-0.192*
		(0.207)	(0.207)		(0.115)	(0.114)
Ln average OECD wage$_{t-1}$			0.225**			-0.178**
			(0.105)			(0.077)
Ln average OECD price$_{t-1}$			0.493*			1.172***
			(0.263)			(0.171)
Country fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	N	Y	Y	N
Observations	2296	824	824	2232	805	805
Number of countries	161	66	66	144	63	63
R-squared	0.84	0.83	0.8	0.77	0.82	0.82

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants except wages and prices in OECD.

[26] In cases in which good data are available, there is a sizeable effect on migration flows (see Hanson and Spilimbergo, 1999).

VIII. CONCLUSIONS

The world economy has become increasingly integrated in the past few decades. While international labor mobility has always been an important feature of the world, nowadays mobility has become quicker and more responsive to economic incentives. In a globalized world, it is much easier to get information on wages in other countries.

The goal of this paper is to study the effect of globalization on the responsiveness of domestic wages to devaluation. In order to do this, we present a simple analytical framework that explicitly includes reservation wages abroad and derive testable implications from this model. We evaluate the implications of this model by looking at the effect of exchange rates on four different variables: wages in the sending countries, wages of foreign-born individuals in the U.S., migration rates, and remittances. We identify the effect of exchange rate movements on domestic wages using variation across countries in the degree of integration between domestic and international labor markets. We show that the effect of a devaluation on wages depends on the degree of integration as predicted in our framework. The results are robust to including several controls; different definitions of exchange rates; different concepts of labor market integration; different definition of migrants and different sample of countries. In addition, there is direct evidence for a strong relationship between exchange rate movements, emigration, and remittances.

The contributions of this paper are several. First, we present a simple framework to show how the integration of labor markets may affect wages and the pass-through from exchange rates to wages. Second, we propose several measures of labor market integration. Third, we present an empirical analysis of the impact of labor market integration on wages in the sending countries, on the wages of foreign-born workers in the U.S., and on the direct effect of exchange rates on migration rates and remittances.

Our paper has implications for the empirical and the theoretical literature in macroeconomics and development. On the empirical side, future research should focus on defining more nuanced measures of labor market integration. In this paper, we analyze labor markets as a whole; in reality, labor markets are very fragmented and one market can be deeply integrated while the others can be poorly integrated.[27] Future research should aim at constructing skill-specific labor market integration indices. Another direction of future research is the study of specific information channels through which markets become more integrated.

Our paper has broader implications also for the theoretical literature. If the direct effect of a devaluation on labor markets is sizeable in presence of labor market integration, future macroeconomic models of devaluation and crisis should explicitly take into consideration the effect of a devaluation on labor markets. This could have important implications for welfare analysis and on the policy dialogue.

[27] Note that in some cases, labor markets for unskilled workers are integrated as is the case for Mexico and the United States. In other cases, the labor markets for skilled workers are integrated as is the case for many African countries whose francophone elites can migrate relatively more easily than unskilled workers.

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APPENDIX

Wage data

The statistics on wages are obtained from the ILO's Key Indicators of the Labor Market (KILM). The ILO reports average earnings per worker or, in some cases, average wage rates. Some of the series cover wage earners (i.e., manual or production workers) only, while others refer to salaried employees (i.e., non-manual workers), or all employees (i.e., wage earners and salaried employees). The series cover workers of both sexes, irrespective of age.[28]

The concept of earnings relates to remuneration in cash and in kind paid to employees, as a rule at regular intervals, for time worked or work done together with remuneration for time not worked, such as for annual vacation, other paid leave or holidays. In general, earnings exclude employers' contributions in respect of their employees paid to social security and pension schemes and also the benefits received by employees under these schemes. However, some countries report any such payments made. Earnings also exclude severance and termination pay. Statistics on earnings relate to employees' gross remuneration, i.e., the total before any deduction is made by the employer in respect of taxes, contributions of employees to social security and pension schemes, life insurance premiums, union dues and other obligations of employees.

