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Migration and Remittances in the
Republic of Haiti

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**Labor Supply Response to International Migration and Remittances in the Republic of Haiti[†]**

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*Abstract*

The Republic of Haiti is the prime international remittances recipient country in the Latin American and Caribbean (LAC) region relative to its gross domestic product (GDP). The downside of this observation may be that this country is also the first exporter of skilled workers in the world by population size. The present research uses a zero-altered negative binomial (with logit inflation) to model households' international migration decision process, and endogenous regressors' Amemiya Generalized Least Squares method (instrumental variable Tobit, IV-Tobit) to account for selectivity and endogeneity issues in assessing the impact of remittances on labor market outcomes. Results are in line with what has been found so far in this literature in terms of a decline of labor supply in the presence of remittances. However, the impact of international remittances does not seem to be important in determining recipient households' labor participation behavior, particularly for women.

Keywords: Republic of Haiti, international migration, remittances, labor supply.
JEL classification: C39, F22, F24, J22.

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**Introduction**

International migration of workers is a constant in the relatively short history of Haiti as a free Republic. Important early waves of emigration in the Republic of Haiti can be dated back to the early 20th century with Haitians traveling to Cuba to work in the Cuban *Zafra*.[1] It is estimated that between 1910 and 1930 some two hundred thousands Haitians, pushed by economic hardship, migrated to Cuba to work on cane plantations.[2] The flows of Haitians to Cuba went unabated until the Batista regime, under the amendment of the Cuban immigration law in 1939, put a ban on black workers and started with massive deportations of Haitians.[3] Haitian migrants to the Dominican Republic (DR) also started during the same period and for the same reason and purpose. Although actual numbers are not readily available in that case, several authors concur on that the Haiti-DR migration corridor was far more important than that of Haiti-Cuba (see for instance Castor, 1971:88; Lundahl, 1979:625). The flow of Haitian workers to the DR was to be put in check in 1937 after the '*perejil*' massacre under the Trujillo regime.[4] However incredible it may seem, migration of Haitian workers to the DR was soon resumed in 1939 (Perusek, 1984). To date, it is estimated that about one million Haitians live in the DR (Ratha and Shaw, 2007).

Ironically, while thousands of Haitians were leaving for Cuba and the DR at the turn of the 20th century facing unthinkable vicissitudes through their journey, the country saw hundreds of catholic Arabs (mainly Lebanese, Syrians, and later Palestinians) strand on its shores in search of better fortune.

The second wave of important Haitian emigration is to be found at the beginning of the Duvalier era in the early 1960s. In contrast to the first two cases discussed earlier, migration during that era was motivated primarily by political reasons. Most of those migrants came from the middle and upper-middle class and were in general very well-

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[1] This term refers to the sugar cane harvest period in Cuba.
[2] See Proudfoot (1950).
[3] Ibid, p.50.
[4] *Perejil*, which in Spanish means parsley, was the word that would determine the fate of a black person of dubious nationality to be slaughtered or not by Dominican officials. How well this word was pronounced was the determining factor. Trujillo's movement to get rid of Haitians in the DR was coined "*Operación Perejil* (or under its popular name, *El Corte)*" – The Parsley Massacre.

educated.[5] The regular destinations were the Canada, United States, France, and the newly independent African nations.

Emigration of Haitians persists to date and it has become even more widespread. The map of destination countries has not budged much, except in the case of Cuba and the African countries. The corollary of these migration outflows is that Haiti is the fourth (82%) tertiary education migrant sender in the world after Surinam (90%), Guyana (86%), and Jamaica (83%) (Docquier and Marfouk, 2006). By population size,[6] the country would be the world first exporter of skilled migrants (Ratha and Shaw, 2007).

The often upshot of emigration, particularly when it comes to developing countries, is remittances. Remittance flows to developing countries reached USD 251 billion in 2007, up almost 14 per cent from previous year's USD 221 billion.[7] This source of external resources for developing countries is above official development assistance (ODA) and second after foreign direct investment (FDI), which reached USD 379 billion in 2006. In the case of Haiti, after reaching a record high of 52.4 per cent relative to GDP in 2004, remittances inflows amounted to USD 1,184 billion in 2007. At the time that remittances represent a source of livelihoods to many Haitian households who live on the brink, this non labor income flow has also infused the country's economy with much needed capital. As can be depicted in figure 1 below, remittances now outpace FDI and ODA combined and seems to not be driven, as is often the case for the last one, by the flurries and flusters of politics.

