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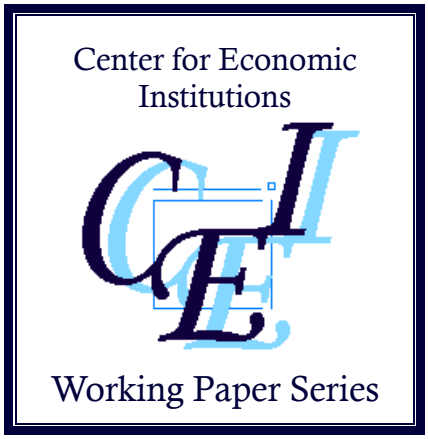

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Skilled Emigration, Wages and Real Exchange Rate in a Globalized World

Alice Ouyang* and Saumik Paul**

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Abstract

Building on a simple analytical model, we provide cross-country empirical evidence from 67 countries that the net skilled emigration appreciates bilateral real exchange rates in source countries. Channels of causality, when Law of One Price (LOOP) holds, are through "spending effect" and "resource allocation effect", analogous to the remittance-based Dutch disease effect. Pricing-to-market model allows pass-through for both tradable and nontradable prices when LOOP is violated. Internal (relative price of tradable to nontradable) price explains about 60% of the RER appreciation, which is mostly driven by the outcomes on developing countries. The outcomes are robust across different levels of skilled emigration, alternative model specifications and withstand placebo tests with unskilled emigration.

Keywords: Emigration, Exchange Rate, the Dutch Disease

JEL Classifications: F22, F31

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1. Introduction

A growing literature on the impact of emigration on source countries wages suggest a strong and positive effect (Mishra, 2007; Aydemir and Borjas, 2007; Bouton, Paul and Tiongson, 2010). The magnitude differs across schooling groups and the greatest increase has been for the high-skilled stayers with 12 to 15 years of education owing to a higher emigration rate from this group (Mishra and Topalova, 2007). This opens up many important indirect general equilibrium questions. Could an increase in average wages pass through relative prices of nontraded goods and in turn affect real exchange rate movements? While studies show that the elasticity of domestic wages to real exchange rate range from .15 to .40 depending on the level of barriers to labor mobility (Mishra and Spilimbergo, 2011), little is known on reverse causality of this channel. This paper explores this issue. In particular, we examine if net skilled emigration affects bilateral real exchange rates in source countries through the wage channel.

As theory suggests, a reduction in the supply of labor because of out-migration is likely to increase the wages of those workers staying home. Studies provide empirical evidence both at the individual and regional or sector specific wages. At an individual level, Mishra (2007) using the supply shifts in education-experience groups (Borjas, 2003) finds that a 10 percent increase in emigration, on average, increases wages in Mexico by almost 4 percent. Similar evidence has been found by other studies. Aydemir and Borjas (2007) on Mexico, Bouton, Paul and Tiongson (2010) on Moldova, Elsner (2010) on Ireland, Gagnon (2011) on Honduras estimate wage elasticity of emigration between 1 to 4 percent[1]. Empirical findings on sector specific wages are similar. Lucas (1987, 2005) finds that mine worker emigration to South Africa has raised wages in Malawi and Mozambique. Similarly, Hanson (2006) finds that the average hourly earnings in states with high emigration rates increased by 6 to 9 percent, compared to states with low-emigration rates. We call this "labor supply shock" channel.

Moreover, Marjit and Kar (2005) argue that the return to capital could decline as a result of skilled emigration in a particular sector, and this could subsequently raise the wages in other (non-migrating) sectors. Going one step further, Oladi and Beladi (2007) introduce nontradable

[1] Notable exceptions are Docquier, Ozdan and Peri (2010) and Pryymachenko (2011), which fail to provide such evidence on OECD and EU countries, respectively.

goods in a small open economy set up with skilled emigration. This implies that an acute emigration shock in nontradable sector might drive wages up in tradable sector. We call this "return to capital" channel of emigration. We postulate that skilled emigration produces an upward thrust on sector-specific (tradable and nontradable) domestic average wages through both "labor supply shock" channel and "return to capital" channel. The relative effect on wages across tradable and nontradable sectors depends on how effective each of these channels is. We come back to this later.

The significance of remittances in the discussion of livelihood effects of skilled emigration is undeniable (Mishra and Topalova, 2007; Spatafora and Aggarwal, 2005). With steady growth of remittances over the past few decades (Spatafora and Aggarwal, 2005), a number of studies examined possibilities of a remittance-based Dutch disease effect. It is argued that the inflow of remittances analogous to discovery of new resources relative to the size of the recipient economy could appreciate real exchange rates (Corden and Neary, 1982). While some studies (Amuedo-Dorantes and Pozo, 2004; Lartey, Mandelman and Acosta, 2012; Hassan and Holmes, 2012) provide supportive empirical evidence to this phenomenon, other studies put caution on a hasty conclusion (Rajan and Subramanian, 2005; Barajas et al, 2010). Although, the main goal of this paper is to provide evidence for an alternative channel linking skilled emigration and real exchange rates, we control for remittances in our analysis and offer a more robust explanation for the movements in real exchange rates related to labor mobility.

We now turn to the standard literature analysing factors behind movements in real exchange rates. Engel (1999)'s influential work showed about 90 percent of the fluctuations in the US bilateral real exchange rates was driven by changes in the tradable goods component. Burstein et al. (2006) refute such findings on the ground that the price of tradables was measured using unsuitable proxies. In a comprehensive study of 1225 country pairs over the period 1989–2005, Betts and Kehoe (2008) find that real exchange rate fluctuations tend to co-move much more strongly with internal prices when there are more intensive trade relationships. Again, Ouyang and Rajan (2013) considering a panel of 51 economies over the period 1990–2010, find that internal relative prices contribute only 30 to 40% variation in real exchange rates. While such ambiguity persists, the questionable existence of Law of One Price (LOOP) has also received much attention. Assuming that LOOP holds

(Harrod-Balassa-Samuelson hypothesis), Canzoneri, et al (1997) show that if productivity of tradable relative to nontradable goods grows faster at home rather than abroad, then the home country should experience a RER appreciation. Macdonald and Ricci (2005) find that distribution sector plays a similar role in RER appreciation. However, studies (Heston et al, 1995; Eaton and Kortum, 2001) also show that international deviations from the LOOP for traded and nontraded goods are of nearly the same magnitude. Closest to ours in spirit, an article by Alessandria and Kaboski (2011) deserves a mention. Building on a pricing-to-market model based on international productivity differences and search frictions, this study shows that international differences in wages accounts for almost 63% of the violation from absolute purchasing power parity.