Specifically, earnings include: direct wages and salaries, remuneration for time not worked (excluding severance and termination pay), bonuses and gratuities and housing and family allowances paid by the employer directly to this employee. The detailed components are as follows: (a) direct wages and salaries for time worked, or work done, cover: (i) straight time pay of time-rated workers; (ii) incentive pay of time-rated workers; (iii) earnings of piece workers (excluding overtime premiums); (iv) premium pay for overtime, shift, night and holiday work; (v) commissions paid to sales and other personnel. Included are premiums for seniority and special skills, geographical zone differentials, responsibility premiums, dirt, danger and discomfort allowances, payments under guaranteed wage systems, cost-of-living allowances and other regular allowances. (b) Remuneration for time not worked comprises direct payments to employees in respect of public holidays, annual vacations and other time off with pay granted by the employer. (c) Bonuses and gratuities cover seasonal and end-of-year bonuses, additional payments in respect of vacation period (supplementary to normal pay) and profit-sharing bonuses. (ii) Statistics on earnings distinguish cash earnings from payments in kind. Wage rates: These include basic wages, cost-of-living allowances and other guaranteed and regularly paid allowances, but exclude overtime payments, bonuses and gratuities, family allowances and other social security payments made by employers. Ex gratia payments in kind, supplementary to normal wage rates, are also excluded.

The coverage of the data differs for countries because of the following reasons (1) whether the reported statistic is wages or earnings; (2) whether it covers employees, wage earners or salaried employees; and (3) whether it includes social security contributions by employer. When we studied the descriptions more closely, we found that certain countries like Chile, Turkey,

[28] See also Hassett and Mathur (2008), who provide details on the ILO wage data.

Colombia, Ecuador, Kenya, Kyrgyzstan, Mexico, Malaysia, Panama and Ukraine included social security contributions by employers in the earnings data. Another difference arises because the industrial classification changed during this period. Since the beginning of the 1990s, an increasing number of countries have made a switchover in their data reporting systems for industrial statistics from Revision 2 to Revision 3 of the International Standard Classification (ISIC).

We include country fixed effects to allow for all these differences in coverage in the panel regression.

Data on Migration

The principle sources of the OECD migration statistics are population registers, residence or work permits, censuses and surveys. However, a wide variety of other data sources (e.g., special surveys, counts at border crossings, analysis of landing cards) are also used.

In the data, the immigrant population is usually defined in one of two ways. Some countries have traditionally focused on producing data that represents foreign nationals (European countries, Japan and Korea) whilst others refer to the foreign-born (Australia, Canada, New Zealand and the United States). This difference in focus relates in part to the nature and the history of immigration systems and legislation on citizenship and naturalization.

The foreign-born population can be viewed as representing first-generation migrants, and may consist of both foreign and national citizens. The size and composition of the foreign-born population is influenced by the history of migration flows and mortality amongst the foreign-born. For example, where inflows have been declining over time, the stock of the foreign-born will tend to age and represent an increasingly established community.

The population of foreign nationals may represent second and higher generations as well as first-generations of migrants. The characteristics of the population of foreign nationals depend on a number of factors (i) the history of migration flows, (ii) natural increase in the foreign population, and (iii) naturalizations. Higher generations of immigrants arise in situations where they retain their foreign citizenship even when native-born. The nature of legislation on citizenship and the incentives foreigners have to naturalize both play a role in determining the extent to which this occurs in practice. In some countries, such as the United States, those who are native born but who are foreign nationals are a non-existent or negligible group as legislation is such that birth within the country usually entitles individuals to citizenship.

One of the key issues in the migration statistics is the measurement of "illegal immigrants." The data do not include explicit estimates of illegal immigrants. However, some stock data partially incorporate illegal migration, therefore the phenomenon does not necessarily go completely unmeasured. For example, individuals may remain on population registers after their permits have expired, residing as illegal (or "undocumented") immigrants.