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[5] See for instance Jadotte (1977) for an early research on Haitian immigrants to Quebec-Canada.

[6] That is for countries with population above 5 million inhabitants.
[7] See the World Bank's "Migration and Remittances Factbook 2008", by Ratha and Xu.

**Fig 1. Haiti international remittances inflows, ODA, and FDI: years 1971-2005.**[8]
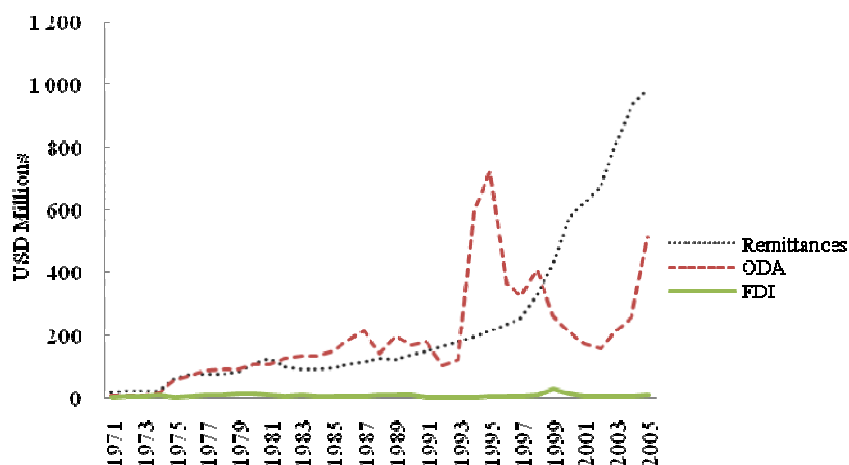


These figures make manifest the weight that carries this income source for this Caribbean nation. The relevance of international migration and remittances to Haiti's economy notwithstanding, researches in the field are scanty and largely descriptive. Not enough attention has been paid to the evaluation of the economic implications of these two factors. Data from a recent survey by the Inter-American Development Bank (IADB, 2007) reveal that 45 per cent of Haitian households have a family member living abroad. Of those, 31 per cent receive an average of USD 150 with almost 80 per cent of this value being spent on consumption. Orozco (2006) considers remittances as a vehicle for social inclusion in Haiti as they allow participation in the market process through the higher demand capacity that remittances bestow upon the deprived recipient households.

Lamaute-Brisson (2002:175-176) sustains that, whenever remittance resources are dedicated to financing economic activities they are generally allotted to informal activities in the service sector with low level of productivity. Moreover, Lamaute-Brisson (2003) maintains that, although remittances allow some households escape poverty, they do not necessarily reduce inequality in Haiti as remittances accrue more to the top deciles of the income distribution. This contention is in line with Jadotte (2006).

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[8] Values from 1990 to 1997 for remittances are missing and are extrapolated assuming that remittances increased during this period at the average growth rate of 1971-1989. All sources are from the World Development Indicators (the World Bank), except remittances data from the IMF's Balance of Payments.

**Fig 2. Kernel density estimates**



Log Income per Equivalent Adult (excluding remittances)

**Table 1. Kolmogorov-Smirnov (K-S) test rejecting the hypothesis of equal distribution functions (figure 2 above).**

| Smaller group | D | P-value | Corrected |
|---|---|---|---|
| Non migrant: | 0.0957 | 0.000 | |
| Migrant: | -0.0007 | 0.999 | |
| Combined K-S: | 0.0957 | 0.000 | 0.000 |