Using a simple theoretical framework, we spell out two channels through which the effect of skilled emigration shock gets transmitted onto real exchange rates. The first channel is through the relative price of tradables to nontradables (or internal prices). In light of the Harrod-Balassa-Samuelson model, we argue that a higher wage resulting from skilled emigraion in both sectors may induce "the spending effect" analogous to what we find in the remittance-based Dutch disease effect (Barajas et al, 2010). Assuming that there is no leisure-consumption trade off, this enables households to spend extra on both tradables and non-tradables. If LOOP holds, then there is no change in prices of tradables (price takers), but prices of nontradables go up as they are determined in the domestic economy. Since the relative prices move in favor of nontradables, this erodes the competitiveness of tradable sectors, a phenomenon known as "resource allocation effect." Both of these effects lead to a real exchange rate appreciation.

However, in this study, we allow for the failure of LOOP. The second channel borrows a pricing-to-market model based on international productivity differences and search frictions as developed by Alessandria and Kaboski (2011). The authors demonstrate the role of local wages in the price-setting behavior of firms. Unlike the first channel, pricing-to-market model allows pass-through for both external (relative prices of tradable goods) and internal (relative price of tradables to nontradables) prices assuming possible violations of LOOP. Assuming that an increase in net skilled emigration in home country increases relative wages and therefore prices in favour of home country, this makes tradable goods in home country less competitive

compared to foreign country and leads to an appreciation of real exchange rates. We postulate that these two mechanisms jointly appreciate real exchange rates, and the relative contribution of external and internal prices depends on the extent of the failure of LOOP and relative wage elasticity of skilled emigration across tradable and nontradable goods sectors.

Building on this, we test the hypothesis that whether skilled emigration appreciates real exchange rates. We consider bilateral real exchange rates and its two price components as dependent variables. To identify the effect of skilled emigration on real exchange rates we use cross-country-pair variation in net skilled emigration. Variation in the net skilled emigration explains the net mean wage differences across country-pairs, which in turn explains in movements in bilateral RER. Two price components of RER, namely the external and internal prices, identify the relative strength of each channel in explaining the movements in RER. We use political quality index and the lagged growth rate of real GDP per capita in the source country as instruments to address possible endogeneity bias between net skilled emigration and real exchange rates. Baseline outcomes indicate an appreciation of real exchange rates resulting from skilled emigration. For developed source countries, the external prices component is stronger whereas for developing source country sample the internal price component makes a stronger contribution. We also find strong evidence on the remittance-based Dutch disease effect; however, wage effect channel of skilled emigration appears to be a more robust explanation of the exchange rate movements. Empirical findings on RER appreciation are robust across different levels of skilled emigration, alternative model specifications and withstand placebo tests with unskilled emigration. In addition, we also provide to empirical support to the wage channel of skilled emigration.

To our knowledge this is the first study that provides evidence to appreciation of real exchange rates resulting from skilled emigration. Our paper can be linked to existing literature in a number of ways. First, this study corroborates to the remittance-based Dutch disease theory. We offer an alternative and a more robust explanation of the exchange rate movements related to labor mobility. Second, this paper makes an indirect contribution to our understanding of the factors behind movements in real exchange rates. Our study does not address the volatility in real exchange rates; however, it provides evidence on the relative contribution of external and internal prices when real exchange rates appreciate. Finally, this study aims to contribute to the

growing literature on economics of international migration. In a recent paper, Clemens, Ozden and Rapoport (2014) provide evidence of a significant growth in migration research, especially in the areas related to the direct and indirect effects of human capital movement. Taking advantage of the availability of novel datasets, especially on cross-border migration by skill-groups (Artuc, Docquier, Ozden and Parsons, 2015), this study extends our knowledge base on the indirect general equilibrium effects of the mobility of human capital in source countries.

We plan the rest of the section in the following manner. In section 2, we forward a simple motivational model. In section 3, we discuss data, summary statistics, econometric strategy and findings. Section 4 summarizes some robustness test, which is followed by some concluding remarks in section 5.

2. A Simple Motivational Model

We use a general analytical framework similar to Macdonald and Ricci (2005), where they examine the role of distributional sector in explaining the movements in real exchange rates. This study focuses on bilateral real exchange rate movements, as a result we consider two open economies (countries 1 and 2), and each economy has two sectors of production, tradable and nontradable goods. The model assumes constant returns to labor in both sectors, and identical Cobb-Douglas preferences in tradable and nontradable goods for both economies.

We denote skilled emigration as a share of total emigration from country 1 to 2 as M_{12} and in a similar way from country 2 to 1 is denoted as M_{21}. The net skilled emigration from country 1 to 2 is $\overline{M_{12}} = M_{12} - M_{21}$. Based on the literature on the effect of skilled emigration on wages, which shows a positive elasticity, we define wage ratios in tradable and nontrdable sectors as a function of net skilled emigration, as follows:

$$W_{T1}/W_{T2} = \theta_T \overline{M_{12}} \text{ and } W_{N1}/W_{N2} = \theta_N \overline{M_{12}} \quad (1)$$

where $W_{T1}/W_{T2}$is the wage ratio in tradable sector between country 1 and 2, θ_T is the wage elasticity of skilled emigration in tradable goods sector. Similar notations for nontradables; only replacing *T* by *N*.

Alessandria and Kaboski (2011) develop a pricing-to-market model based on international productivity differences and search frictions, where they demonstrate the role of local wages in the price-setting behavior of firms. In light of this model, we write the prices in tradable good sector for country 1 and 2 as

$$P_{T1} = \varphi_T W_{T1}^{\beta} W_{T2}^{1-\beta} \text{ and } P_{T2} = \varphi_T W_{T2}^{\beta} W_{T1}^{1-\beta}.$$

Thus, based on pricing-to-market model tradable sector prices are a function of wages in both country and a identical mark-up φ_T for both countries, which represent other costs associated with distribution sector (Macdonald and Ricci, 2005), productivity differences (Canzoneri, et al, 1997), etc. Similarly, for nontradable sectors we write the prices as a function of wages in own country only and some mark-up costs

$$P_{N1} = \varphi_{N1} W_{N1} \text{ and } P_{N2} = \varphi_{N2} W_{N2}.$$

After some algebraic calculations, the prices ratios in tradable sector and nontradable sectors can be written, respectively, as

$$P_{T2}/P_{T1} = (W_{T1}/W_{T2})^{1-2\beta} \text{ and } P_{N2}/P_{N1} = (\varphi_{N2}/\varphi_{N1})(W_{N2}/W_{N1}).$$

Replacing wage ratio with net skilled emigration from equation (1), we rewrite price ratios as

$$P_{T2}/P_{T1} = (\theta_T \overline{M_{12}})^{1-2\beta} \text{ and } P_{N2}/P_{N1} = (\varphi_{N2}/\varphi_{N1})/(\theta_N \overline{M_{12}}) \qquad (2)$$

Thus, price ratios in both tradable and nontradable sectors are written as a function of skilled emigration rates from each sector, respectively. Now, we turn to the real exchange rate.