Derivation of the relationship between wages of immigrants in the U.S. and labor market integration with the U.S.

Consider two countries, the U.S. and the origin country of immigrants (i). Assume that labor is homogenous and that the labor market in the U.S. is segmented according to the nationality of immigrants.

Labor demand for immigrants from country i in the U.S.

In line with studies on the labor market impact of immigrants (Quote), we assume that immigrant workers are imperfect substitutes for domestic workers. The resulting labor demand for immigrant workers from country i is:

$$L_i^{d,US} = (\frac{w_i^{US}}{P^{US}})^{-\beta} X^{d,US} \qquad \text{(A1)}$$

Where $L_i^{d,US}$ is the labor demand for immigrants from country i in the U.S., w_i^{US} is the nominal wage of immigrants from country i in the U.S., P^{US} is the price index in the U.S., $X^{d,US}$ is a composite term that captures the other factors like income in the U.S., which affect labor demand.

Labor supply of immigrants from country i in the U.S.

Labor supply of immigrants in the U.S. is specified as follows.

$$L_i^{s,US} = (\frac{w_i^{US}}{P_i} * e_i)^{\delta I_{i,US}} X^{s,i} \; X^{s,US} \qquad \text{(A2)}$$

Where $L_i^{s,US}$ is the labor supply of immigrants in the U.S. from origin country i; P_i is the domestic price in origin country i and e_i is the nominal exchange rate in local currency units per US$ in origin country i.[29] $X^{s,US}$ and $X^{s,i}$ are composite terms that reflect other factors respectively in the U.S. and in the origin country, affecting labor supply of immigrants in the U.S. These capture the push and pull factors that are likely to affect labor supply of immigrants in the U.S. The key innovation once again in the paper is to introduce $I_{i,US}$ in the labor supply equation. We assume $\delta > 0$, i.e., ceteris paribus, an increase in the real exchange rate in the origin country increases the labor supply of immigrants in the U.S. Moreover, higher is the degree of integration of the labor market with the U.S., a given increase in the real exchange rate leads to a bigger increase in labor supply.

In equilibrium, assuming segmented labor markets for immigrants in the U.S.,

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[29] Note that for simplicity we are deflating wages in the U.S. by origin country price index; in other words, we assume that a migrant even if he works in the U.S. consumes his wage in the origin country. If we assume that only a share of wages earned abroad β is spent at home and the rest is spent in the U.S., the labor supply equation can be modified as $L_i^{s,US} = (\frac{w_i^{US}}{P_i^{\beta}(P^{US})^{1-\beta}} * e_i)^{\delta I_{i,US}} X^{s,i} \; X^{s,US}$. While all results go through, we prefer to keep the simple notation in Equation (A2).

$$L_i^{d,US} = L_i^{s,US} \quad \text{(A3)}$$

Taking logs of (A3) and simplifying:

$$\ln \frac{w_i^{US}}{P^{US}} = -f(I_{i,US}) * \ln \frac{e_i}{P_i} + x^{US} + x^i \quad \text{(A4)}$$

Where $f(I_{i,US}) = \frac{\delta I_{i,US}}{\beta + \delta I_{i,US}} > 0; f'(I_{i,US}) > 0$; x^{US} and x^i are control variables in the U.S. and origin country i respectively that affect real wages of migrants in the U.S. Equation (A4) forms the basis of our empirical specification with real wages of immigrants in the U.S. as the dependent variable. Equation (A4) implies that the higher the degree of labor market integration of an origin country with the U.S., a given change in real exchange rate leads to a larger drop in wages.

