"Stay with us"? Emigration and the labour market in Honduras

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Abstract

Previous research has argued that migration forms an essential component to economic convergence between countries, particularly through the labour market. This paper contributes to the debate on the use of the skill cell approach of migration devised by Borjas (2003) by applying it to Honduras in the years following Hurricane Mitch, from 2001 to 2007. Relying on individual cross-sectional data and an instrumental variable approach, the estimates show that a 10% shift in emigration of the labour force from Honduras increased wages in Honduras by around 20%, an elasticity which is much higher than previous findings in other studies on other countries. Emigration also raised the average hours worked and and underemployment (albeit marginally) and decreased self-employment, with stronger impacts for women and individuals working in rural areas. The paper also refutes the idea that the adequate 'labour market' on which to measure such impacts is local rather than national, an idea coherent with Borjas. Results based on different definitions of skill cells, notably occupation and industrial sector, conclude that apart from wages these definitions do not yield any significant link between emigration and the labour market - suggesting that there is mobility of workers across occupations and sectors.

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1 Introduction

Migration of people is not without controversy - for both home and host country. The increase in emigration from Honduras over the past decade has been accompanied by a political debate over its impact on the country's development, reminiscent of Mexico during the Bracero period (Durand, 1994). Slogans such as '*quédate con nosotros*' (translation: 'stay with us') championed by the Honduran Association of Maquiladoras have emerged, providing anecdotal evidence that the departure of young and productive workers has had an effect on attitudes at home towards emigration. But while emigration may be negatively affecting recruitment in sectors which employ workers that have the increasing option to leave the country, such as the maquiladoras, it is also bringing benefits to workers staying behind – by relieving a congested labour market.

This paper empirically tests whether emigration from Honduras had an aggregate impact on the labour market. Migration is one of the major mechanisms through which income levels equalise between countries (Hatton and Williamson, 1998 and this is achieved, in part, through wages. The literature on the impact of emigration on labour, apart from a few recent studies, has remained either theoretical (see for instance Berry and Soligo, 1969; Hatton, 2007) or focused on the household (for instance Azam & Gubert, 2005; Amuedo-Dorantes & Pozo, 2006; Glinskaya & Lokshin, 2009). This is rather surprising considering that emigration rates are relatively higher than immigration rates in comparison to the size of the population they may impact, particularly for small developing countries. Countries with high proportions of emigrants per capita typically have higher proportions than the proportions of immigration in the countries with the highest rates of immigration. Jamaica and Albania for instance have estimated emigrant stocks as a percentage of population of 39% and 27% respectively (World Bank, 2008) while Canada and Australia have estimated stocks of immigrants equalling 19% and 20% of their total population.[1] In fact, since many potential emigrants are motivated by opportunities of employment, these figures should in reality be much higher if we consider the direct population they impact on the labour market: the country's labour force; labour force participation is typically lower in developing countries.

Anecdotal evidence indeed points to a picture linking emigration and labour outcomes. Studies such as Macharia (2003) on Kenya and Ennaji & Sadiqi (2004) on Morocco, for instance, mention the importance of the loss of workers in migrant sending regions and its impact on the labour participation of left-behind household members as well as on the productivity of the household as a unit (particularly for rural households). The recent East-to-West migration experience of the European Union accession countries has also provided a basis of observtion on the impact of large waves of emigration. In reviewing the Lithuanian experience, Thaut (2009) notes that the free

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[1]This comparison does not include countries with populations under 1 million as well as countries from the Gulf Cooperation Council (GCC).

movement of workers has helped relieve pressure on the domestic labour market, drive down unemployment and push wages upward, although this has caused major labour shortages in certain sectors. In Romania, the simultaneous outflow of workers in the midst of growing demand for labour has forced the country to turn to immigration to compensate for the gap (Silasi and Simina, 2007).

This paper builds on the growing literature using the skill cell approach (Borjas, 2003) to measure the impact of *emigration* on the labour market in Honduras, as opposed to *immigration*, as has been more common. The empirical literature on the impact of immigration flows on the labour market is generally perceived as being divided into two strands[2] one where researchers have exploited random shocks to a geographically-focused labour market, such as the Mariel Boatlift from Cuba to Florida (Card, 1990), and the other where the variation in the composition of immigration vis-à-vis their closest native counterparts in the labour market is exploited over time. Honduras, a country roughly the size of the state of Florida coincidentally, provides a good case study for merging both ideas given the short, intense and unexpected emigration period following Hurricane Mitch in 1998; emigration has since this time risen dramatically. Figure 1 below shows the evolution of emigrant stocks of Hondurans in the U.S. based on U.S. Census and American Community Surveys from 1960 to 2008.[3]

The random path carved by the hurricane, which incidentally split the country in two, provides a one-shot randomised base on which to exploit the short- and medium-term impact this emigration wave had on the labour market. Honduras has low internal migration rates, low levels of international immigration, a high brain drain rate and has experienced sluggish capital-adjustment in the past. As such, it is conceivable that the period of emigration examined in this paper (2001-2007) led to a labour market impact, over this period.[4]

The skill cell approach of migration estimates the impact of migration using a pseudo-panel consisting of skill groups based on characteristics which make mobility between cells unlikely (or low), such as education and experience. This paper tests a number of openly debated questions on the use of the skill cell approach. First, it compares the impact of emigration on two definitions of the relevant labour market: departmental vs. national. Such a division formed one of the major reasons Borjas first devised the skill cell approach, arguing that there are spatial spillover effects to immigration; as locals react to the impact of local immigration, they move to other

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[2]A third strand, not developed here, uses general equilibrium models to simulate the impact of immigration on wages (Borjas et al., 1997; Ottaviano Peri, 2012).:

[3]A comparable plot for the years in this study (2001, 2004, 2007) shows a similar trend.

[4]Specific country-based research on the impact of emigration is important as the impact depends on how the skill-composition of emigrants as a group differs from the skill-composition of the resident population remaining in the home country and on the way the home economy adjusts to changes in skill mix. The composition of emigrant flows and adjustment mechanisms differ across countries, sometimes in important ways. Given these differences, it would be wrong to infer from other studies the effects of emigration on the Honduran labour market (Dustmann *et al.*, 2005).

areas leading to an underestimation of its impact when only local labour markets are observed. Second, it tests whether alternate definitions of skill cells, notably based on occupations and industrial sector, yield similar results. Finally, it measures various impacts on labour market outcomes beyond wages, such as hours worked, self-employment and underemployment. In addition, while Borjas aggregated the pseudo-panel at the skill level, the data used in this paper are microdata, which permit a greater number of individual controls and more insight on which particular groups are driving the results, such as gender and the rural/urban divide.

The results suggest that on average a 10% shift in emigration of the home country labour force increased average wages by around 20%, a result which is much higher than other studies on emigration. Running the same specification at the departmental level reduced the impact to less than one percent. Defining skill cells by occupation and industrial sector yielded a lower elasticity of around 3%. Emigration increased hours by about 3%, but yielded either negligible or insignificant impacts at the departmental, occupational and industrial levels. Interestingly, emigration was found to decrease self-employment by up to 9% and increase underemployment by up to 3%. Finally, in all cases, the impact was stronger for women and for rural workers.

The rest of the paper is divided as follows. Section 2 provides a literature review, the empirical framework and the data used in the paper, while section 3 provides a statistical analysis of the labour market and emigration in Honduras. Section 4 provides and discusses results, as well as additional robustness tests. Section 5 concludes the paper. Tables and figures are reported in the Appendix at the end of the paper.

2 Migration and wages in Honduras: setting and data

2.1 Literature and background

The resurgence of international human migration in the last 20 years and the debate which surrounds it have led to a growing number of economic studies on the links between migration and labour (see OECD, 2007 and 2011 for a review). While receiving countries have intensely debated the impact the South-North migration trend has had on their labour markets, the impact on the source country has had secondary importance in policy debates. Of the several questions raised in this field, this paper builds on "how effective is migration in equalising inter-regional earnings of comparable labour?", put forth by Sjaastad in 1962. Specifically it focuses on labour outcomes by which the convergence mechanism may occur, wages, hours worked, self-employment and underemployment – as most international migrants were part of and will be part of the labour force in their home and host countries. Berry and Soligo (1969) provided an early theoretical basis demonstrating how migration can act as an important vector of wage convergence between poorer and richer countries, in a model with two labour

markets. The basic premise, modelled on a labour supply-demand framework, is the following: a decrease in labour supply in the country of origin should increase wages, as the labour market finds its equilibrium, in the short-term. The simplified neoclassical model provides a motivation to answer an empirical question: do wages increase when members of the labour force leave the country?

According to the arguments and framework discussed above, the laws of supply and demand have rather unambiguous implications[5], but the effect can theoretically range from zero to very large. The ability of an economy to readjust its capital-labour ratio largely determines the outcome. Labour markets adjust to their long term equilibrium, when economies are open and capital flexible and tradable. In cases of closed economies, however, the long term demand for labour can, in turn, be affected. In open economies, the output mix of tradable goods, the degree to which labour markets are imperfect and the level of international openness will determine whether and how quickly a country's labour market readjusts to its long-term equilibrium (through capital reallocation and internal migration for example). For instance, the labour market of a relatively closed economy with little variety in exported goods will likely experience long-term adjustments in its labour market equilibrium when facing a change in labour supply, while a relatively open economy with a high output mix will revert back to its original labour market equilibrium as the adjustment occurs rather through its capital-labour ratio and its mix of export goods, at least at the aggregate level (Dustmann *et al.*, 2005).

The effect transits through an immediate change in the supply of labour and its skill composition. An impact on the labour market is expected if the skill composition of migrants (for both cases of emigration and immigration) differs from the composition of the native work force. Otherwise, emigration will only scale down the labour component of production function. Therefore, while aggregate shifts in labour supply may not necessarily impact average wages, they may have differing impacts depending on the substitutability between workers. For instance, workers may have different levels of substitutability depending on their education levels, experience, occupations or specific sectors. This is straightforward when thinking of immigration; with emigration it implies questioning whether the workers that were underemployed or unemployed prior to their counterparts emigrating are perfect substitutes for the jobs left behind. Otherwise, pressure on wages required to replace that labour increases.

There are several empirical approaches to investigating the link between emigration and wages. One approach is to look over a long period to see if wages historically converge between labour sending and labour receiving countries. In the case of Europe, research shows that emigration contributed to real wage convergence towards that of richer countries in the 19th and early 20th centuries by decreasing the growth of the

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[5]This is not necessarily true if we consider general equilibrium effects. In fact, simulating changes in the production function and capital-labour ratios, Docquier *et al.* (2011) find that immigration even led to *increases* in wages, while emigration led to *decreases* in wages from 1990 to 2000 in a group of OECD countries, a seemingly counterintuitive result spawned by general equilibrium effects.

labour force (Boyer *et al.*, 1993; Williamson, 1996).