Assuming P_1 denotes the domestic price level, while P_2 denotes the foreign price level, the real exchange rate (RER) can be expressed as:

$$RER = E\ P_2/P_1$$

Since both countries have identical Cobb-Douglas preferences, the aggregate price level for both can be written as $P_i = P_{Ni}^{\alpha} P_{Ti}^{1-\alpha}, i = 1, 2$. Substituting the expressions of aggregate prices, we get the real exchange rate as a function of tradables and non-tradable prices:

$RER = E\ P_{N2}^{\alpha} P_{T2}^{1-\alpha} / P_{N1}^{\alpha} P_{T1}^{1-\alpha}$, or this can written as

$$RER = (E\ P_{T2}/P_{T1})\ (P_{N2}/P_{N1})^{\alpha}\ (P_{T2}/P_{T1})^{-\alpha}$$

Taking log both sides, the expression becomes

$$ln(RER) = ln\ (E\ P_{T2}/P_{T1}) + \alpha ln(P_{N2}/P_{N1}) -\ \alpha ln(P_{T2}/P_{T1}) \qquad (3)$$

Equation (1) decomposes bilateral real exchange rates *(RER)* of country 1 with respect to country prices in country 2 into two price components. The first price component is the ratio of tradable prices (or external prices, we denote it as RER^{XT}) and the last two factors constitute the ratio nontradable to tradable prices (or internal prices, we denote it as RER^{IN}). This is familiar model of the Balassa-Samuelson hypothesis (Balassa, 1964; Samuelson, 1964), where in the presence of the LOOP the first component equals to 1 and most of the variation in real exchange rates is explained by the productivity differences in different sectors through the internal prices. However, we allow for the failure of the LOOP since skilled emigration shock gets transmitted also through the relative prices of tradable goods (or external prices. This intuition is carried forward to the empirical analysis as well. Next we place price ratios in equation 3 by skilled emigration shares from equation 2, and the bilateral RER becomes as a function of net skilled emigration rates.

$$\ln(RER) = ln(E) + (1 - 2\beta)\ln(\theta_T \overline{M_{12}}) + \alpha \ln(\varphi_{N2}/\varphi_{N1}) -\ \alpha \ln(\theta_N \overline{M_{12}}) -\ \alpha(1 - 2\beta) ln(\theta_T \overline{M_{12}}) \qquad (4)$$

Equation (4) shows RER as a function of net skilled emigration rate. This can also be

further simplified into

$$rer = rer^{XT} + rer^{IN}$$

Where

$rer = \ln(RER)$

$rer^{XT} = ln(E) + (1 - 2\beta)\ln(\theta_T \overline{M_{12}})$ and

$rer^{IN} = \alpha \ln(\varphi_{N2}/\varphi_{N1}) - \alpha \ln(\theta_N \overline{M_{12}}) - \alpha(1 - 2\beta) ln(\theta_T \overline{M_{12}})$

Thus both real exchange rates and its price components, external and internal prices, are shown as a function of net skilled emigration. Next we spell out two possible mechanism based on our simple analytical framework.

Case 1: Law of One Price (LOOP) holds

If LOOP holds then $EP_{T2}/P_{T1} = 1$, or the only internal prices explain movements in real exchange rates. A higher wage in both tradable and nontradable sectors resulting from skilled emigration sectors may induce "the spending effect" analogous to what we find in the remittance-based Dutch disease effect (Barajas et al, 2010). Assuming that there is no leisure-consumption trade off, this enables households to spend extra on both tradables and non-tradables. For a small open economy (Krugman, 1989), if the LOOP holds, then there is no change in prices of tradables (price takers), but prices of nontradables go up as they are determined in the domestic economy. Since the relative prices move in favor of nontradables, this erodes the competitiveness of tradeable sectors, a phenomenon known as "resource allocation effect." Both of these effects lead to a real exchange rate appreciation.

Case 2: Law of One Price (LOOP) does not hold

Unlike the first channel, pricing-to-market model allows pass-through for both external (relative prices of tradable goods) and internal (relative price of tradables to nontradables) prices assuming possible violations of LOOP (Alessandria and Kaboski, 2011). Assuming that

an increase in net skilled emigration in favour of country 1 increases relative wages and therefore prices in favour of country 1, this makes the relative prices of tradable goods lower for country 1, thus EP_{T2}/P_{T1} lowers with a relatively high increase in P_{T1}. As a result, tradable sector in country 1 becomes less competitive compared to country 2 and in turn leads to an appreciation of bilateral real exchange rate for country 1.

We postulate that these two mechanisms jointly appreciate real exchange rates, and the relative contribution of external and internal prices depends on the extent of the failure of LOOP and relative wage elasticity of skilled emigration across tradable and nontradable goods sectors.

3. Data and Empirical Strategy

3.1. Data and Descriptive Evidence

We use a sample of 67 sample economies for this study (listed in Appendix 1). We calculate real exchange rates based on available data on price indices. While the CPI is generally used to compute the bilateral real exchange rate, PPI proxy for the price index for tradable goods.[2] We rescaled all the price indices to the base year of 1990. All the CPI, PPI, and nominal exchange rate data are taken from the IMF *International Financial Statistics* (*IFS*) database. Furthermore, we calculate both internal and external prices of bilateral real exchange rate, and use them as the dependent variables. Skilled emigration is defined as the share of emigration stock with college education level over the total emigration stock. The bilateral emigration data is taken from Docquier, Ozden and Peri (2014). Since the bilateral data for skilled emigration is available only for two years (i.e. 1990 and 2000) only, we consider a panel regression with two time periods. Data on control variables are taken from *World Development*

[2] Since there exists no consensus about which price index is appropriate for tradable goods, we follow the best practices. Betts and Kehoe (2006, 2008) argue that sectoral gross output deflators may be preferred over CPI based retail prices as it measures the output value of the production side and excludes the non-traded marketing and final consumption services that tend to be included in the CPI component data. Due to unavailability of the data on sectoral gross output deflators, their other recommendation is to use the PPI.