Table A1. Countries in the Sample and Top Destination Countries, 1981-2005 (share of migrants in parentheses)

Origin Country	First Destination	Second Destination	Third Destination	Fourth Destination	Fifth Destination
Australia	US (45.55259)	UK (36.86518)	Japan (5.604491)	Germany (4.340753)	Ireland (1.774444)
Austria	Germany (60.98495)	US (22.04737)	Switzerland (9.658471)	Italy (2.503857)	Netherlands (1.114762)
Azerbaijan	Greece (83.69099)	Poland (54.63917)	Italy (30.83492)		
Belgium	US (23.29953)	Netherlands (20.01301)	Germany (17.95798)	Luxembourg (11.82121)	Spain (10.36394)
Bolivia	US (95.54259)	Italy (2.607727)	Sweden (1.54805)	Netherlands (.3016379)	
Botswana	Netherlands (81.90925)	Italy (18.09075)			
Brazil	Japan (49.30959)	US (33.36343)	Portugal (10.16177)	Italy (3.764487)	Spain (2.194695)
Bulgaria	Turkey (89.23187)	Germany (40.34266)	Greece (17.49072)	Italy (11.69657)	Czech Rep (4.14896)
Canada	US (89.03738)	UK (2.983768)	Australia (2.921766)	Germany (1.224331)	Greece (1.152907)
Chile	US (60.81044)	Australia (19.75738)	Sweden (7.607743)	Spain (5.304509)	Italy (2.291702)
China	US (44.40633)	Japan (17.48408)	Canada (15.26432)	Australia (7.200474)	Korea (3.373995)
Colombia	US (88.80374)	Spain (8.184064)	Italy (1.873212)	Norway (.6115786)	Netherlands (.2802509)
Costa Rica	US (99.24124)	Italy (.5918468)	Netherlands (.1669128)		
Croatia	Germany (54.77436)	Australia (14.19412)	Austria (13.07474)	Switzerland (10.74103)	Italy (4.053644)
Cyprus	Australia (55.53741)	Turkey (26.11263)	Greece (17.0231)	Hungary (.8267785)	Italy (.3794637)
Czech Rep	US (50.93083)	Germany (33.16109)	Slovak Rep (6.246355)	Italy (4.82095)	Netherlands (1.56538)
Denmark	Sweden (25.46042)	Germany (19.86984)	US (19.2713)	Norway (18.45042)	Spain (5.576809)
Dominican Rep	US (93.74419)	Spain (4.293072)	Italy (1.768106)	Netherlands (.1695906)	Greece (.0250432)
Ecuador	US (78.97874)	Spain (16.74682)	Italy (4.14329)	Netherlands (.1311544)	
El Salvador	US (99.29029)	Mexico (.8223777)	Italy (.4471579)	Sweden (.0682295)	Netherlands (.0057866)
Estonia	Finland (83.75227)	Sweden (11.91455)	Italy (2.385605)	Poland (1.947571)	
Finland	Sweden (61.19329)	US (17.50731)	Germany (10.05655)	Norway (4.042445)	Belgium (1.916381)
France	US (26.45001)	Germany (14.21662)	Belgium (14.19096)	UK (10.46964)	Canada (8.869189)
Germany	US (56.54967)	Canada (8.725454)	Austria (6.279871)	Australia (5.88965)	Switzerland (5.846994)
Ghana	US (64.63347)	UK (19.86415)	Italy (12.8111)	Netherlands (2.406767)	Greece (.2607971)
Guatemala	US (99.5553)	Mexico (3.020712)	Italy (.1319454)	Netherlands (.0238796)	
Hungary	US (30.63225)	Germany (20.91877)	Canada (18.20461)	Australia (9.417146)	Austria (8.706375)
Iceland	Denmark (40.14516)	Sweden (27.54029)	Norway (26.58144)	Netherlands (2.696764)	Luxembourg (2.057531)
Israel	US (89.16121)	Italy (2.980376)	Netherlands (1.959458)	Denmark (1.871194)	Hungary (1.248933)
Jamaica	US (72.89533)	Canada (19.55103)	UK (7.50897)	Netherlands (.0282627)	Italy (.016406)
Japan	US (81.77773)	Germany (5.673021)	UK (5.19707)	Korea (2.459388)	New Zealand (1.445456)
Kazakhstan	Greece (97.51798)	Poland (41.16694)	Italy (23.48015)	Hungary (7.177386)	