*Source:* Author's own calculations based on the ECVH-2001

**Fig 3. Kernel density estimates**



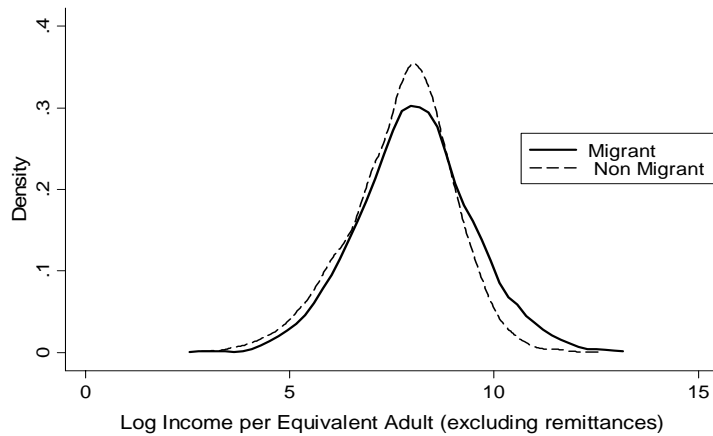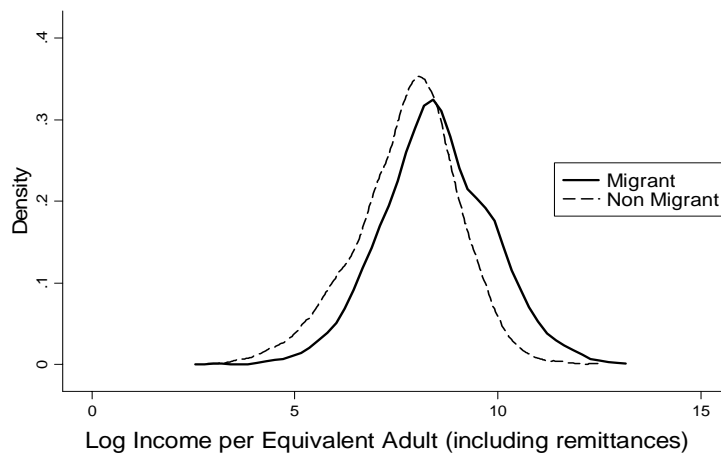Log Income per Equivalent Adult (including remittances)

**Table 2. Kolmogorov-Smirnov (K-S) test rejecting the hypothesis of equal distribution functions (figure 3 above).**

| Smaller group | D | P-value | Corrected |
|---|---|---|---|
| Non migrant: | 0.2041 | 0.000 | |
| Migrant: | -0.0005 | 0.999 | |
| Combined K-S: | 0.2041 | 0.000 | 0.000 |

*Source:* Author's own calculations based on the ECVH-2001

Figures 2 and 3 above, with their associated Kolmogorov-Smirnov (K-S) tests, corroborate this fact and are also in line with Jadotte (2006). We estimate first kernel densities for migrant (i.e. household with relatives abroad) and non migrant households with the counterfactual of *ex ante* remittance per equivalent adult income;[9] then the same assessment is done including remittance income. The results show migrant households to fare better than their non-migrant counterparts, and the difference between the two groups widens after remittance income is accounted for. The robustness of this finding is ascertained with the K-S test.

Remittances can have far reaching impacts on recipient households and such impacts can extend beyond those that directly receive those transfers. There exists an extensive body of literature presenting evidence on the pertinence of international migration and remittances and their micro and macroeconomic bearings. Although it has traditionally been established in the literature that developing countries' outmigration, particularly South-North,[10] carries along the depletion of their human capital stock through the so-called brain drain effect,[11] in some quarters emigration has been seen to have a silver lining as it is often followed by remittances, which in many cases can attenuate some of the possible negative impacts of migration outflows. Among the possible positive effects of remittances on the sending countries one could invoke, along with the claim of declining poverty rates in remittances recipient households,[12] the fact that remittances allow liquidity-constrained households to free up resources that can be invested in, say, health and education. Many studies have attempted to determine the existence of a positive correlation between level of schooling of children in migrant households and remittances (Hanson and Wodruff (2003), Cox-Edwards and Ureta (2003), López-Córdova (2005), Acosta (2006),[13] McKenzie and Rapoport (2006)). Using anthropometric measures, height-for-age and weight-for-age Z-scores as proxies for

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[9] The equivalence scale used is the one proposed by Jadotte (2006).

[10] South-South migration flows are also very important. For instance, Ratha and Shaw (2007) estimated that some 74 million of all migrants live in developing countries. This figure represent about 47 per cent of all migrants, but the authors conclude that their remittance impact is negligible, accounting to only 9 per cent of the bulk of remittances received by developing countries.