Indicators (*WDI*), which we discuss in the next section.

[Table 1 is about here]

Table 1 provides descriptive evidence on the level and growth of skilled emigration in the period from 1990 to 2000 across regions. Skilled emigration rate is estimated as a percentage of total emigration. For the full sample of 67 countries, the average skilled emigration rate is estimated to be 23.4 percent and 33.4 percent, in 1990 and 2000, respectively. The growth of average skilled emigration during this period is estimated to be about 34%. A comparison across regions reveals interesting migration trends. While skilled emigration rates are high in developed and OECD countries, these figures are mostly driven by migration within the developed or OECD group of countries. The average skilled emigration rate from developed to developing countries is significantly lower than that of developed to developed countries. However, we find evidence of catching up, as the growth rate of average skilled emigration is recorded highest (almost 144 percent) for developing countries, especially for south-south migration corridors. Overall, the average growth of skilled emigration is upward during the period of our analysis and is arguably sizable to affect the movement of exchange rate movement. Appendix 1 provides information at the country level for 67 countries studied in this paper.

3.2. Empirical Model and Identification Strategy

To examine the impacts of skilled emigration on real exchange rate movement, we use a baseline regression model similar to equation (4) in the theoretical section, as follows:

$$rer_{ijt} = \beta_0 + \beta_1 netSkill_{ijt} + \beta_2(dTradeopen_{ijt}) + \beta_3(dRGDPPC_{ijt}) + \beta_4(dKAopen_{ijt}) + \beta_5(dr_{ijt}) + \beta_6(dGovtgdp_{ijt}) + \beta_7(dTOT_{ijt}) + \beta_8 D_t + e_{ijt}$$

where the dependent variable, rer_{ijt}, is the log of bilateral real exchange rate between country i and country j. A rise of real exchange rate indicates real exchange rate appreciation. The set of explanatory variables are as follows:

$netSkill_{ijt} = \left(\frac{Skill\ emigration_{ijt} - Skill\ emigration_{jit}}{Total\ Emigration_{ijt} + Total\ Emigration_{jit}}\right)$ is the net skilled emigration from country *i* to country *j*;

$dTradeopen_{ijt} = \ln\left(\frac{Export_{ijt} + Import_{jit}}{GDP_{it}}\right) - \ln(\frac{Export_{jit} + Import_{ijt}}{GDP_{jt}})$ is the relative trade openness between country *i* and country *j*;

$dRGDPPC_{ijt} = \ln(RGDPPC_{it}) - \ln(RGDPPC_{jt})$ measures relative real GDP per capita between country *i* and country *j*;

$dKAopen_{ijt} = KAopen_{it} - KAopen_{jt}$ measures relative capital account openness between country *i* and country *j*. The Chinn and Ito capital account openness index is used to proxy the level of capital account openness.

$dr_{ijt} = r_{it} - r_{jt}$ measures real interest rate difference between country *i* and country *j*;

$dGovtgdp_{ijt} = ln\left(\frac{Govt_{it}}{GDP_{it}}\right) - ln\left(\frac{Govt_{jt}}{GDP_{jt}}\right)$ is the relative government spending between country *i* and country *j*;

$dTOT_{ijt} = \ln(TOT_{it}) - \ln(TOT_{jt})$ is the relative terms of trade between country *i* and country *j*;

$D_t =$ Year fixed effect. Since our data is two-year panel, this is the dummy for year 2000.

To identify the effect of skilled emigration on real exchange rates, we use cross-country-pair variation in net skilled emigration. In the absence of data on wages by tradable and nontradable sectors, we assume that variation in the net skilled emigration explains the net mean wage differences across country-pairs, which in turn explains in movements in bilateral RER as argued in the theoretical section. Two price components of RER, namely the external and internal prices, identify the relative strength of each channel in explaining the movements in RER. A fixed effect model may seem to be a natural choice for estimation, but for a couple of reasons we opt for an alternative strategy. First, the within group (country-pair) variation in net skilled emigration is not significantly high. Second, there could be some measurement errors involved in the estimation of skilled emigration rates (Docquier, Ozden and Peri (2014). In such cases fixed effects models are too restrictive and often produces undesirable results (Angrist and Pischke, 2009).

It is unreasonable to reject possibilities that real exchange rates and net skilled emigration are endogenous. Mishra and Spilimbergo (2009) argue that devaluation may trigger some out

migration. They find that the elasticity of domestic wages to real exchange rate range from .15 to .40 depending on the level of barriers to labor mobility. We correct for such endogeneity bias using two instruments, a measure of corruption[3] and lagged real GDP per capita growth. A growing base of studies examines the effect of corruption as a push factor behind emigration. In a recent study, Cooray and Schneider (2014) find that as corruption increases the emigration rate of those with high levels of educational attainment also increases. In another study, Dimant et al. (2013) argue that the existence of corruption could lower the returns to education slowing down the process of economic growth acting as a push factor for out-migration. Based on such studies, it is plausible to assume that corruption is correlated with skilled emigration and affects movements in real exchange rates only through skilled emigration. Not to mention, employment conditions and wage level also serve as economic factors of international emigration (Greenwood, 2005; Mayda, 2005). In addition, we use a lagged real GDP per capita growth rate as an instrument to correct such bias.

Now we turn to explaining control variables and justify their inclusion in our baseline regression model. A country with a relatively high real GDP per capita to other countries is expected to have higher incomes and hence increases demand for nontradables, causing a real exchange rate appreciation, an outcome known as Harrod-Balassa-Samuelson effect. Insofar as government spending tends to be largely biased to the nontradable sectors, we expect that an increase in the share of government expenditure tends to cause an appreciation of real exchange rate. Higher real interest rates tend to attract more capital inflows, and cause a higher demand for domestic currency, resulting in an appreciation of real exchange rate. If net capital inflow increases due to capital account liberalization, it leads to an expansion in the monetary base, and raise the current expenditure and demand for nontradables, resulting in a real exchange rate appreciation.