Another commonly used approach, focused on shorter time periods, is to exploit variation in the labour force due to the change in the supply of labour from immigration. Many studies, for instance, exploit the *spatial* differences in immigration, comparing labour market outcomes between regions based on the change in immigrants working in each region, or in one in particular (see for instance Card, 2001; Dustmann *et al.*, 2005; Pischke and Velling, 1997). Others exploit a sudden influx of external labour, such as the Mariel Boatlift from Cuba to Florida (Card, 1990) and the repatriation of French citizens from Algeria (Hunt, 1992). This long and standing literature has generally concluded that in most countries the negative impact is small and often statistically insignificant.

The skill cell approach was conceived as a direct response to criticism of the spatial approach described above. Borjas (2003) focused on the national impact of immigration, rather than smaller geographical segments common in previous studies.[6] The major advantage of Borjas' approach is that it solves a problem that has dogged the spatial correlation approach: native workers may react to the change in labour supply due to emigration by migrating internally. Indeed, mobility between skill groups is less frequent than over space. He divided workers by education level and by years of work experience[7] to form skill cells, arguing that mobility between such cells was unlikely but that mobility (or substitutability) *within* cells was, on the other hand, likely. That is, it would be uncommon for someone with a high education level and low experience level to compete in the labour market with an individual with a low education level but high experience level. However, an individual could compete with someone of the same level of education and experience – even over space. As such, a major determinant of the impact of emigration on wages and the key identification of the model lied in the variation in the distribution within skill groups, over time. He used long-term (census) data to test the impact of immigration to the U.S. and found a negative and significant impact of the order of 4%, thus suggesting an under evaluation of the impact in previous research. In fact, running the same regressions at the state level, as in previous studies, diminished the magnitude of the impact. Some papers have questioned the definition of skill cell, arguing that mobility within cells is more common within an occupation or industry group than within groups based on education level (Orrenius and Zavodny, 2007).

Complementary but not fully integrated to this literature is a growing body of

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[6]Decaluwé and Karam (2010) furthermore confirm Borjas' claim that internal migration will obfuscate the impact of migration on labour markets. Focusing solely on regional changes could hide the impact of emigration if the jobs left behind by emigrants were subsequently taken by other workers in Honduras from other regions. The net impact in this case would be zero; internal migration may wipe out any positive impact in the medium-to-long run, hence the need to have a national view of the labour market.

[7]To be clear, the level of analysis is not the individual, the household or different countries but rather the skill group.

micro-oriented work. The research in this field mainly focuses on the impact of emigration and remittances on the migrant's household and attempt to answer whether and why household members staying in the home country alter their labour supply decision following the emigration of a fellow household member. It differentiates between two effects: the lost-labour effect and the remittance effect. A decrease in household labour will, for instance, clearly affect labour decisions differently than the influx of income. Conclusions in this literature are mixed. In general they suggest that the loss of labour incites more labour exerted out of the remaining household members, through participation in the labour force, an increase in hours worked, in jobs which they normally would not accept, while the remittance effect decreases the pressure to do so (OECD, 2011). In short, emigration and remittances impact the reservation wage of members staying behind, with the effects depending on gender and whether the household is rural or urban. These effects can be transmitted more generally and reach households without migrants. Looking at Mexico for instance, Dyer and Taylor (2009) show that migration and remittances indeed spurred labour opportunities and higher wages for members of households with no migrants.

Few papers have empirically measured the impact of *emigration* nationally on the labour market. Studies that have estimated the impact of emigration using the skill cell approach include Mishra (2007) and Aydemir & Borjas (2007) on Mexico, Borjas (2008) on Puerto Rico and Bouton *et al.* (2009) on Moldova; they all conclude that emigration increased wages with elasticities ranging from 2% to 6% (interpretation: a 10% increase in emigration leads to a 2% to 6% increase in wages).[8] These papers either look at the long term, with big gaps between years, or ignore the potential for reverse causality between emigration and labour outcomes.

On the surface Honduras, with its 8 million inhabitants, exhibits many of the common labour market features found in developing countries. As with many developing countries, labour force participation in Honduras is low; in 2006 it was 55% (CEMLA, 2008). It is a relatively poor country with little in terms of formal job generation. In 2006, 60% of Honduran households were living under the national poverty line (ISACC,

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[8]Mishra (2007), Aydemir and Borjas (2007) and Borjas (2008) all take a very long-term approach, while Decaluwé and Karam (2010), Hanson (2007) and Bouton *et al.* (2009) use shorter periods. Since migration is an adaptable phenomenon, the point at which a country finds itself in the migration cycle will surely influence the impact it has on wages. Social groups (*ie.* Hometown Associations, HTAs), households, regions and countries have different ways of coping with emigration and remittances depending on the length of time since migrants have left the home country. Moreover and as pointed out by Dustmann *et al.* (2005), while there may be impacts in the short-term, so long as the distribution of skills between migrants and non-migrants is different, the long-term effects depend on the openness and output mix of the country. Using a slightly modified approach to exploit regional differences in Mexico, Hanson (2007) also arrives at a similar conclusion. While the elasticity derived in Hanson (2007) is higher, the author warns that the number includes both direct and indirect effects (emigration's impact on growth) of emigration and therefore likely overvalues the true elasticity. In a simulation exercise based on a 1998 social accounting matrix of Morocco, Decaluwé and Karam (2010) also find that the direction of the effect is positive.

2009). In fact, at USD $4000, GDP/capita sits somewhere in the middle of the ranking of Central America. The lack of formal job creation has generated a burgeoning informal sector (ISACC, 2009) in which the share of the non-agricultural labour force employed informally between 1995 and 2006 ranged from 66% to 71%. These shares were 54% to 58% for Mexico in comparison (IILS, 2009). Agriculture also plays an important role for the economy. 56% of the population live in a rural municipality and 36% of the working population is involved in agriculture and livestock farming [followed by commerce (18%) and manufacturing (15%)]; the agricultural sector also experienced the highest growth (34%) between 2001 and 2006 (ISACC, 2009). The manufacturing sector is dominated by the maquiladora system, the third largest of its kind in the world. It employs approximately 130 000 Hondurans, and increasingly women (CEMLA, 2008).

However, unlike the countries featured in previous studies, emigration from Honduras, until very recently, was relatively low – particularly in comparison to its neighbouring Central American countries. The combination of economic growth and the sudden and unexpected devastation caused by Hurricane Mitch in October 1998 ignited a wave of emigration from Honduras. Honduras, along with Nicaragua, took the brunt of the second deadliest Atlantic hurricane on record at the time; nearly 15 000 Hondurans were killed as a direct result of the Hurricane[9] and many fled the country to the U.S. In fact, as internal migration fell, international emigration took its place (UNAT-UNFPA, 2006; ECLAC, 2007). The stock of workers was not, in turn, replaced with the same velocity: immigration to Honduras is amongst the lowest rates in the world as the foreign born comprise 0.4% of the population (UN, 2005). Figure 2 illustrates the stagnation – and even slight contraction - of the labour force following Hurricane Mitch. The labour force did not expand again until 2003.

The fact that many young men have left the country in a relatively short time span has not gone unnoticed back home; the Honduran Association of Maquiladoras, which relies heavily on low-cost labour, campaigned in Honduras with the slogan 'quédate con nosotros' in response to their inability in retaining workers in Honduras. Given this context, it is not surprising that an increasing number of women are finding employment. In higher skill sectors, the high brain drain rate in Honduras also indicates a contrast between those leaving and those staying in Honduras.

As stated in Borjas *et al.* (2008), a large part of the differences in results on the impact of migration on the labour market found in the literature can be explained by methodology. In light of this background and given the rapid rise of emigration

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[9]The track of the hurricane crossed through the country entirely. As an emergency response, the U.S. granted Hondurans that were in the U.S. at the time of the hurricane (Hondurans living in the U.S. had to provide proof of continuous residence in the U.S. since December 30, 1998 and continuous physical residence since January 5, 1999) temporary protected status (TPS); such protection covered Hondurans without legal papers and prevented their detainment, deportation and enabled them to legally work in the country. This protection continues to this day (US Citizenship and Immigration Services, www.uscis.gov). Information on the number of deaths comes from http://www.preventionweb.net. Ensor (2009) provides a complete account of the details and destruction caused by the hurricane.

from Honduras, this paper brings together two branches of the literature. Like Borjas (2003), it exploits the variation in the size of skill cells due to emigration from Honduras to measure whether there was an impact on the labour market through wages, hours worked and informal employment. Its main contribution is to bring the literature closer to the natural experiment approach proposed by Card (1990) by exploiting the random nature of the destruction generated by Hurricane Mitch in 1998, which spurred a migratory response by those affected. As opposed to other papers that have attempted to use a sudden change in policy, such as Bouton *et al.* (2009) on the opening of Moldova, Hurricane Mitch offers an unexpected shock to the labour market. In fact, the hurricane's path had already passed the coast of Honduras heading north when it unexpectedly veered back South and split the country in two. In addition to the fact that few hurricanes in the region have hit the coast with the same intensity, this paper argues that Hurricane Mitch is a valid natural experiment on which to model emigration.

2.2   Framework

The identification strategy of this paper follows the one developed in Borjas (2003). The theoretical foundation supposes a very simple supply and demand framework that suggests decreases in domestic labour supply due to emigration lead to an increase in domestic wages (Berry and Soligo, 1969). In the case of Honduras for instance, this would mean that a decrease in the supply of labourers from a specific skill group would have led to an increase in the average wage for the same skill group left in Honduras. In their most basic form, skill groups are defined on education and experience. The model thus exploits differences across skill groups in the Honduran labour force and Honduran emigrant flows to the U.S. for the years 2001, 2004 and 2007, thus forming a pseudo-panel where the level of observation is the skill cell. The baseline estimated equation is as follows:

$$w_{ijt} = \delta m_{ijt} + s_i + v_j + \pi_t + (s_i * \pi_t) + (v_j * \pi_t) + (s_i * v_j) + \varepsilon_{ijt} \qquad (1)$$

where w_{ijt} represents the logged mean monthly wage for education group i, in experience group j in year t. m_{ijt} is the emigrant supply shock[10] from Honduras to the U.S. in cell (i, j, t) and is measured as follows:

$$m_{ijt} = \frac{M_{ijt}}{M_{ijt} + N_{ijt}} \qquad (2)$$

where M_{ijt} is the number of Honduran emigrants in the U.S. in cell (i, j, t) and N_{ijt} is the national labour force in Honduras in group (i, j, t). m_{ijt} measures the ratio between emigrant stock (out) and the labour force (in) in a particular skill group and in

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[10]The paper follows Borjas (2003) in calling this term a *supply shock.*

a particular year, in other words, the intensity of emigration in a particular skill group at a particular point in time.