Kenya	US (93.2746)	New Zealand (2.145571)	Italy (1.903449)	Sweden (1.223646)	Netherlands (.7673396)
Korea	US (55.02663)	Japan (39.13342)	Australia (2.586597)	Germany (1.400599)	New Zealand (1.109761)
Kyrgyz Rep	Greece (65.13762)	Italy (26.2997)	Hungary (8.562692)		
Latvia	US (83.89914)	Ireland (8.306334)	Sweden (4.028736)	Italy (3.108419)	Poland (.5446776)
Lithuania	US (91.07237)	Ireland (3.886721)	Sweden (1.769762)	Poland (1.613993)	Italy (1.570828)
Macedonia	Switzerland (30.50755)	Germany (29.25552)	Australia (24.97792)	Italy (12.89916)	Sweden (.8961744)
Malaysia	Australia (48.95321)	US (26.30397)	UK (14.67253)	New Zealand (6.543108)	Japan (5.159594)
Mauritius	Italy (99.22034)	Netherlands (.7796617)			
Mexico	US (99.85799)	Germany (.0727241)	Italy (.0508816)	Netherlands (.008897)	Sweden (.0067854)
Netherlands	Canada (19.22672)	Germany (18.35629)	Belgium (15.12146)	Australia (14.89911)	US (12.88937)
New Zealand	Australia (85.82389)	UK (9.110172)	US (4.363788)	Ireland (.3239917)	Netherlands (.2005222)
Nicaragua	US (99.832)	Italy (.1398456)	Netherlands (.0281554)		
Norway	Sweden (44.12623)	US (21.91123)	Denmark (17.44356)	Germany (9.963388)	Netherlands (2.830764)
Pakistan	US (55.37356)	UK (20.03692)	Germany (7.90257)	Italy (4.555847)	Spain (3.352581)
Panama	US (99.30139)	Italy (.4937447)	Greece (.158827)	Netherlands (.0460368)	
Philippines	US (67.11703)	Canada (11.71443)	Japan (7.887843)	Australia (5.649026)	Italy (3.409102)
Poland	US (36.05516)	Germany (26.55773)	Canada (15.43466)	Australia (5.500922)	Austria (3.774676)
Portugal	France (44.43937)	US (14.92947)	Canada (14.4286)	Switzerland (12.51382)	Germany (11.99086)
Romania	Italy (22.63683)	Germany (21.17121)	US (17.41822)	Hungary (11.28786)	Austria (9.074023)
Russia	US (67.92616)	Germany (18.91619)	Finland (3.053924)	Greece (2.720376)	Italy (1.681843)
Singapore	Australia (56.51764)	US (35.95875)	New Zealand (6.153967)	Netherlands (1.13665)	Italy (.2329975)
Slovak Rep	Czech Rep (46.25716)	US (33.96193)	Germany (14.3889)	Italy (2.579273)	Hungary (1.580357)
Slovenia	Germany (46.42404)	Austria (36.73391)	Italy (8.720099)	Switzerland (6.133075)	Sweden (1.349209)
South Africa	US (31.04371)	Australia (29.72343)	UK (23.25884)	New Zealand (8.913949)	Portugal (3.829841)
Spain	Germany (27.37697)	US (22.24974)	Switzerland (16.94552)	Belgium (9.549132)	UK (9.450335)
St Vincent Gr	Greece (92)	Netherlands (6.4)	Italy (1.6)		
Switzerland	Germany (31.45018)	US (28.40734)	Italy (12.81826)	Portugal (10.69598)	Spain (6.038415)
Thailand	US (71.27717)	Japan (15.27754)	Sweden (3.014041)	New Zealand (2.485101)	Denmark (2.377577)
Trinidad Tob	US (99.90805)	Netherlands (.0556351)	Italy (.0363136)		
Turkey	Germany (70.28643)	France (7.835502)	Austria (4.619998)	Netherlands (3.653004)	US (3.563825)
UK	Australia (36.77272)	US (23.98246)	Canada (19.87641)	New Zealand (6.921081)	Germany (3.667293)
US	Canada (29.94303)	UK (18.62629)	Germany (14.28788)	Australia (7.425347)	Japan (5.819962)
Ukraine	US (46.41976)	Germany (21.16271)	Portugal (11.50146)	Czech Rep (10.78997)	Italy (2.700366)
Zimbabwe	UK (84.85722)	New Zealand (12.25763)	Greece (1.900802)	Netherlands (.6067292)	Italy (.3776146)