The trade openness is used to proxy for the trade restriction condition for a country. A relative closed economy or a country with higher tariffs tends to worsen the current account

[3] The corruption index is calculated based on the absolute political institution quality measure in Kuncic (2012). This political institution quality measure is mainly constructed based on a country's democracy, bureaucratic quality, and corruption level. A higher value indicates a better political institution quality, range roughly from 0.17 to 0.93. Here we subtract the political institution quality measure from its maximum value (i.e. 0.93) to proxy a country's corruption level.

position and increases the demand for the price of nontradables, appreciating the real exchange rate. The overall effects of terms of trade on the real exchange rate are ambiguous, and can be classified into income and substitution effects. The income effect indicates that an improvement of term of trade (i.e. an increase in export prices, or a fall in import prices) tends to raise the income of an economy, and further increase the demand for nontradables. On the other hand, substitution effect suggests that an improvement of term of trade resulted from an export price increase may cause a depreciation of domestic currency since now nontradables become relatively cheap under given levels of nominal exchange rate and nontradable prices. Finally, dummy for year 2000 is used to control for the time effect.

3.3. Empirical outcomes

3.3.1 The effect of net skilled emigration on RER

There are 1530 country pairs in total, and to avoid double counting we have considered only the unique country pairs.[4] The results for total sample demonstrate that the growth of skilled emigration is associated with an appreciation of the real exchange rates and its external and internal components and the estimated coefficients are statistically insignificant. Table 2 reports two-stage least squares (2SLS) outcomes. We perform Darbin-Wu-Hausman test to check the presence of endogeneity bias. We reject the test statistic if bilateral real exchange rates and the net skilled emigration are endogenous. We find strong statistical evidence supporting the presence of endogeneity. This is reported in the last row of table 2. The second last row reports outcomes on Hanson J statistic, which tests for over-identification restrictions in the presence of multiple instruments. The instruments are valid since in most of the cases, as we accept the null hypothesis. Overall, internal (relative price of tradable to nontradable) price channel explains about 60% of the RER appreciation.

[Table 2 is about here]

[4] For example we consider bilateral real exchange rate and net skilled emigration only for *i* (source country) to *j* (host country); we do not consider entries for *j* (source country) to *i* (host country) as this will be just a mirror image of the other.

3.3.2. The Dutch Disease Effect and the Skilled Emigration

A rise in the relative price of nontradable goods resulting from remittances corresponds to a real exchange rate appreciation, which is known as the Dutch Disease effect through remittances (Lartey, Mandelman and Acosta, 2012). We control for the inflow of remittances and examine the relationship between the skilled emigration and real exchange rates. For empirical purpose, we use the net remittance received between country *i* and *j*, in our bilateral model specification. In panel A of Table 3, we report OLS outcomes of remittances on the real exchange rate. The so-called Dutch disease effect is evident and statistically significant; however, the tradable channel appears to be stronger in transmitting such effect, contrary to theoretical expectations. In panel B of Table 4, we report outcomes of our baseline 2SLS model controlling for the remittance based Dutch disease effect. In the presence of remittances, the relationship between net skilled emigration and the real exchange rate is statistically significant but the nontradable component of the real exchange rate appears to be stronger now. This could be partially due to the fact that the movement in the tradable component of the real exchange rate is explained by the net remittances received variable. Thus when both effects are combined, a higher skilled emigration rates appreciated the real exchange rate – the Dutch disease effect through remittances is more prominent in the variation in external prices whereas the wage effect through labor supply shock is more prominent in the variation in internal prices. Overall, we find statistically significant evidence of the Dutch disease effect providing support to the existing literature (e.g. Lartey, Mandelman and Acosta, 2012) and this effect coexist with the wage effect channel.

[Table 3 is about here]

3.3.3 Developed versus Developing Source Countries

Next we look at Table 4, which empirical outcomes for two samples, developed source

country and developing source country.[5] While the findings on the appreciation of the real exchange rate are robust across different subsamples, the outcomes on the real exchange rate components vary. For the developed source country sample, the net skilled emigration pass-through effect on the external prices component of the real exchange rate appears to be stronger than the internal price component of the real exchange rate. However, for the developing source country sample we find exactly the opposite outcome. This could be due to the fact that skilled emigration is more intense in the nontradable sector for developing source countries, whereas for the developed source countries it is the tradable sector which experiences more skilled emigration. Another reason could be that pricing-to-market model is less effective for determining prices for tradable goods in developing source countries. However, for developed and developing samples, they are not absolutely separated. We define it as whether the source country is developed countries or developing countries. So for developed-developing pairs and developing-developed pairs, they are exactly the same in our total sample and we just keep one of them, but in our sub-sample cases, each of them show up in each sub-sample (due to source-receiving direction). For this reason, the sum of developed and developing countries does not equal to total sample observations.

[Table 4 is about here]

4. Robustness Checks

4.1. Variants of baseline estimation strategy

4.1.1. Two-step GMM Outcomes

The GMM estimator could be more efficient than 2SLS if heteroskedasticity problem exists. As a robustness check we also report the 2-step GMM outcomes in Table 5. In a majority of the cases, the instruments do not pose any issues with the over-identification restrictions.

[5] It is based on World Bank classification.

Overall, the two-step GMM outcomes provide strong support to the appreciation of real exchange rates. For the total sample, internal price channel contributes more than the external price channel, however for developed country sample it is just the opposite. For developing country sample, external prices show depreciation however the magnitude do the estimated coefficient is negligible and statistically insignificant. Overall, majority of the two-step GMM regression outcomes are in accordance with the 2SLS regression outcomes.

[Table 5 is about here]

4.1.2. Indirect Least Square Outcomes

Based on the first stage regression outcomes of IV (2SLS)[6] , the correlation between the difference in the level of corruption and the net skilled migration is positive and statistically significant; and the magnitude of the coefficient is also high. This implies that corruption is a strong determinant of skilled emigration in line with the existing literature. As a robustness check, we next consider the differences in corruption level as a single instrument, hence the 2SLS methods essentially becomes an indirect least square (ILS) estimation. Table 6 reports the outcomes. Overall, the outcomes conform to the baseline IV (2SLS) outcomes. Similar trends are identifies across developed and developing country samples. Appreciation in real exchange rates is explained mostly by the external prices for the developed country sample, whereas the opposite holds for the developing country sample. Overall, the external price channel has a stronger effect on the appreciation of bilateral real exchange rates.

[Table 6 is about here]

[6] We do not provide these results to save space, but are available upon request from the authors.