[11] A growing body of the literature (the New Brain Drain) has contemplated the possibility of a brain gain (or beneficial brain drain) on account of migration. Seminal papers in this literature include Mountford (1997), Stark, Helmenstein, and Prskawetz (1997, 1998), Vidal (1998), Beine, Docquier, and Rapoport (2001, 2003), Stark and Wang (2002), Stark (2004), Stark et al. (2004).

[12] Results tend to be conflicting in terms of the impact of remittances on poverty and inequality when remittances are endogenized. Using a no migration counterfactual, the poverty or inequality reducing effects of remittances tend to decline, disappear, or inverted when these are treated not as an exogenous increase in household income, but rather a substitute for one of the household´s income sources. See for instance Acosta et al. (2007) and the literature therein for evidence on Latin American and Caribbean countries.

[13] Acosta (2006) does not find any significant effect of remittances on schooling after controlling for wealth.

health status, Acosta, Fajnzylber and Lopez (2007), and Mansuri (2007) revealed that children in remittances recipient households have higher index in both measures in Guatemala and Nicaragua, and Rural Pakistan, respectively. Infant mortality also appears to be lower in such households. Similar results were found for Mexico (López-Córdova, 2005), and Uganda (Ssengonzi, De Jong, and Stokes, 2002). Additionally, remittances can allow small entrepreneurs in developing countries, where generally access to credit markets is restricted to a few, engage in riskier and more profitable activities.[14]

On the other hand, international migration may also have negative impacts on children educational attainment in migrant households due to migrated parents who could have exerted a positive influence on a child's assiduity at school had they been present. On the macroeconomic sphere, large inflows of foreign exchange can have serious consequences such as perverse effects on tradable commodities and on relative competitiveness due to the appreciation of the receiving country's real exchange rate.[15] This may be particularly true in the case of small economies where the remittances inflows are large compared to their GDP. That sort of Dutch Disease effect that may arise from the appreciation of the real exchange rate can eventually result in a balance of payment crisis since the currency appreciation will most likely constringe the country's ability to export.[16]

Furthermore, it is often echoed that remittances lower the shadow value of market wage (particularly for women) in recipient households. Concurrently, as is established in the labor economics literature, the supply of labor declines with an individual´s reservation wage.[17] So, if remittances drive up the reservation wage of individuals in remittances recipient households, the expected impact on labor force participation behavior is negative. The regular conjecture is that in a developing country context this negative effect will be strong among women, particularly in households with high dependency ratios. The rationale for such a conjecture lays in the premise of the low shadow value of market wage in the presence of remittances, which is a non labor source of income. Thus, remittances may allow individuals to buy time out of the labor market in favor of either home production or simply

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[14] See Yang (2004) for evidence from the Philippines, and Acosta (2007) for evidence from El Salvador.

[15] See among others Amuedo-Dorantes and Pozo (2004) for Latin America and the Caribbean, and Gupta, Pattillo and Wagh (2007) for evidence for Sub-Saharan African countries.

[16] Some would contend, as is generally presented in textbooks, that labor migration is a substitute for trade and therefore consideration of the former's negative impact on the latter, through remittances, is devoid of sense. We will not delve into this discussion here as this is beyond the scope of this research.

[17] See Killingworth (1983).

to increase the consumption of leisure. On the other hand, as mentioned earlier, if remittances relax credit constraints allowing households to engage in entrepreneurial and commercial activities, the impact on labor may be positive. Additionally, migration in itself will exert upward pressure on sending countries' wage rate, with potential positive effects on labor supply. So, the ultimate effect of international remittances on labor market outcomes is therefore ambiguous and becomes an empirical matter.

Finally, some authors have now come to question the much heralded benefactions of remittances claiming a certain idleness and dependency culture that may be set in motion. Others point the fact that the expected development impact of remittance income through sustained growth has not been shown. Therefore, they perceive remittances as a new development mantra and a craze that is soon to wane (for further insight on these views see, among others, Kritz, Keely and Tomasi, 1981; Duran and Massey, 1992; Kapur, 2003; de Haas, 2005; Bussolo and Medvedev, 2007; Grigorian and Melkonyan, 2008).