δ is the parameter of interest and gives the percentage change of wage given a 1% change in emigrant shares. Because the group size, on which data for wages is derived, varies, the regressions are weighed by the size of the labour force (N_{ijt}).

s_i, v_i and π_t are vectors for specific group fixed effects while $(s_i * \pi_t), (v_j * \pi_t)$ and $(s_i * v_j)$ are their respective interaction terms. The first two interaction terms control for the fact that the profile of returns to education and experience might change over time, while the last term controls for the possibility that the profile of returns to experience changes between different education groups. This last term is sometimes dropped if there are few cells. In this case, the number of cells is limited to 3 years x 4 education groups x 10 experience groups. These 120 skill cells are then reduced to 117 as the cells made up of individuals with the top level of experience and education are empty. Economy-wide shocks are captured by the time fixed effect.

A major contribution to the literature in this paper is the use of rich cross-sectional microdata; in addition to the skill-group regressions described above, the equation is also estimated using an individual-level wage regression. Individual micro data increases significantly the number of observations, and consequently the accuracy. The equation is specified as follows:

$$w_{nt} = \delta m_{ijt} + \beta X_{nt} + \varepsilon_{nt} \tag{3}$$

where w_{nt} represents the wage for individual n in year t. m_{ijt} is the emigrant supply shock from Honduras to the U.S. in cell (i, j, t) in which the individual belongs; it is measured in the same way as in the group level regressions. But in contrast to equation (1), equation (3) includes the term βX_{nt}, a vector of standard Mincerian individual controls such as marital status, gender, urban/rural household, occupation, industrial sector, education and work experience. The error term ε_{nt} is robust to heteroskedasticity and clustered at the ijt level to allow for arbitrarily correlated errors within groups over time. This paper presents results using model (3), as the greater controls help hone in on the true impact of emigration. However, the aggregated regressions were also done in parallel to ensure that they were in the same neighbourhood in terms of order of magnitude, significance and sign.

An obstacle with such a model is the issue to endogeneity. Therefore, instrumental variable estimates are calculated using a two-stage least-squares method, to deal with the endogeneity of the m_{ijt} variable as it may be driven by wages itself. That is, in the first stage m_{ijt} is regressed on all other exogenous variables mentioned in equation (3) plus an instrument, described later, and the predicted values from this regression are used to replace m_{ijt} in equation (3). The above framework can be easily substituted to include a dependent variable other than wage, such as hours worked and binary response variables such as underemployment and informal employment. In the latter two cases the estimation is done with a linear probability model.

2.3 Data

This section describes the data used in the empirical analysis of the paper. As the vast majority of Hondurans abroad are in the U.S. (>90%), data on Hondurans in the U.S. is used as general proxy for Hondurans abroad.[11] Data on individuals born in Honduras and living in the U.S. are drawn from microdata samples of the American Community Surveys (ACS) for the years 2001, 2004 and 2007. The ACS, which began in 2000, is collected by the U.S. Census Bureau. It collects information similar to the standard decennial census, on approximately 250 000 nationally representative American households on a monthly basis (3 000 000/year). The survey is the largest and most representative survey in the U.S. tracking immigrants as it includes such information as country of birth, U.S. citizenship status, the year of entry into the U.S. and the place of residence one year prior. Its surveying method also allows it to give a good approximation of irregular migrants in the U.S., although it is likely that the ACS still underestimates the actual number of unauthorised workers entering the U.S. – simply due to the inherent difficulty in tracking them. The data used in this paper were obtained from the Integrated Public Use Microdata Samples (IPUMS) USA Project and are 1/232nd, 1/239th and 1/100th random draws from the 2001, 2004 and 2007 raw ACS data respectively (see Ruggles *et al.*, 2010).

An emigrant is defined as a person over the age of 15 and under the age of 66 born in Honduras and living in the U.S. according to the ACS; this definition does not depend on naturalization or on whether the migrant is in a regular (ie. legal) situation or not. At the age of 16, individuals can legally work in almost all U.S. states.[12] Individuals are divided into education and experience groups. There are four education groups corresponding to (a) no education (less than 6 years of formal education completed), (b) primary education (at least 6 but less than 13 years of formal education completed), (c) secondary education (at least 12 but less than 17 years of formal education completed) and (d) post-secondary education (more than 16 years of formal education completed).[13] Because information on work experience is not available in the surveys, it is estimated using Age-AT,[14] where AT is the assumed age of entry into the labour market, consistent with previous studies. For those without education or primary education, AT=16; for those with secondary education, AT=18 and for

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[11]A similar assumption and argument is made in Mishra (2007).

[12]U.S. Department of Labor, www.dol.gov.

[13]Formal and compulsory education in Honduras begins at the age of 6 and ends at the age of 12, in what is called *'basica'* or primary education. It is free and paid by the public system. Secondary education is divided in two. From the age of 12 to 15, students attend the '*ciclo comun*' and follow-up with another two years in '*ciclo diversificado*' (ages 15-17). Beyond this, students can attend technical school (ages 16-19) or enter university (World Higher Education Database). According to the ISACC (2009) report, 71% of the population had not progressed further than primary education by 2006, although this is somewhat of a reflection of the low average age in the country.

[14]This is consistent with Borjas (2003).

individuals with a post-secondary degree, AT=22.[15] Experience groups are divided into 10 groups, each defined by 5 years of experience level.

Data on the Honduran labour force and average wages in Honduras come from the Encuesta Permanente de Hogares de Propositos Multiples (EPHPM) (translation: multi-purpose permanent household survey), a biannual (May and September) nationally representative household survey for the years 2001, 2004 and 2007. The EPHPM is administered by the Honduran National Statistical Institute (INE) since 1990. It provides a wide range of individual information such as gender, education, year of birth and rural/urban location. While in some years the data is missing or incomplete, the surveys for the years 2001, 2004 and 2007 contain complete data for both May and September surveys, aside from September 2004. Because of this reason, the results shown in this paper are provided for the May samples. The particular surveys were also chosen so as to match the ACS data.[16]

Sample sizes vary substantially, from around 36 000 individuals in May 2001 and May 2004 to over 80 000 in May 2007. Because this may affect the accuracy of the averages, weights are used in the regressions and year dummies are added. A member of the labour force in Honduras is defined as a person over the age of 15 and under the age of 66, working or looking for work in Honduras according to national household surveys. The survey questions asked were "In the last week, did you dedicate at least one hour for an activity for which you were paid" and "In the last week, did you search for paid employment?". An individual part of the labour force was defined as a person answering yes to either one of these questions, which are standard ILO-defined questions typically used to count the labour force. It is notable that the definition of wages and the labour force used in this paper includes, to an extent, informal employment; as pointed out earlier this is a key characteristic of the Honduran labour market. Additionally, and for the purposes of this analysis, the size of the labour force was limited to those that had also provided information on their monthly labour income. Self-employment is defined as those that answered 'self-employed' when asked their occupational category.

To match the education information between the two sources of data (from two countries), individuals that declared their highest educational level in the EPHPM being 'none', 'an alphabetisation programme' or 'pre-basica' were categorised as 'without any level' ('No Formal Education'). Individuals that declared their highest education level as 'basica' were categorised as 'primary education' ('Primary'). Those who declared 'ciclo comun' or 'diversificado' were categorised as having 'secondary education' ('Secondary')

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[15]This is a crude approximation; by definition it assumes individuals enter the labour force immediately after completion of their studies. It also assumes that experience for men and women can be approximated in the same way, which is not necessarily the case – childbearing and childrearing have an impact on the experience profile of women.

[16]For instance, while it may have been interesting to use data from 1999, the data exist for the EPHPM but not for the ACS. In the same way, the 2000 data do not exist for the EPHPM (due to a reform of the INE) while they do for the ACS.

and finally those with 'tecnico superior' or anything higher, regardless of whether they completed their university studies, were categorised as having a 'superior' ('Superior') education level. Individuals with at most nursery or kindergarten education in the ACS were categorised as having no formal education. Individuals with their education level at most grade 1 to grade 6 (included) were categorised as having 'primary education'. Individuals with education levels ranging from grade 7 to grade 12 (including U.S. General Education Diplomas, GEDs) were categorised as 'secondary education' and all individuals with any higher form of education were categorised as having 'superior education'.

Wages are defined as the sum of monthly monetary or in-kind income, including income derived from self-employment. The survey asked "in the last month, how much was your monthly income in Honduran lempiras"?[17] Wages are deflated using CPI data from the WDI (World Bank).

Given the number of education levels, experience groups and years (4 x 10 x 3), there are 120 different skill groups. In reality, due to the number of schooling years, the groups with the highest years of experience and education levels are empty, yield in fact 117 skill groups.

3   Emigration and the labour market in Honduras

This section documents general evidence of a link between emigration from Honduras following Hurricane Mitch and its impact on the labour market. The general objective is to highlight the rapid increase in emigration and the diversity in the increase by education and experience over time and the contrast of this diversity with the distribution of workers remaining in Honduras. Labour supply shocks change in the share of emigrated workers within each skill group over time. It then shows basic evidence on the link between emigration and labour outcomes in Honduras.

The distribution of emigrants from Honduras following Hurricane Mitch was mostly of secondary level, in absolute numbers. Figure 3 presents data on Honduran immigrant stocks in the U.S. by education level for the years 2001, 2004 and 2007; they represent M in equation (2). The rise in emigration is evident, particularly in 2007 for those with primary and secondary education. While those with post-secondary education were indeed highly represented immediately after the hurricane, their stocks stagnated following 2001 – they were surpassed in absolute numbers by those with primary education by 2007.

In contrast, the labour force in Honduras was mostly primary level educated and its growth was less pronounced. Figure 4 provides details on the total size of the labour force in Honduras for each education category for the same years; this represents N in equation (2). Notably, the size of the labour force without any formal education did not

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[17]The lempira is the currency of Honduras.

grow to the same extent, as opposed to those with primary and secondary education. This suggest a general educational upgrade in the country.

In comparison to the stock of emigrants in the US presented in Figure 2, those remaining in Honduras with primary education form a very large part of the labour force in Honduras, while those with secondary and superior education a much smaller one. Comparing the evolution of these groups on both sides over time is noteworthy as it forms variation on the labour supply shock. While the group of individuals with no formal education has stagnated in Honduras, the size of the group in the U.S. has grown. The opposite can be said of the group with post-secondary education; it has stagnated in the US, while it has slightly grown in Honduras. Notably the group of primary and secondary educated has grown by a lot in the U.S. and only slightly in Honduras. For all education groups apart from those with superior education, growth over the 2001-2007 period was higher in the emigrant stock than in the labour force remaining in Honduras; more people relative to the previous stock of similarly educated individuals were leaving the country than entering the labour force in Honduras. Despite the changes in the labour force, the share of women and of rural workers remained stable through this time period.