4.2. Robustness Check for Level Effects

4.2.1. High versus low net skilled emigration countries

To check whether there is any level effect, we ran regressions on high and low net skilled emigration countries, separately. We use median skilled emigration as a cut-off point between these two samples. As a result there is a systematic difference in the sample sizes between these two groups within total sample, developed country sample and developing country sample, with more than 65% owing to high net skilled emigration countries. The outcomes on high net skilled emigration countries strongly support the association of appreciation of real exchange rates and the growth of skilled emigration rate (Table 7). The outcomes on low net skilled emigration sample show similar outcomes, but the estimated coefficients are statistically insignificant. Overall, given that our theoretical model predictions hold, it suggests a possible correlation between the level of net skilled emigration and appreciation of real exchange rates. The external price channel has a stronger effect on the movement in real exchange rates compared to the internal price channel.

[Table 7 is about here]

4.2.2. High versus Low Remittances Recipient Countries

Next we consider high and low remittance samples to check if the level of remittances received affects the nest skilled emigration effect pass-through (Table 8). The median value of remittance received over GDP ratio is used to distinguish between these two samples. The high remittances received country sample is larger than the low remittances recipient country sample. The estimated coefficients for the high remittances received countries are in support of an appreciation of real exchange rates resulting from the net skilled emigration. The outcomes on developing countries sample are statistically insignificant. However, for low remittances received countries the outcomes are somewhat different. For the total sample, it shows a depreciation of exchange rates whereas the nontradable price component still shows an

appreciation. Similar outcomes hold for both developed and developing country samples. Overall, it suggests that in high remittances recipient countries, real exchange rate appreciation is mainly through the external price channel. However, in low remittances recipient countries, this channel appears to be weaker and results in a depreciation of external prices.

[Table 8 is about here]

4.3. Placebo Test: Effects of Unskilled Emigration on Real Exchange Rates

The causal relationship between the net skilled emigration and real exchange rate movement assumes that a higher net skilled emigration rate causes an appreciation in real exchange rates through the wage effect channel. If other types of emigration, such as unskilled emigration, show similar outcomes, then it undermines the causal relationship between skilled emigration and real exchange rates violating the exclusion restrictions for the instruments. To check this, we replicate our baseline outcomes with the net unskilled emigration rate. The IV (2SLS) results are reported in Table 9. Panel A of Table 9 shows the effect of net unskilled emigration on real exchange rates. We find a depreciation of real exchange rates with the net unskilled emigration rates, and this outcome is robust and statistically significant across different samples. Controlling for remittances do not change the signs of net unskilled emigrations, it only becomes insignificant. However, there exists strong evidence of the Dutch disease effect through remittances. The findings on this placebo test indicate that the causal relationship is not affected by other types of out-migration channels.

[Table 9 is about here]

4.4 Evidence on the wage channel

Empirical findings discussed so far explain the possible roles that both sets of prices play

in determining the movements in real exchange rates, but they fall short in explaining the magnitude of the wage effect of skilled emigration. Since data on average country-level wages by nontradable and tradable sectors is not available, it becomes difficult to measure the precise multiplier effect of the wage channel on real exchange rates. As a second best option, we use the standardized monthly and daily wages computed by Freeman and Oostendorp (2001). This data set contains monthly and daily wages for different occupations and industries based on the International Labour Organization (ILO) classification. We use this information together with the classification of tradable and nontradable industries and occupations from Kletzer and Jensen (2010) to compute country level weighted average wages for tradable and nontradable sectors. The information available in Kletzer and Jensen (2010) is directly applicable to the US, however we assume without any loss of generality that such classification are likely to be similar across countries.

[Table 10 is about here]

In Appendix 2, we compare the average wages between developed and developing countries for tradable skilled, tradable unskilled, nontradable skilled and nontradable unskilled workers. The growth in nominal average wages is significantly higher in developing countries especially for the skilled workers. Since wage data for both 1990 band 2000 is available for only 20 countries, the summary evidence may reflect some selection bias, hence should be interpreted with caution. As a last step, we run some cross-country regressions to examine the correlation between skilled emigration and wages across tradable and nontradable sectors. The estimated coefficients (shown in Table 10) suggest a positive and statistically significant correlation between skilled emigration and wages. The outcomes are robust across monthly and daily wages. Overall, both the summary and regression outcomes indicate a positive relationship between skilled emigration and wages. This supports our theoretical prediction of the wage effect of skilled emigration.

5. Conclusion

This study aims to contribute to the growing literature on economics of international migration. While more than two-thirds of skilled migrants are directed to the US, the UK, Canada and Australia, they come from more than 100 countries. Thus, skilled emigration, broadly speaking, opens up many indirect general equilibrium questions in the source country. This study, in particular, aims to look at the relationship between skilled emigration and real exchange rate movement in the source country. Building on a simple analytical model, we argue for two possible channels of causality. If LOOP holds, then skilled emigration appreciates RER through the "spending effect" and "resource allocation effect", analogous to the remittance-based Dutch disease effect. The second channel is based on a pricing-to-market model, where local wages affect the price-setting behavior of firms and unlike the first channel, pricing-to-market model allows pass-through for both external (relative prices of tradable goods) and internal (relative price of tradables to nontradables) prices assuming possible violations of LOOP. We postulate that both of these channels contribute to an appreciation of real exchange rates.

We provide cross-country empirical evidence from 67 countries that the net skilled emigration appreciates bilateral real exchange rates in source countries. To identify the potential channels of causality, we decompose the real exchange rate into two sets of relative prices, viz. the relative price of traded goods between economies (external prices) and relative price of tradables and nontradables (internal prices) within each country. Overall, internal (relative price of tradable to nontradable) price channel explains about 60% of the RER appreciation, which is mostly driven by the outcomes on developing countries. The outcomes are robust across different levels of skilled emigration, alternative model specifications and withstand placebo tests with unskilled emigration.

Certain caveats deserve mention. An almost 54% growth in skilled emigration rate between 1990 and 2000 in developing countries warrants a more refined study of skilled emigration disaggregated by gender, industry and occupation groups. Another area that requires further attention is a more precise classification of tradable and nontradable jobs across industries in different countries. We leave it as possible scopes for future studies.