Notes. For each country, the share of migrants correspond to the year in the period 1981-2005 with the maximum number of destination countries. Migrants in the OECD countries are defined by nationality or country of birth.

Source: Q:\DATA\mobility\data\summarystatstable.dta

Table A2. Years in the Sample. 1981-2005

Year	Number of observations
1981	22
1982	24
1983	22
1984	22
1985	20
1986	25
1987	24
1988	24
1989	25
1990	25
1991	27
1992	29
1993	29
1994	28
1995	29
1996	38
1997	48
1998	48
1999	49
2000	50
2001	39
2002	40
2003	26
2004	22
2005	5
Total	740

Table A3. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Real wage per hour (local currency units)	740	2.83	9.66	0.00	163.08
Lag real exchange rate (local currency units per US$)	740	2.07	13.80	0.00	264.29
Lag emigration rate to the OECD	740	2.20	3.27	0.00	21.14
Lag exports / GDP	740	26.12	18.67	3.71	184.31
Lag imports/GDP	740	30.02	19.06	5.24	160.88
Lag crisis (per capita real GDP growth <0)	710	0.06	0.24	0.00	1.00
Lag unemployment rate	574	8.02	4.94	0.50	25.20
Lag tax wedge	419	42.01	13.89	6.93	82.94
Lag FDI/GDP	393	3.00	3.87	0.00	45.15
Average nominal wage per hour in the OECD (local currency units)	393	1201.75	313.71	364.51	1656.60
Average CPI in the OECD	393	80.98	17.84	40.98	118.44
Lag real migration-weighted exchange rate	740	1.18	10.56	0.00	242.14
Lag real trade-weighted exchange rate	719	97.66	944.16	0.51	14874.69
Lag Remittances/GDP	333	1.28	2.11	0.04	13.40
Lag stock of migrants in the OECD (in '000)	393	390.87	554.52	0.16	5895.74
Real wage per hour of immigrants in the United States	546	5.72	3.32	0.31	25.00
Lag emigration rate to the US	546	2.76	5.82	0.02	59.52
Real wage from IFS (index number)	211	91.18	30.44	6.45	274.46
Real wage per month; Freeman-Oostendorp (local currency units)	146	2369.82	12814.97	4.26	132242.60
Share of capital-intensive exports in overall (in percent)	740	45.17	14.86	12.14	86.73
Share of capital-intensive imports in overall (in percent)	740	44.41	7.20	31.59	69.52
Low-skill real wage per month; Freeman-Oostendorp database (local currency units)	146	1938.79	9986.17	3.94	95869.44
High-skill real wage per month; Freeman-Oostendorp database (local currency units)	146	3009.25	17340.56	4.85	189400.30

Table A4. Panel Unit Root Test

	Ln (real wage)	Ln (real exchange rate)
Levin-Lin ADF-stat	-1.91261	-2.67213
Im, Pesharan & Shin ADF-stat	-3.86461	-6.07111
Number of countries	69	69
Number of periods	25	25

Notes. The missing values for intermediate years have been interpolate to apply the unit root tests. All reported values are distributed N(0,1) under null of unit root or no cointegration. Large negative values imply rejection of the unit root, with the 5% critical value being -1.64.