Combined together, Figures 3 and 4 form the elements of the key variable of interest defined in equation (2). Figure 5 shows the size of the change in emigration relative to the labour force in Honduras [M/(M+N)] by education groups. Between 2001 and 2007, the aggregate M/(M+N) increased by about 4 percentage points, but the changes varied widely between education groups. As pointed out, a major difference between Honduras and Mexico is the level of brain drain and the ACS data confirm the magnitude, although the magnitude of the brain drain decreases after 2001. Recent immigration to the U.S. is characterised by low-educated individuals, but the relative distribution changes drastically when taking the point of view of the sending country. Unsurprisingly, the greatest labour shocks for the Honduran labour market were in the two most educated groups. This is largely because the labour force of lower educated individuals in Honduras is relatively larger than those with higher education; as a result, even though there may be less high educated individuals emigrating from Honduras in absolute terms, the relative quantitative importance of this group vis-à-vis the group of similar workers left in Honduras is much higher. In order of size, M/(M+N) is highest for those with superior education, followed by secondary education, no formal education and primary education.

The distribution of emigrants and the labour force in Honduras over the same years are also strikingly different. Table 1 summarises the distribution of the labour force remaining in Honduras (within N) and the distribution of migrants (within M) over time and by education group. The size of the impact depends on the difference between the distributions of these two groups (Dustmann *et al.*, 2005). Because many high-skilled workers leave developing countries, but also because developing countries typically have lower stocks of high-skilled migrants to replace them, upward pressure on wages is

strongest as we move up the scale of education levels. We would therefore expect little or no change, even in the medium run if the distributions were similar. However, different distributions in the two groups would warrant, at least in the medium run, a change in the equilibrium of the labour market, as the economy re-adjusts its capital-labour ratio.

It is clear from Table 1 that the group leaving Honduras (M) has a different distribution than those staying behind (N). The majority ($>44\%$ in all three years) of emigrants fall in the secondary education category, with post-secondary education ranking second initially, before primary educated emigrants surpass this group by 2007. The labour force in Honduras however, has relatively little secondary (about half relative to emigrants) and post-secondary (about one-third to half relative to emigrants) educated individuals in comparison. It is noteworthy however, that the gap in each education group has reduced over time – even if only slightly.

Average wages and hours worked are presented in Figures 6A and 6B. As expected, wages increase with education and experience level. No growth was experienced by any particular group however, and in fact most groups saw a decrease in their real wages from 2001 to 2007. Those with the highest levels of education saw the biggest drop in real wages. This sluggish wage growth is consistent with the relative size of this group in Honduras and the relatively lower number of Hondurans emigrating (Figure 4) as well as with the gradual movement to the right of the educational distribution in the country (Figure 3). Average hours worked are also rather stable, with a drop occurring in 2007 for those with no formal education and primary education. Those with secondary education work the most. In terms of self-employment are stable with a similar drop; self-employment also falls as education levels rise.

However, stocks of both emigrants and labour force also vary by experience level - further dividing into experience groups shows even more variation over time. In fact, when labour outcomes are plotted against skill groups by education and experience groups over time in a scatter plot, the relationship consistently yields a positive relationship. Figures 7A and 7B show scatter plots between average real wages and average hours worked by skill group (education x experience group and year) plotted against average M/(M+N) at the same skill level. The relationships are clear and moreover consistent when plotted individually per year, more so for wages; the correlation coefficients are respectively 0.8465 and 0.5511. The relationship is consistent for each year.

Correlations cannot claim a causal link between these two events, but they signal a potential link. Given these results, the next section provides regression results using the model presented in section 2.

4 Empirical results

4.1 Basic results

This section presents results derived from the model described in Section 2. As mentioned earlier, the labour force (N) is limited to the samples in the month of May as well as to individuals that provided information on their income. To increase the level of precision, results are presented using the micro data, following equation (3). The first columns of Tables 2 to 5 present results of a specification identical to the Borjas grouped data model. That is, ijt groups are aggregated together and the regression is run using these groups. In the basic model, this yields an number of observations of 117. The labour force (N) is calculated only on those that declare an income, and fixed effects are included for each defining characteristic of the skill group, including interactions with year. Regressions are weighed by the size of the labour force in each cell with robust standard errors. The elasticity of the impact of the supply shock on wages using this specification is 2.094, or in other words an increase of 21% for a 10% increase in M. Changing the skill cells to reflect occupation or sector (Tables 2B and 2C)[18] drastically lowers this elasticity closer to 0% - yet remains significant. The last set of regressions on wages, Table 2D, shows results for skill cells based on time, education, experience and department.[19] As was equally shown by Borjas (2003), the coefficient

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[18]Individuals were grouped into the following 10 occupations, consistent with the quality and type of data in the EPHPM: professionals, directors, office workers, commercial representatives, farmers, transport driver, manufacturing worker, technical worker, warehouse/storage worker and services worker. They were also grouped into the following 10 industrial sectors: agriculture, mining, manufacturing, gas and electricity, construction, hospitality, transport/communication, finance and social services. Technically this would equate to 1200 cells (3 years x 4 education groups x 10 experience groups x 10 occupational/industrial groups), but with the sizeable overlap in education level and occupation/industry, in the end there are 1036 occupation-based and 918 industry-based non-empty cells. The M component of the equation (emigrant stock) was however left as originally defined, that is *education*experience*year*, as a change in industry is highly likely for migrants, particularly if they obtained their education in the home country. Therefore, defining M by occupation or industry would make little sense.

[19]Technically there should be 2160 skill cells in this group (3 years x 4 education groups x 10 experience groups x 18 departments). In the end there are 1704 non-empty cells. While nationally representative of population, the EPHPM data do not include data from the two least-populated departments: Gracias a Dios (>70 000 inhabitants) and Islas de la Bahía (>40 000 inhabitants), which equates to a maximum of 1920 skill cells. A second caveat is on departmental-based cell groups. Information on emigration by department from Honduras (or generally any country) does not exist and therefore makes matching M and N by department impossible. The results reported below are for M based on education and experience groups, while N is based on department, education and experience groups. The overall problem is small since the results are used to compare the idea pioneered by Borjas on the geographical level of the labour market. In this paper, the results can be interpreted as a general, nationwide shock on labour, with local (or national depending on the skill group) readjustments. That is, as internal migration is low in Honduras, we should expect a non zero and significant impact nonetheless.

is much smaller, and in this case, changes sign.

The second column of each table presents results using individual controls, consistent with Mincerian theory on labour. This also has the advantage of boosting observations to more than 50 000. Notably, the elasticity of the supply shock on wages is similar as in the grouped model in the first column, but elasticities are slightly lower across all types of skill cell measures. In the case of the base model, the elasticity is 14%, while for the others they lower yet even more.

The third column of each *education cell group* sub-table presents results on the specific contribution of the coefficient of the supply shock on the dependent variables by (a) gender and (b) whether the household is rural or urban. In all cases, except for skill cells based on industry, the contribution of the coefficient was stronger for women and individuals working in rural areas, with the exception that the coefficient for hours is not significant. For industry-based cells, the effect was stronger for urban workers, although the overall effect on wages is very small.

A critical identification issue in this paper is the endogeneity between migration and wages. Wages can also be the determining factor for migration as an increase or a decrease in local wages might spur the outflow of workers. For this reason, the paper also presents results from a 2SLS instrumental variable regression in the fourth column. An important pull-factor for potential emigrants (and their households) are social networks, on which potential migrants can rely for information. These, in effect, make emigration cheaper, by providing information not easily provided to all potential emigrants. Therefore, the size of the skill cell in the US in the previous year is used as an instrument, as it should be unrelated to wages, while heavily linked with emigration. Using this IV yields results that are positive and significant. The order of magnitude is slightly lower for the basic education x experience skill cells but higher for all others, despite remaining relatively smaller than the effect in the basic model. First-stage results are as expected, with the instrument yielding a significant coefficient (results available upon request).

Tables 3(A-D) to 5(A-D), show similar regression results pertaining to hours worked, self-employment and underemployment within the skill group. The elasticities for hours worked go in the same direction as wages but to a smaller degree. The elasticity in this case is around 2.5% when instrumented. By liberating space in the labour market, emigration permits those that wish to work more, to do so. Specific household models also argue that with emigration comes the loss of valuable labour which must be replaced, thus decreasing the reservation wage of individuals staying behind. In the IV model, only the basic education x experience skill cells model remains significant. In the occupation, industry and departmental-based skill cell models, the variable of interest loses its significance.

The idea behind looking at self-employment is that emigration may lead to a transition to better paid formal jobs in Honduras. Most workers in Honduras are informally employed, and most of them self-employed. Indeed the results yield a negative rela-

tionship between the two, up to 9% with the instrumental variable model. Indeed, this result is consistent across all types of skill cell measures, and strongest when measured at the departmental level.

The last set of tables focus on underemployment.[20] One would expect that with emigration relieving the labour market that underemployment would decrease, thus giving a negative relationship. Surprisingly, the coefficient using the traditional measure of skill group is positive. The departure of workers from a skill group led to an increase in underemployment. While occupation and industry-based skill groups yielded negative yet significant results, their elasticities are small (less than 1%). The effect is also positive, but much smaller using departmental skill cells.

In almost all cases, the effects are strongest for women and rural workers, as is consistent with the literature. First, rural areas often lack a fully functioning labour market. As such, the departure of labour leads to difficulties in replacing labour - manual labour especially; this is consistent with results found by Filipski and Taylor (2011) and Wouterse (2011), where production decreases and work tasks increase as workers emigrate. Second, the gradual emancipation of women on the labour market means they are exploiting new opportunities – some which are being left open by emigration. On the other hand, it leaves open the question of whether women are being over burdened by the added unreported activities related to "home production", as their rate of underemployment increases.

As there may be different ways to measure skill groups, a number of robustness tests are presented below.

4.2   Additional robustness tests

Given the higher elasticities yielded for wages, this section presents regression results from a number of robustness tests conducted for this analysis on wages. They are presented in Table 6, for columns 1 to 4 following the order of earlier tables. The elasticities are only presented for M/N, the variable of interest.

Robustness tests are done on four different assumptions. The first is on the appropriate measure of the emigrant group. A different measure is taken for the "M" variable, one where all emigrants are included disregarding the year they entered the US. The purpose of this test is to gather a more precise figure for emigrant flows from Honduras; it is not considered in the mainstream model since the ACS may not necessarily be representative of annual flows of Hondurans by education and experience level (age),

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[20]The definition of underemployment in the EPHPM includes both visible and invisible underemployment, and follows the conventional definition set by the ILO. Visible underemployment includes individuals in paid jobs or self-employment, whether at work or not at work, involuntarily working less than the normal duration of work determined for that activity (in a specific country), who are seeking or available for additional work. Invisible underemployment are individuals working in jobs where their skills are not adequately utilised.

nor by entry date, but rather of stocks. The result shows that the elasticity is in the same direction, with an even bigger magnitude. The IV model yields a result of around 28%.