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Table 1: Skilled Emigration Ratio (% of Total Emigration among Sample Countries)

	1990	2000	Growth rate (%)
All 67 Sample Countries	23.4	31.38	34
Developed Countries	32.8	40.47	23
To Developed Countries	33.44	41.38	24
To Developing Countries	24.05	30.39	26
Developing Countries	17.21	26.55	54
To Developed Countries	26.21	31.64	21
To Developing Countries	7.45	18.19	144
OECD Countries	32.53	40.45	24
To OECD Countries	33.16	41.37	25
To Non-OECD Countries	24.53	31.51	28
Non-OECD Countries	18.05	27.14	50
To OECD Countries	29.61	33.94	15
To Non-OECD Countries	8.51	18.54	118

Data Source: Authors' calculation. The original data is from Docquier, Ozden and Peri (2014)

Table 2: The Impact of Skilled Emigration on Real Exchange Rate

	rer_t	rer_t^{XT}	rer_t^{IT}
Constant	**4.656*** **	**4.715*** **	-0.0591
	(0.0745)	(0.0515)	(0.0406)
$netSkill_{ijt}$	**1.531*** **	**0.642** **	**0.890*** **
	(0.417)	(0.259)	(0.257)
$dTradeopen_{ijt}$	**-0.0468*** **	**-0.0303*** **	**-0.0165*** **
	(0.00797)	(0.00449)	(0.00502)
$dRGDPPC_{ijt}$	**0.151*** **	**0.0870*** **	**0.0642** **
	(0.0522)	(0.0323)	(0.0318)
$dKAopen_{ijt}$	**0.0876*** **	**0.0502*** **	**0.0374*** **
	(0.0138)	(0.00865)	(0.00856)
dr_{ijt}	**0.781*** **	0.110	**0.671*** **
	(0.177)	(0.111)	(0.102)
$dGovtgdp_{ijt}$	**-0.144*** **	**-0.171*** **	0.0277
	(0.0455)	(0.0274)	(0.0273)
$dTOT_{ijt}$	-0.238	0.0145	-0.253
	(0.308)	(0.189)	(0.182)
D_t	-0.0183	-0.0734	0.0552
	(0.0776)	(0.0533)	(0.0426)
Observations	1,530	1,530	1,530
Hanson J Statistic	0.740	0.068	3.644
	[0.390]	[0.795]	[0.056]
Durbin-Wu-Hausman χ^2 test	54.326	8.087	44.710
	[0.000]	[0.004]	[0.000]

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.
[2] IV (2SLS) Estimation outcomes Robust to Heterokedasticity; Instruments are net corruption and lagged RGDPPC growth between country *i*and *j*.
[3] The p-values of Hansen J-Test of over-identifying restrictions are reported in baskets.
[4] Durbin-Wu-Hausman Chi-square test is to test the endogeneity of net skilled emigration ratio. The null is that regressor is exogenous. The p-values are reported in baskets.
[5] q_t represents RER, q_t^T and q_t^{NT}represent external and internal price components of RER, respectively.

Table 3: The Dutch Disease Effect and Skilled Emigration

	rer_t	rer_t^{XT}	rer_t^{IT}
Panel A			
$Remit_{it} - Remit_{jt}$	**1.564***** (0.428)	**2.563***** (0.436)	**-0.998***** (0.239)
Observations	1,215	1,215	1,215
R-square	0.326	0.263	0.070
Panel B			
$netSkill_{ijt}$	**1.301***** (0.481)	0.0745 (0.284)	**1.227***** (0.408)
$Remit_{it} - Remit_{jt}$	**1.627*** (0.931)	**2.485***** (0.484)	-0.858 (0.700)
Observations	1,080	1,080	1,080
Hanson J Statistic	3.082 [0.079]	2.363 [0.124]	0.821 [0.365]
Durbin-Wu-Hausman χ^2 test	21.910 [0.000]	0.009 [0.924]	50.507 [0.000]

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.
[2] IV (2SLS) Estimation outcomes Robust to Heterokedasticity; Instruments are net corruption and lagged RGDPPC growth between country *i* and *j*.
[3] The p-values of Hansen J-Test of over-identifying restrictions are reported in baskets.
[4] Durbin-Wu-Hausman Chi-square test is to test the endogeneity of net skilled emigration ratio. The null is that regressor is exogenous. The p-values are reported in baskets.

Table 4: The Impact of Skilled Emigration on Real Exchange Rate, Developed versus Developing Source Countries

	Developed Source Country			Developing Source Country		
	rer_t	rer_t^{XT}	rer_t^{IT}	rer_t	rer_t^{XT}	rer_t^{IT}
$netSkill_{ijt}$	**1.321*** **	**1.025*** **	**0.296** **	**1.095** **	0.0724	**1.022*** **
	(0.303)	(0.267)	(0.126)	(0.439)	(0.288)	(0.360)
Observations	1,192	1,192	1,192	1,104	1,104	1,104
Hanson J Statistic	3.973	0.093	28.324	2.922	1.876	0.796
	[0.046]	[0.760]	[0.000]	[0.087]	[0.171]	[0.372]
Durbin-Wu-Hausman χ^2 test	48.848	22.986	8.044	16.978	0.115	37.079
	[0.000]	[0.000]	[0.005]	[0.000]	[0.734]	[0.000]

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.
[2] IV (2SLS) Estimation outcomes Robust to Heterokedasticity; Instruments are net corruption and lagged RGDPPC growth between country *i*and *j*.
[3] The p-values of Hansen J-Test of over-identifying restrictions are reported in baskets.
[4] Durbin-Wu-Hausman Chi-square test is to test the endogeneity of net skilled emigration ratio. The null is that regressor is exogenous. The p-values are reported in baskets.

Table 5: Instrumental Variable (2-step GMM) Outcomes - The Impact of Skilled Emigration on Real Exchange Rate

	rer_t	rer_t^{XT}	rer_t^{IT}
$netSkill_{ijt}$	**1.466*** **	**0.649** **	**0.814*** **
	(0.410)	(0.258)	(0.254)
Observations	1,530	1,530	1,530
Hanson J Statistic	0.740	0.068	3.644
	[0.390]	[0.795]	[0.056]

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.

[2] IV (2-step GMM) Estimation outcomes Robust to Heterokedasticity; Instruments are net corruption and lagged GDPPC growth between country *i*and *j*.

[3] The p-values of Hansen J-Test of over-identifying restrictions are reported in baskets.

Table 6: Instrumental Variable (ILS) Outcomes (Just identified model) - The Impact of Skilled Emigration on Real Exchange Rate

	rer_t	rer_t^{XT}	rer_t^{IT}
$netSkill_{ijt}$	**1.276*** **	**0.697** **	**0.579*** **
	(0.411)	(0.324)	(0.217)
Observations	1,530	1,530	1,530

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.
[2] IV (Indirect Least Squares) Estimation outcomes Robust to Heterokedasticity; Instruments are net corruption between country *i*and *j*.