Table A5. Effect of Exchange Rates on Wages: Migrants defined by Foreign-Born: Sample-Selection

Dependent variable: ln(real wage)		
	[1]	[2]
Ln real exchange rate$_{t-1}$	0.159	-0.020
	(0.322)	(0.114)
Ln real exchange rate$_{t-1}$ * ln emigration rate$_{t-1}$	0.015	0.009
	(0.027)	(0.027)
Ln emigration rate$_{t-1}$	-0.039	0.025
	(0.048)	(0.037)
Ln (exports/GDP)$_{t-1}$	0.256	0.409**
	(0.263)	(0.190)
Ln (imports/GDP)$_{t-1}$	-0.549**	-0.476**
	(0.231)	(0.223)
Country fixed effects	Y	Y
Year fixed effects	Y	Y
Observations	338	338
Number of countries	43	43
R-squared	0.96	0.96

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All variables refer to the origin country of migrants.

Table A6. List of Occupations: Freeman-Oostendorp Occupational Wages Around the World Database

Occupation	Skill
Farm supervisor	Skilled
Field crop farm worker	Unskilled
Plantation supervisor	Skilled
Plantation worker	Unskilled
Forest supervisor	Skilled
Forestry worker	Unskilled
Logger	Unskilled
Tree feller and bucker	Unskilled
Deep-sea fisherman	Unskilled
Inshore (coastal) maritime fisherman	Unskilled
Coalmining engineer	Skilled
Miner	Skilled
Underground helper, loader	Unskilled
Petroleum and natural gas engineer	Skilled
Petroleum and natural gas extraction technician	Skilled
Supervisor or general foreman	Skilled
Derrickman	Unskilled
Miner	Skilled
Quarryman	Unskilled
Butcher	Unskilled
Packer	Unskilled
Dairy product processor	Unskilled
Grain miller	Unskilled
Baker (ovenman)	Unskilled
Thread and yarn spinner	Unskilled
Loom fixer, tuner	Unskilled
Cloth weaver (machine)	Unskilled
Labourer	Unskilled
Garment cutter	Unskilled
Sewing-machine operator	Unskilled
Tanner	Unskilled
Leather goods maker	Unskilled
Clicker cutter (machine)	Unskilled
Laster	Unskilled
Shoe sewer (machine)	Unskilled
Sawmill sawyer	Unskilled
Veneer cutter	Unskilled
Plywood press operator	Unskilled
Furniture upholsterer	Unskilled
Cabinetmaker	Unskilled
Wooden furniture finisher	Unskilled
Wood grinder	Unskilled
Paper-making-machine operator (wet end)	Unskilled
Journalist	Skilled
Stenographer-typist	Skilled
Office clerk	Skilled
Hand compositor	Skilled
Machine compositor	Skilled
Printing pressman	Skilled
Bookbinder (machine)	Skilled
Labourer	Unskilled
Chemical engineer	Skilled
Chemistry technician	Skilled
Supervisor or general foreman	Skilled
Mixing- and blending-machine operator	Unskilled
Labourer	Unskilled
Mixing- and blending-machine operator	Unskilled
Packer	Unskilled
Labourer	Unskilled
Controlman	Unskilled
Occupational health nurse	Skilled
Blast furnaceman (ore smelting)	Unskilled
Hot-roller (steel)	Unskilled
Metal melter	Unskilled
Labourer	Unskilled
Metalworking machine setter	Unskilled
Welder	Unskilled
Bench moulder (metal)	Unskilled
Machinery fitter-assembler	Unskilled
Labourer	Unskilled
Electronics draughtsman	Unskilled
Electronics engineering technician	Unskilled
Electronics fitter	Unskilled
Electronic equipment assembler	Unskilled
Ship plater	Unskilled
Power distribution and transmission engineer	Skilled
Office clerk	Skilled
Electric power lineman	Unskilled
Power-generating machinery operator	Unskilled
Labourer	Unskilled
Building electrician	Unskilled
Plumber	Unskilled