The next set of robustness tests rests on the relevant labour market groups, changing both M and N. The first is on experience groups. Given that in several studies the definition of experience group changes, the regressions presented above were rerun using 1-year experience groups rather than 5 year-based groups. Another test restricts the sample of the Honduran labour force to men only, given that women occupy a different role, reservation wage and preferences in the labour force – particularly in a developing country context. Also, given the difficulty in measuring agricultural incomes, the following test restricts the sample to urban workers in Honduras. All three of these tests do not change the sign or significance of the model. In fact, they all yield similar orders of magnitude for the variable of interest, ranging from 15% to 20%.

The third set of robustness tests relies on testing for self-selection. In dealing with self-selection issues for emigration, this paper turns to the solution provided by Mishra (2007), which argues that in areas where emigration is low, self-selection issues are minimised since we observe all types of individuals and not only the ones left-behind in the ijt cells. As such we can posit that that the two groups (emigrants and those staying behind) are not very different. For this, the models are run using a third of the municipalities in Honduras that have the lowest rates of emigration (based on census data in 2001). While emigration rates varied following Hurricane Mitch, the relative importance in order of magnitude by municipalities stayed relatively the same. That is, in municipalities where emigration was low, rates were still the lowest in 2001, although they may have increased after Hurricane Mitch. The regression results show that self-selection issues seem to not be a problem here, as the results are nearly the same as with the full sample.

Finally, the last refinement directly exploits the random aspect of the Hurricane. It presents regressions using a 2SLS model as before but with an added instrument – the natural random element of the path of Hurricane Mitch. The instrument is essentially the minimum distance in kilometres between the municipality of the individual the hurricane squared multiplied by the wind strength (in km/h) at that specific point multiplied by the elevation of the municipality surveyed.

The instrument exploiting the variation in the path of Hurricane Mitch through Honduras was constructed in the following manner. The official codes corresponding to Honduran departments and municipalities were obtained from the *Registro Nacional de las Personas* (the National Registry) website.[21] Each municipality was then geocoded[22] using the Google Geocoding Application Programming Interface (API). Information

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[21]www.rnp.hn

[22]Geocoding is the process of converting locations into geographic coordinates (longitude and latitude).

on the track of the hurricane was obtained from *Unisys Weather*[23] which provides several geographic coordinates collected at different sequenced points for the hurricane, including the wind speed and air pressure at those specific points. Geographic data for each municipality was then matched to each point on the hurricane track. The shortest distance was retained in a database.[24] Finally, elevation for each municipality was also included as a component to the new instrument and retrieved from geonames.org, a consortium of geography researchers. This final component is an important once since despite the proximity and intensity of the hurricane, most damage to infrastructure, agriculture and generally to labour markets came afterwards through landslides and floods; municipalities at higher elevations were mostly spared from these problems. Each component was multiplied to create a one-time instrument to match with the previous emigrant stock instrument used earlier and merged with the main EPHPM database according to municipality. The results are slightly lower than before, but positive and significant; adding the hurricane path to the IV used earlier yields and elasticity of abour 15%.

5 Conclusions

This paper deals with a migration topic which has largely not been investigated: the impact of emigration on wages. It also focuses on a country which has not been adequately covered in the literature, despite fast growing emigration in the 2000s, following Hurricane Mitch. Bringing two strands of literature closer together, it exploits a natural disaster by turning to the Borjas (2003) empirical model. It shows that the sudden and intense emigration period from Honduras following Hurricane Mitch yielded an increase in wages of the order of 20% for every 10% shift of emigration from 2001 to 2007 – an elasticity much higher than any previous study on the topic. Moreover, emigration from Honduras increased hours worked and underemployment, while decreasing self-employment. Borjas' basic education x experience skill cells yield the highest results, while using occupation, industry and departmental skill cells yield relatively negligible effects, with the exception of self-employment. This lends support to the fact that using such small skill cells where mobility may be higher, such as between departments or occupations, will yield smaller elasticities, which is why many models that do so find smaller impacts. This is true at least for wages - the more common labour outcome measured in the literature. The paper also highlighted the slow emancipation of women in Honduras, and the rising cost of losing labour in rural areas.

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[23]www.weather.unysis.com

[24]For robustness, three measures of distance were retained: Vincenty, Haversine and the law of cosines. The three methods make slightly different assumptions in their calculations, such as on the curvature of the planet, but given the relatively small distances dealt with, the differences yielded were negligible.

Honduras' low ranking in openness and output mix combined with its inability to appropriately replenish and retain its high-skilled work force implies that the impact is likely to linger in the long run, possibly contributing to rising inequality. The conclusions of this paper suggest that emigration generates a redistribution of wealth from capital to labour – yet applies a certain level of additional stress leading to underemployment to make up for the loss of labour. In general, individuals in skill cells with high emigration rates are better off: higher wages, more working hours and less self-employment, which in the case of Honduras usually means bad informal jobs.

The Honduran Association of Maquiladoras likely sees emigration as a threat as it must pay workers higher salaries as a result. As such, at least from a global distribution point of view, the 'stay with us' slogan – which focuses on the dangers and risks of migration – appears to be biased. However, this paper ignores the general effect that the loss of labour may inflict on overall production.

This paper has also highlighted potential for future research. In light of the low internal migration in some countries, it would be a valuable exercise to estimate the impact of emigration on the labour market using the spatial correlation approach and contributing a valuable comparison of the two approaches. Unfortunately, countries do not track information on those who leave the country and therefore, while the aggregate emigrant shock on the labour market can be estimated, estimates on the differences between regions based on emigration intensity are much more difficult to obtain.

A second area of research is related to remittances. The question dealt with in this paper is strongly linked to the debate on the clear differentiation between the impact of emigration and the impact of remittances on labour outcomes. An influx of money in a household changes individual preferences for work, but it is difficult to predict where the tradeoff between working more and working less lies. In the lone known study, Kim (2007) shows that remittances increase unemployment in Jamaica. Adding remittances in the framework above has little sense because remittances are primarily a household variable. Because the framework in this paper uses a skill group level analysis, there is no reason to believe that remittances sent from a certain skill group should impact the labour choices of the same skill group in Honduras. Integrating remittances into the framework would be a useful contribution to the understanding of the links between migration and labour markets.

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Appendix

Figure 1: Number of Individuals Born in Honduras Living in the USA[a]
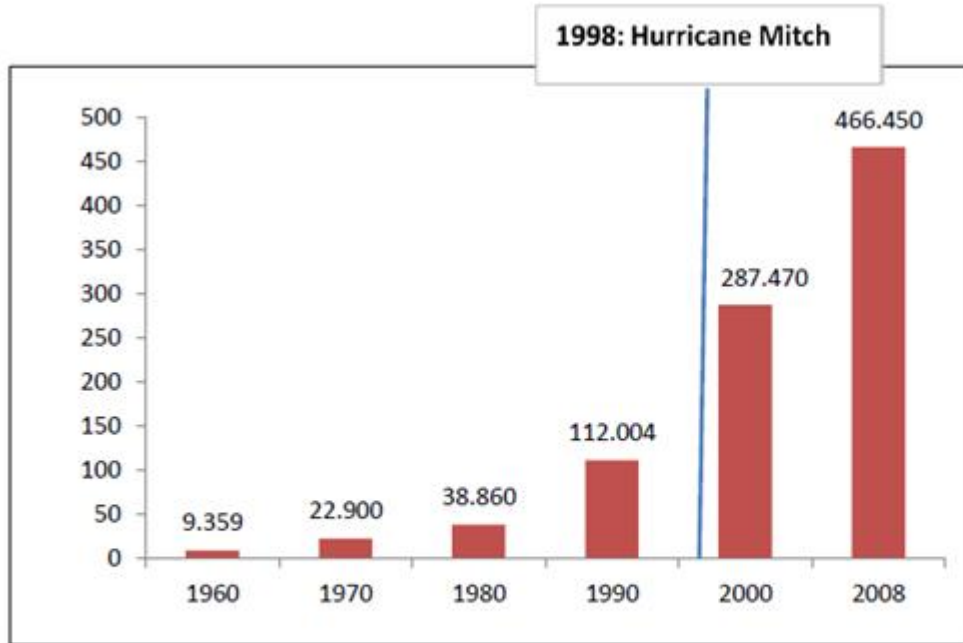
Figure 2: Size of labour force in Honduras[a]

Size of Honduras labour force
(1997-2007, millions)