Table 7: The Impact of Skilled Emigration on Real Exchange Rate by Emigration Size

	rer_t	rer_t^{XT}	rer_t^{IT}
High Emigration sample			
$netSkill_{ijt}$	**1.180*** **	**0.739*** **	**0.441*** **
	(0.269)	(0.237)	(0.137)
Observations	954	954	954
Low Emigration sample			
$netSkill_{ijt}$	0.154	0.0920	0.0625
	(0.359)	(0.416)	(0.203)
Observations	576	576	576

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.
[2] High emigration sample is defined as the share of total emigration over total population is greater than the median value in the corresponding sample.

Table 8: The Impact of Skilled Emigration on Real Exchange Rate by Remittance Size

	rer_t	rer_t^{XT}	rer_t^{IT}
High remittance sample			
$netSkill_{ijt}$	**2.262****	**1.190****	**1.073****
	(0.994)	(0.596)	(0.500)
Observations	904	904	904
Low remittance sample			
$netSkill_{ijt}$	**-0.749****	**-1.400*****	**0.651*****
	(0.309)	(0.466)	(0.230)
Observations	626	626	626

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.
[2] High remittance sample is defined as the share of total remittance received over GDP is greater than the median value in the corresponding sample.

Table 9: Placebo Test – IV (2SLS) Outcomes on the Impact of Unskilled Emigration on Real Exchange Rate

	rer_t	rer_t^{XT}	rer_t^{IT}
$netUnSkill_{ijt}$	**-0.551***	0.0166	**-0.568*****
	(0.305)	(0.282)	(0.201)
Observations	1,530	1,530	1,530
$netUnSkill_{ijt}$	-0.490	-0.543	0.0537
	(0.416)	(0.453)	(0.182)
$Remit_{it} - Remit_{jt}$	**2.414*****	**3.527*****	**-1.113*****
	(0.921)	(1.028)	(0.413)
Observations	1,080	1,080	1,080

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.

Table 10: OLS Outcomes on the Wage Effects of Skilled Emigration

	Tradable Sectors		Nontradable Sectors	
	Hourly Wage	Monthly Wage	Hourly Wage	Monthly Wage
Dependent variable: Wages in 1990 and 2000 (in logarithm)				
Skilled emigration share	**1.311****	**1.129****	0.793	0.89
	(0.581)	(0.504)	(0.717)	(0.687)
Observations	39	39	38	38
R-squared	0.912	0.919	0.895	0.87
Dependent variable: average wage of (1990-1995) and (2000-2005) (in logarithm)				
Skilled emigration share	**1.424*****	**1.377*****	**1.317***	**1.506****
	(0.487)	(0.459)	(0.656)	(0.589)
Observations	53	53	50	50
R-squared	0.884	0.875	0.868	0.864

[1] * significance at 10 percent; ** significance at 5 percent; *** significant at 1 percent.

Appendix 1: Skilled Emigration Ratio (% of Total Emigration among Sample Economies): All 67 Sample Countries

Countries	1990	2000	Countries	1990	2000
Argentina	38.10	41.75	Malaysia	31.68	35.29
Australia	49.20	56.63	Mexico	13.67	14.95
Austria	30.80	35.60	Morocco	12.33	14.80
Belgium	29.52	38.90	Netherlands	38.13	43.52
Brazil	31.32	33.66	New Zealand	39.09	49.07
Bulgaria	16.57	23.35	Norway	30.50	38.54
Canada	47.86	61.18	Pakistan	8.39	15.67
Chile	40.93	40.59	Panama	57.09	56.94
Colombia	26.27	32.29	Paraguay	17.27	7.03
Costa Rica	42.52	42.50	Peru	35.08	36.26
Croatia	21.62	19.94	Philippines	50.71	56.00
Cyprus	23.68	38.68	Poland	29.69	39.55
Czech Republic	39.98	35.25	Romania	24.74	33.21
Denmark	34.28	40.83	Russia	14.43	29.17
Egypt	23.45	29.78	Saudi Arabia	34.20	38.55
Estonia	30.87	36.61	Singapore	33.48	42.60
Finland	19.69	26.94	Slovakia	12.65	17.88
Germany	35.71	41.18	Slovenia	22.13	22.26
Greece	17.95	22.33	South Africa	55.83	65.06
Hong Kong SAR	59.35	62.39	Spain	14.72	24.11
Hungary	39.38	40.71	Sri Lanka	20.69	25.93
India	13.66	29.31	Sweden	38.87	46.56
Indonesia	14.83	18.14	Switzerland	43.55	44.76
Iran	49.33	52.98	Syria	24.16	30.13
Ireland	21.07	33.48	Thailand	34.96	36.23
Israel	50.09	55.48	Trinidad and Tobago	53.15	49.47
Italy	14.72	18.40	Tunisia	16.20	20.40
Japan	54.69	60.23	Turkey	8.76	9.59
Kazakhstan	11.35	22.10	Ukraine	7.90	28.79
Korea	39.99	50.39	United Kingdom	39.03	48.57
Kuwait	25.83	30.95	United States	52.17	60.21
Latvia	36.43	38.15	Uruguay	32.26	20.92
Lithuania	20.67	27.22	Venezuela	47.95	52.82
Macedonia	23.38	27.71			

Appendix 2: Evolution of Monthly and Daily Wages

Unit: US$		Developed			Developing		
		1990	2000	% change	1990	2000	% change
Monthly wage	Tradable skilled worker	1902.19	2134.56	12.22%	143.13	256.78	79.40%
	Tradable unskilled worker	1411.40	1576.14	11.67%	106.82	148.98	39.47%
	Nontradable skilled worker	2088.76	2422.93	16.00%	137.08	205.68	50.05%
	Nontradable unskilled worker	1494.83	1706.41	14.15%	102.83	140.72	36.85%
Daily wage	Tradable skilled worker	11.35	12.75	12.41%	0.72	1.29	78.41%
	Tradable unskilled worker	8.25	9.24	11.95%	0.51	0.75	46.06%
	Nontradable skilled worker	12.62	14.78	17.13%	0.68	1.04	52.73%
	Nontradable unskilled worker	8.76	9.88	12.86%	0.49	0.70	43.73%

Note: Authors' own compilation based on Freeman and Oostendorp (2001) data on wages