Table A6. List of Occupations: Freeman-Oostendorp Occupational Wages Around the World Database

Occupation	Skill
Constructional steel erector	Unskilled
Building painter	Unskilled
Bricklayer (construction)	Unskilled
Reinforced concreter	Unskilled
Cement finisher	Unskilled
Construction carpenter	Unskilled
Plasterer	Unskilled
Labourer	Unskilled
Stenographer-typist	Skilled
Stock records clerk	Skilled
Salesperson	Skilled
Book-keeper	Skilled
Cash desk cashier	Skilled
Salesperson	Skilled
Hotel receptionist	Skilled
Cook	Unskilled
Waiter	Unskilled
Room attendant or chambermaid	Unskilled
Ticket seller (cash desk cashier)	Skilled
Railway services supervisor	Skilled
Railway passenger train guard	Unskilled
Railway vehicle loader	Unskilled
Railway engine-driver	Unskilled
Railway steam-engine fireman	Unskilled
Railway signalman	Unskilled
Road transport services supervisor	Skilled
Bus conductor	Unskilled
Automobile mechanic	Unskilled
Motor bus driver	Unskilled
Urban motor truck driver	Unskilled
Long-distance motor truck driver	Unskilled
Ship's chief engineer	Skilled
Ship's steward (passenger)	Unskilled
Able seaman	Unskilled
Dock worker	Unskilled
Air transport pilot	Skilled
Flight operations officer	Skilled
Airline ground receptionist	Skilled
Aircraft cabin attendant	Skilled
Aircraft engine mechanic	Unskilled
Aircraft loader	Unskilled
Air traffic controller	Skilled
Aircraft accident fire-fighter	Skilled
Post office counter clerk	Skilled
Postman	Skilled
Telephone switchboard operator	Skilled
Accountant	Skilled
Stenographer-typist	Skilled
Bank teller	Skilled
Book-keeping machine operator	Skilled
Computer programmer	Skilled
Stenographer-typist	Skilled
Card- and tape-punching- machine operator	Skilled
Insurance agent	Skilled
Clerk of works	Skilled
Computer programmer	Skilled
Government executive official:	Skilled
Stenographer-typist	Skilled
Card- and tape-punching- machine operator	Skilled
Office clerk	Skilled
Fire-fighter	Skilled
Refuse collector	Unskilled
Mathematics teacher (third level)	Skilled
Teacher in languages and literature (third level)	Skilled
Teacher in languages and literature (second level)	Skilled
Mathematics teacher (second level)	Skilled
Technical education teacher (second level)	Skilled
First-level education teacher	Skilled
Kindergarten teacher	Skilled
General physician	Skilled
Dentist (general)	Skilled
Professional nurse (general)	Skilled
Auxiliary nurse	Skilled
Physiotherapist	Skilled
Medical X-ray technician	Skilled
Ambulance driver	Unskilled
Automobile mechanic	Unskilled
Pattern makers (wood)	Unskilled
Permanent way labourers	Unskilled
Labourers (unskilled, public parks and gardens)	Unskilled

Source: http://www.nber.org/oww/

Table A7 . Effect of Exchange Rates on U.S. Immigrant Wages-Interactions: Sample Selection

Dependent variable: ln (real wage of immigrants in the U.S.)	
	[1]
Ln real exchange rate$_{t-1}$	0.555
	(0.477)
Ln real exchange rate$_{t-1}$ * ln emigration rate to the US$_{t-1}$	-0.116
	(0.107)
Ln emigration rate to the US$_{t-1}$	-0.626**
	(0.305)
Ln (exports/GDP)$_{t-1}$	-0.197
	(0.228)
Ln (imports/GDP)$_{t-1}$	0.036
	(0.345)
Country fixed effects	Y
Year fixed effects	Y
Observations	264
Number of countries	47
R-squared	0.36

Notes. * significant at 10%; ** significant at 5%, *** significant at 1%. Robust standard errors in parentheses. All explanatory variables refer to the origin country of migrants.