[Line chart showing the size of the Honduras labour force from 1997 to 2007. The y-axis ranges from 2 to 2.8 in increments of 0.2. The line starts at about 2.1 in 1997, rises to about 2.35 by 1999, remains relatively flat through 2002, then rises steadily to about 2.7 by 2007. The x-axis shows years 1997 through 2007.]
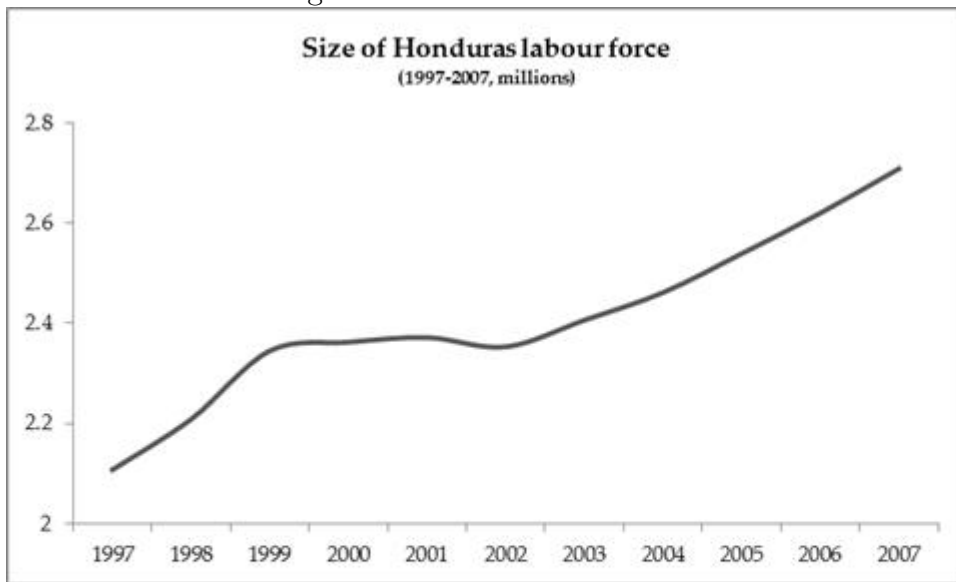
Figure 3: Honduran Emigrant Stock in the U.S. (M), by education level and year[a]
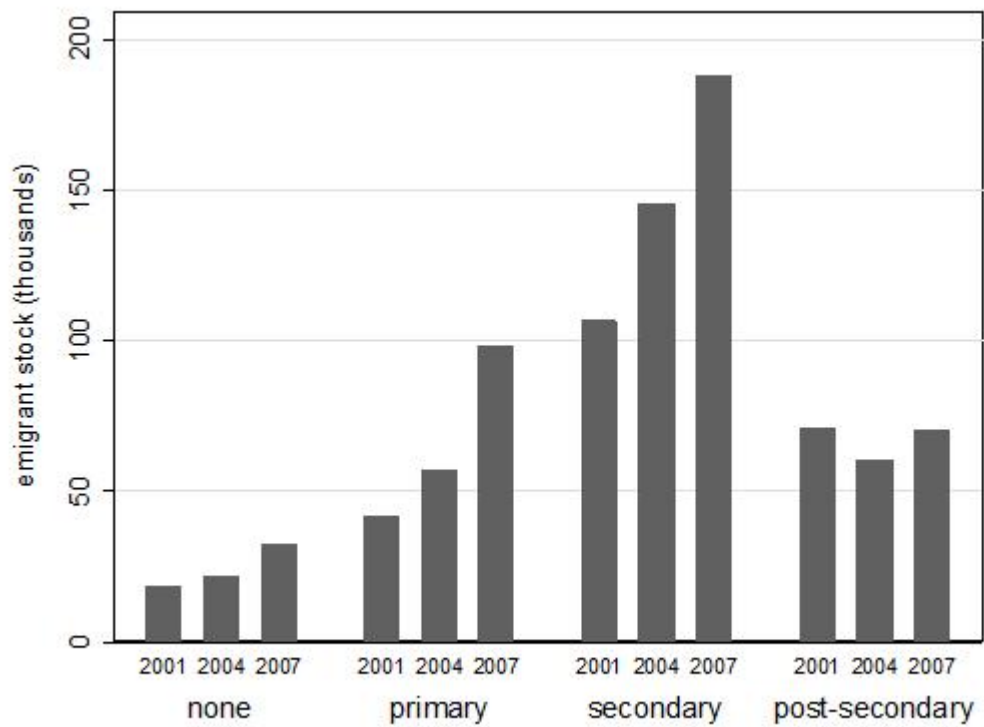
Figure 4: Honduran labour force (N), by education level and year (thousands)[a]
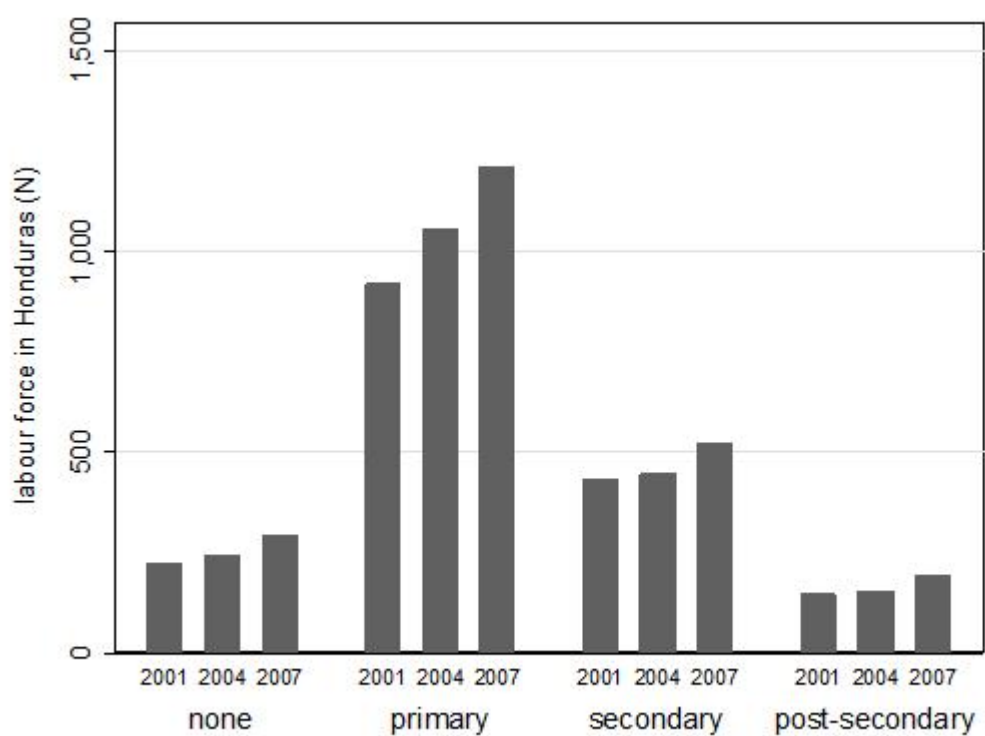
Figure 5: Number of Emigrants by Total Number Left [M/(M+N)], by Education[a]
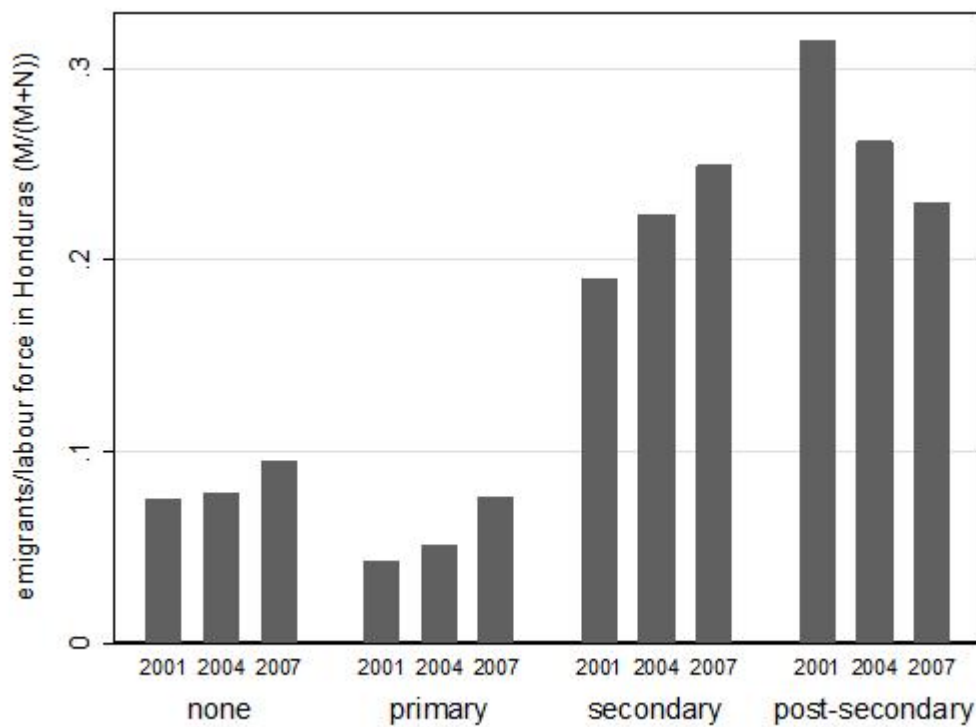
Figure 6: Real wages (in 2007 lempiras, thousands) [a]
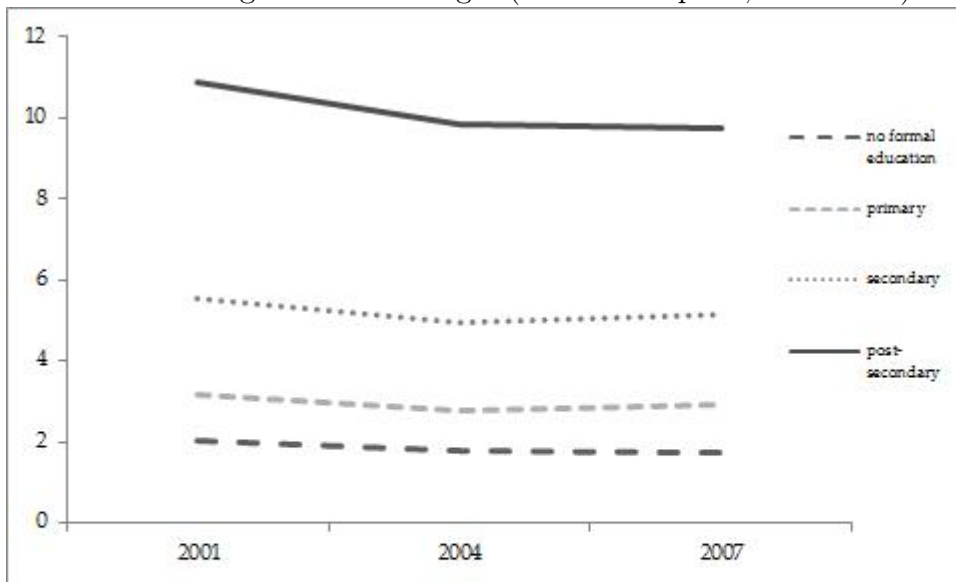
Figure 7: Average hours worked by education level and year[a]
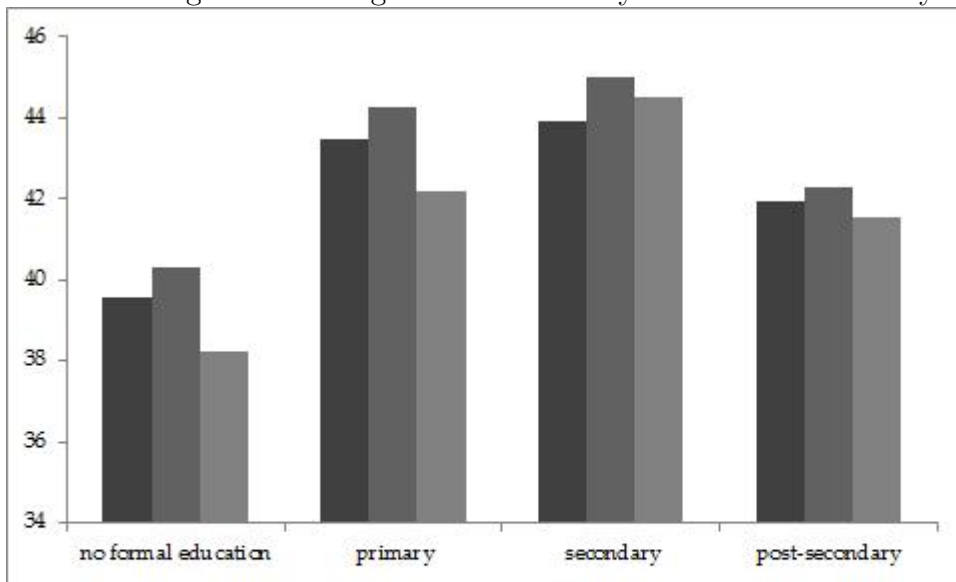
Figure 8: Scattterplot of real wages and M/N
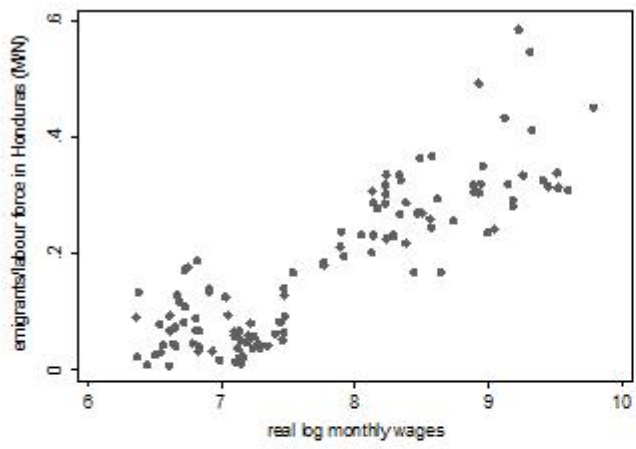
Figure 9: Scattterplot of weekly hours and M/N
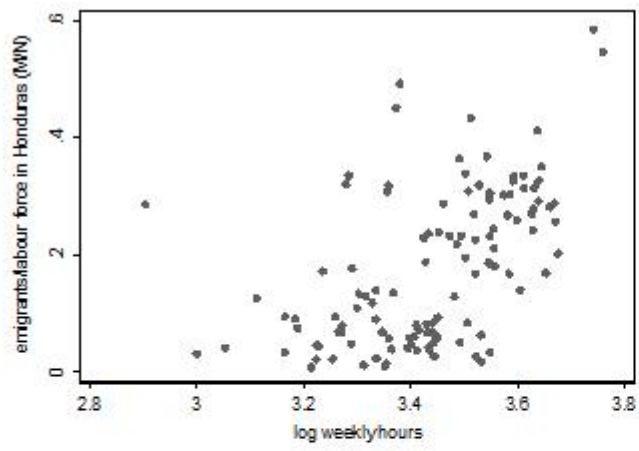
Table 1: Educational Distribution, Emigrants and Non-emigrant Labour Force in Honduras

2001					
Education	None	Primary	Secondary	Post-Secondary	Total
Left-behind LF (N)	13%	53%	25%	9%	100%
Emigrants (M)	8%	17%	45%	30%	100%
2004					
Education	None	Primary	Secondary	Post-Secondary	Total
Left-behind LF (N)	13%	56%	23%	8%	100%
Emigrants (M)	8%	20%	51%	21%	100%
2007					
Education	None	Primary	Secondary	Post-Secondary	Total
Left-behind LF (N)	13%	55%	23%	9%	100%
Emigrants (M)	8%	25%	48%	18%	100%

Source: EPHPM and ACS

Table 2.A: Effect of emigration on wages in Honduras

Dep. var: average logged monthly earnings per skill cell (ijt)

education cell groups	(1)	(2)	(3)	(4) IV
M/N	2.094***	1.397***	2.262***	1.875***
	(0.000)	(0.000)	(0.000)	(0.000)
male		0.437***	0.495***	0.435***
		(0.000)	(0.000)	(0.000)
urban		0.560***	0.619***	0.560***
		(0.000)	(0.000)	(0.000)
married		0.100***	0.101***	0.101***
		(0.000)	(0.000)	(0.000)
exp		0.067***	0.067***	0.065***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
primary		0.449***	0.454***	0.464***
		(0.000)	(0.000)	(0.000)
secondary		0.720***	0.716***	0.677***
		(0.000)	(0.000)	(0.000)
post-secondary		1.144***	1.153***	1.054***
		(0.000)	(0.000)	(0.000)
M/N*male			-0.532***	
			(0.005)	
M/N*urban			-0.660**	
			(0.011)	
Constant	6.143***	5.623***	5.542***	5.618***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.240	0.353	0.354	0.353

Notes: Robust pval in parentheses, clustered by ijt cell. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Regressions are weighed by individual frequency weights. Occupational, industrial and departmental controls not shown. Interaction between education/experience with year also not shown. Male, urban and married are dummy variables = 1. The reference group for education is 'no formal education'.

Table 2.B: Effect of emigration on wages in Honduras

Dep. var: average logged monthly earnings per skill cell (ijt)

occupation cell groups	(1)	(2)	(3)	(4) IV
M/N	0.143***	0.099***	0.216***	0.297***
	(0.000)	(0.000)	(0.000)	(0.001)
male		0.498***	0.536***	0.499***
		(0.000)	(0.000)	(0.000)
urban		0.470***	0.497***	0.459***
		(0.000)	(0.000)	(0.000)
married		0.098***	0.099***	0.098***
		(0.000)	(0.000)	(0.000)
exp		0.037***	0.037***	0.037***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
M/N*male			-0.094***	
			(0.001)	
M/N*urban			-0.075**	
			(0.024)	
Constant	8.118***	7.704***	7.659***	7.681***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.321	0.382	0.382	0.379

Table 2.C: Effect of emigration on wages in Honduras

Dep. var: average logged monthly earnings per skill cell (ijt)

	(1)	(2)	(3)	(4)
industry cell groups				IV
M/N	0.053***	0.028***	0.060***	0.438***
	(0.000)	(0.000)	(0.001)	(0.000)
male		0.533***	0.538***	0.518***
		(0.000)	(0.000)	(0.000)
urban		0.098***	0.099***	0.100***
		(0.000)	(0.000)	(0.000)
married		0.037***	0.037***	0.040***
		(0.000)	(0.000)	(0.000)
exp		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)			-0.027**	
			(0.028)	
M/N*male			-0.017	
			(0.105)	
M/N*urban		0.498***		0.500***
		(0.000)		(0.000)
Constant	6.408***	6.292***	6.283***	6.270***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.225	0.352	0.352	0.313

Table 2.D: Effect of emigration on wages in Honduras

Dep. var: average logged monthly earnings per skill cell (ijt)

	(1)	(2)	(3)	(4)
department cell groups				IV
M/N	-0.018***	-0.010***	-0.006	0.088***
	(0.000)	(0.000)	(0.204)	(0.009)
male		0.442***	0.453***	0.436***
		(0.000)	(0.000)	(0.000)
urban		0.555***	0.557***	0.620***
		(0.000)	(0.000)	(0.000)
married		0.098***	0.098***	0.095***
		(0.000)	(0.000)	(0.000)
exp		0.070***	0.070***	0.069***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
primary		0.397***	0.397***	0.445***
		(0.000)	(0.000)	(0.000)
secondary		0.867***	0.866***	0.677***
		(0.000)	(0.000)	(0.000)
post-secondary		1.441***	1.442***	1.105***
		(0.000)	(0.000)	(0.000)
M/N*male			-0.005**	
			(0.012)	
M/N*urban			-0.001	
			(0.844)	
Constant	6.181***	5.636***	5.627***	5.668***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.241	0.353	0.353	0.270

Table 3.A: Effect of emigration on hours worked in Honduras

Dep. var: average logged weekly hours worked per skill cell (ijt)

	(1)	(2)	(3)	(4)
education cell groups				IV
M/N	0.492***	0.248**	0.381***	0.320**
	(0.000)	(0.018)	(0.002)	(0.026)
male		0.209***	0.208***	0.209***
		(0.000)	(0.000)	(0.000)
urban		0.166***	0.179***	0.166***
		(0.000)	(0.000)	(0.000)
married		0.006	0.006	0.006
		(0.484)	(0.502)	(0.469)
exp		0.012**	0.012**	0.012**
		(0.023)	(0.022)	(0.022)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.006)	(0.006)	(0.005)
primary		0.084***	0.086***	0.086***
		(0.000)	(0.000)	(0.000)
secondary		0.007	0.003	-0.000
		(0.758)	(0.881)	(0.994)
post-secondary		-0.074**	-0.077**	-0.088**
		(0.038)	(0.038)	(0.013)
M/N*male			0.016	
			(0.904)	
M/N*urban			-0.158*	
			(0.063)	
Constant	3.524***	3.623***	3.617***	3.623***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.014	0.092	0.092	0.092

Notes: Robust pval in parentheses, clustered by ijt cell. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Regressions are weighed by individual frequency weights. Occupational, industrial and departmental controls not shown. Interaction between education/experience with year also not shown. Male, urban and married are dummy variables = 1. The reference group for education is 'no formal education'.

Table 3.B: Effect of emigration on hours worked in Honduras

Dep. var: average logged weekly hours worked per skill cell (ijt)

	(1)	(2)	(3)	(4)
occupation cell groups				IV
M/N	0.206***	0.019	0.366***	-0.282
	(0.001)	(0.746)	(0.008)	(0.270)
male		0.272***	0.319***	0.272***
		(0.000)	(0.000)	(0.000)
urban		0.118***	0.127***	0.127***
		(0.000)	(0.000)	(0.000)
married		-0.007	-0.005	-0.006
		(0.479)	(0.563)	(0.527)
exp		0.017***	0.017***	0.016***
		(0.000)	(0.007)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.001)	(0.000)
M/N*male			-0.432***	
			(0.007)	
M/N*urban			-0.111	
			(0.180)	
Constant	3.560***	3.537***	3.501***	3.572***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.054	0.101	0.102	0.100

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Table 3.C: Effect of emigration on hours worked in Honduras

Dep. var: average logged weekly hours worked per skill cell (ijt)

	(1)	(2)	(3)	(4)
industry cell groups				IV
M/N	0.260***	0.093*	0.445***	0.044
	(0.000)	(0.079)	(0.002)	(0.862)
male		0.261***	0.305***	0.262***
		(0.000)	(0.000)	(0.000)
urban		0.131***	0.143***	0.133***
		(0.000)	(0.000)	(0.000)
married		-0.008	-0.006	-0.007
		(0.391)	(0.482)	(0.401)
exp		0.018***	0.019***	0.018***
		(0.000)	(0.006)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.001)	(0.000)
M/N*male			-0.404**	
			(0.014)	
M/N*urban			-0.142*	
			(0.094)	
Constant	3.559***	3.265***	3.221***	3.280***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.041	0.086	0.087	0.086

Table 3.D: Effect of emigration on hours worked in Honduras

Dep. var: average logged weekly hours worked per skill cell (ijt)

	(1)	(2)	(3)	(4)
department cell groups				IV
M/N	0.492***	0.278**	0.607***	0.335
	(0.003)	(0.049)	(0.000)	(0.107)
male		0.253***	0.277***	0.253***
		(0.000)	(0.000)	(0.000)
urban		0.169***	0.188***	0.169***
		(0.000)	(0.000)	(0.000)
married		0.002	0.003	0.002
		(0.811)	(0.768)	(0.797)
exp		0.016***	0.016**	0.016***
		(0.000)	(0.013)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.002)	(0.000)
primary		0.084***	0.085***	0.085***
		(0.000)	(0.000)	(0.000)
secondary		0.022	0.019	0.016
		(0.451)	(0.462)	(0.619)
post-secondary		-0.048	-0.046	-0.059
		(0.224)	(0.213)	(0.227)
M/N*male			-0.230	
			(0.112)	
M/N*urban			-0.229***	
			(0.006)	
Constant	3.524***	3.266***	3.237***	3.266***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.014	0.072	0.072	0.072

Table 4.A: Effect of emigration on self-employment in Honduras

Dep. var: average self-employment per skill cell (ijt)

education cell groups	(1)	(2)	(3)	(4) IV
M/N	-0.842***	-0.713***	-0.331***	-0.923***
	(0.000)	(0.000)	(0.002)	(0.000)
male		-0.006	-0.010	-0.005
		(0.247)	(0.244)	(0.301)
urban		-0.007	0.027***	-0.007
		(0.105)	(0.007)	(0.108)
married		0.095***	0.094***	0.094***
		(0.000)	(0.000)	(0.000)
exp		0.034***	0.034***	0.034***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
primary		-0.038***	-0.034**	-0.042***
		(0.007)	(0.012)	(0.003)
secondary		0.039*	0.030	0.059**
		(0.088)	(0.207)	(0.039)
post-secondary		0.159***	0.151***	0.198***
		(0.001)	(0.001)	(0.000)
M/N*male			0.049	
			(0.363)	
M/N*urban			-0.453***	
			(0.000)	
Constant	0.269***	-0.678***	-0.693***	-0.678***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.189	0.585	0.586	0.585

Notes: Robust pval in parentheses, clustered by ijt cell. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Regressions are weighed by individual frequency weights. Occupational, industrial and
departmental controls not shown. Interaction between education/experience with year
also not shown. Male, urban and married are dummy variables = 1. The reference group
for education is 'no formal education'.

Table 4.B: Effect of emigration on self-employment in Honduras
Dep. var: average self-employment per skill cell (ijt)

occupation cell groups	(1)	(2)	(3)	(4) IV
M/N	-0.235***	-0.122**	-0.370***	0.053
	(0.000)	(0.033)	(0.000)	(0.805)
male		-0.079***	-0.135***	-0.079***
		(0.000)	(0.000)	(0.000)
urban		-0.049***	-0.049***	-0.054***
		(0.000)	(0.000)	(0.000)
married		0.105***	0.103***	0.104***
		(0.000)	(0.000)	(0.000)
exp		0.020***	0.020***	0.021***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.002)	(0.003)	(0.002)
M/N*male			0.553***	
			(0.000)	
M/N*urban			-0.109	
			(0.221)	
Constant	-0.159**	-0.212***	-0.181***	-0.231***
	(0.018)	(0.003)	(0.002)	(0.001)
R-squared	0.297	0.315	0.317	0.314

Table 4.C: Effect of emigration on self-employment in Honduras

Dep. var: average self-employment per skill cell (ijt)

	(1)	(2)	(3)	(4)
industry cell groups				IV
M/N	-0.497***	-0.349***	-0.687***	-0.436**
	(0.000)	(0.000)	(0.000)	(0.030)
male		-0.099***	-0.166***	-0.099***
		(0.000)	(0.000)	(0.000)
urban		-0.076***	-0.068***	-0.073***
		(0.000)	(0.000)	(0.000)
married		0.108***	0.105***	0.108***
		(0.000)	(0.000)	(0.000)
exp		0.020***	0.020***	0.020***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.004)	(0.002)	(0.004)
M/N*male			0.674***	
			(0.000)	
M/N*urban			-0.083	
			(0.331)	
Constant	0.287***	0.315***	0.376***	0.331***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.261	0.285	0.288	0.285

Table 4.D: Effect of emigration on self-employment in Honduras
Dep. var: average self-employment per skill cell (ijt)

	(1)	(2)	(3)	(4)
department cell groups				IV
M/N	-0.842***	-0.837***	-1.184***	-1.036***
	(0.000)	(0.000)	(0.000)	(0.000)
male		-0.096***	-0.166***	-0.095***
		(0.000)	(0.000)	(0.000)
urban		-0.069***	-0.066***	-0.069***
		(0.000)	(0.000)	(0.000)
married		0.111***	0.108***	0.111***
		(0.000)	(0.000)	(0.000)
exp		0.019***	0.018***	0.019***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000**	-0.000***
		(0.007)	(0.018)	(0.003)
primary		-0.053***	-0.051**	-0.057***
		(0.006)	(0.011)	(0.003)
secondary		-0.059**	-0.066***	-0.041
		(0.010)	(0.005)	(0.114)
post-secondary		0.001	-0.013	0.038
		(0.983)	(0.793)	(0.383)
M/N*male			0.727***	
			(0.000)	
M/N*urban			-0.053	
			(0.584)	
Constant	0.269***	0.374***	0.433***	0.373***
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.189	0.240	0.244	0.240

Table 5.A: Effect of emigration on underemployment in Honduras

Dep. var: average underemployment per skill cell (ijt)

education cell groups	(1)	(2)	(3)	(4) IV
M/N	0.242***	0.185***	0.388***	0.292***
	(0.000)	(0.003)	(0.000)	(0.000)
male		0.043***	0.059***	0.043***
		(0.000)	(0.000)	(0.000)
urban		0.022***	0.034***	0.022***
		(0.000)	(0.000)	(0.000)
married		-0.020***	-0.020***	-0.020***
		(0.000)	(0.000)	(0.000)
exp		0.010***	0.010***	0.009***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
primary		0.017**	0.018**	0.019**
		(0.022)	(0.017)	(0.010)
secondary		0.017	0.016	0.007
		(0.110)	(0.157)	(0.579)
post-secondary		-0.028	-0.027	-0.048**
		(0.149)	(0.155)	(0.028)
M/N*male			-0.150**	
			(0.011)	
M/N*urban			-0.136*	
			(0.055)	
Constant	0.113***	0.037***	0.019	0.037***
	(0.000)	(0.005)	(0.186)	(0.005)
R-squared	0.042	0.046	0.047	0.046

Notes: Robust pval in parentheses, clustered by ijt cell. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Regressions are weighed by individual frequency weights. Occupational, industrial and
departmental controls not shown. Interaction between education/experience with year
also not shown. Male, urban and married are dummy variables = 1. The reference group
for education is 'no formal education'.

Table 5.B: Effect of emigration on underemployment in Honduras

Dep. var: average underemployment per skill cell (ijt)

	(1)	(2)	(3)	(4)
occupation cell groups				IV
M/N	-0.017	-0.057*	0.071	-0.216*
	(0.620)	(0.096)	(0.228)	(0.070)
male		0.032***	0.044***	0.032***
		(0.000)	(0.000)	(0.000)
urban		0.024***	0.024***	0.029***
		(0.000)	(0.000)	(0.000)
married		-0.020***	-0.020***	-0.020***
		(0.000)	(0.000)	(0.000)
exp		0.011***	0.011***	0.010***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
M/N*male			-0.108*	
			(0.056)	
M/N*urban			-0.082	
			(0.234)	
Constant	0.161***	0.042**	0.030*	0.060**
	(0.000)	(0.045)	(0.076)	(0.014)
R-squared	0.048	0.052	0.052	0.052

Table 5.C: Effect of emigration on underemployment in Honduras

Dep. var: average underemployment per skill cell (ijt)

	(1)	(2)	(3)	(4)
industry cell groups				IV
M/N	-0.056*	-0.068**	0.096	-0.220*
	(0.098)	(0.034)	(0.106)	(0.093)
male		0.042***	0.060***	0.043***
		(0.000)	(0.000)	(0.000)
urban		0.021***	0.028***	0.027***
		(0.000)	(0.002)	(0.000)
married		-0.020***	-0.020***	-0.020***
		(0.000)	(0.000)	(0.000)
exp		0.011***	0.011***	0.010***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
M/N*male			-0.165***	
			(0.003)	
M/N*urban			-0.085	
			(0.226)	
Constant	0.100***	0.014	-0.004	0.023
	(0.000)	(0.402)	(0.767)	(0.224)
R-squared	0.046	0.050	0.050	0.049

Table 5.D: Effect of emigration on underemployment in Honduras

Dep. var: average underemployment per skill cell (ijt)

	(1)	(2)	(3)	(4)
department cell groups				IV
M/N	0.242**	0.185*	0.388***	0.292*
	(0.024)	(0.078)	(0.000)	(0.063)
male		0.043***	0.059***	0.043***
		(0.000)	(0.000)	(0.000)
urban		0.022***	0.034***	0.022***
		(0.000)	(0.000)	(0.000)
married		-0.020***	-0.020***	-0.020***
		(0.000)	(0.000)	(0.000)
exp		0.010***	0.010***	0.009***
		(0.000)	(0.000)	(0.000)
exp squared (*10 000)		-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)
primary		0.017	0.018**	0.019
		(0.152)	(0.017)	(0.115)
secondary		0.017	0.016	0.007
		(0.350)	(0.157)	(0.755)
post-secondary		-0.028	-0.027	-0.048
		(0.320)	(0.155)	(0.175)
M/N*male			-0.150**	
			(0.011)	
M/N*urban			-0.136*	
			(0.055)	
Constant	0.113***	0.037**	0.019	0.037**
	(0.000)	(0.028)	(0.186)	(0.027)
R-squared	0.042	0.046	0.047	0.046

Table 6: Effect of emigration on underemployment in Honduras

logged wage

model	(1)	(2)	(3)	(4)	robustness test
M/N	1.632***	0.879***	1.579***	2.761***	all arrival ages
	(0.000)	(0.000)	(0.000)	(0.000)	
M/N	0.671***	0.354***	0.744***	1.970***	1-year experience group
	(0.000)	(0.001)	(0.001)	(0.000)	
M/N	1.119***	0.848***	1.358***	1.542***	men only
	(0.000)	(0.000)	(0.000)	(0.000)	
M/N	1.313***	0.917***	0.795***	1.794***	urban only
	(0.000)	(0.000)	(0.000)	(0.000)	
M/N	2.111***	0.808*	0.787*	1.708**	only municipalities with
	(0.000)	(0.083)	(0.082)	(0.019)	low emigration rates
M/N				1.502***	hurricane path (IV)
				(0.000)	