Indeed, much is expected from remittance income flows and the form in which they arrive makes one think that their sheer existence may be a sign of great dysfunctions and lack of opportunities to many in the country these flows reach. If it is true that remittances can be leveraged so that receiving countries can better take advantage of that stable income source, remittances can neither be considered a panacea nor a shortcut solution to the development problems that many countries face.

In this paper we investigate the effects of international migration and remittances on labor market outcomes providing evidence on recipient households' behavior for the republic of Haiti. The present research thus contributes to the literature by providing some evidence of the impact of remittances on Haitian household behavior through labor market outcomes. The remaining of this paper is structured as follows. In Section 2 we make a brief survey of the pertinent literature. Section 3 presents the data source, while in Section 4 we describe the methodology used for the analysis and discuss the econometric issues pertaining to the estimation procedure. Section 5 presents the results and discussion and in Section 6 we conclude and point some future lines of research.

1. **Brief review of previous empirical literature**

Following the pioneering works of Stark and Bloom (1985), and Stark and Levhari (1982), which gave rise to the so called "New Economics of Labor Migration–NELM, a load full of researchers have attempted to unravel the economic implications of international migration on developing countries. Amuedo-Dorantes and Pozo (2006a) revealed that remittances do affect the labor response of both female and male in Mexico. The authors calculate that a 16 per cent increase in monthly per capita remittance income is associated with a 15 per cent decline of the amount of monthly hours worked in the formal sector for both urban and rural areas. In order words, for each additional 100 Mexican pesos of remittance income, 32 hours less of work are employed in the formal sector. On the contrary, they found that a similar expansion of remittance income causes a rise in informal sector employment of similar magnitude of the above decline in the formal sector. Their results clearly suggest a reallocation of labor induced by remittance income among males. As regards female, they found that remittance accretion triggers the decay of hours worked for all types of employment. This insinuates that for remittance income there is an income effect that dominates the substitution effect among Mexican females. Acosta's (2006) results for El Salvador go along the same line, where the author found that male labor supply remains unaffected while female labor declines as remittances rise. Kim (2006) and Bussolo and Medvedev (2008) reach the same conclusion for Jamaica in terms of a general decline of labor outcomes among remittances recipient households.

Funkhouser (1992) found for Nicaragua that remittances heave entrepreneurial activities (self-employment) for men at the time that it reduces women labor supply. Woodruff and Zenteno's (2004) results for Mexico also seem to indicate that remittances help relax wealth and capital constraints that inhibit the development of small enterprises in this country by increasing small scale self-employment. Amuedo-Dorantes and Pozo (2006b) concluded the contrary for the Dominican Republic. The authors found that remittances are associated with a reduction in the likelihood of entrepreneurial activities among recipient households. Hanson (2007) revealed that women from high migration Mexican states are less likely to work outside their home compared to men.

That same negative association of labor market participation and hours worked with remittances is unveiled by Rodriguez and Tiongson (2001) for the Philippines. However, the authors emphasize that men's negative labor response to remittances is more acute than

women's. Brown and Leeves (2007) try to unravel the impact of remittance inflows on the different income sources of recipient households in Fiji and Tonga. By extrapolation, their results may be interpreted in the same sense if we construe more income from a given source as more work (i.e. assuming no change in individuals' productivity level). The authors observe on average a decline of subsistence agriculture and wage income while farm income and own business income boost on account of remittances. If our earlier construction and assumption are plausible, this would be suggesting a reallocation of labor from the former two to the latter two kinds of activities, which may be implying a remittances-induced realignment of these two small islands' economic structure.

To our knowledge, no previous study has addressed the international migration and remittances issue in Haiti through these lenses. The objective of this paper is to further our understating on that matter and to hopefully provide some breech to the lacunae in this research field for Haiti.

## 2. The data source

We use the ECVH-2001 (in French, Haitian Living Conditions Survey-HLCS), which contains data on 7,186 households. The survey includes information on both internal and international migration but our focus here is on the latter. The questions pertaining to migration and remittances and that are of interest for the analysis are the number of relatives a household has abroad and whether it is a remittances recipient. Although information is collected for returned migrants, unfortunately the survey does not provide information on the schooling of those who left and have not returned.

The data disclose that about one third of Haitian households have at least one member living in a foreign country while approximately two thirds of them receive remittances, which make up more than 40 per cent of their income.[18] On average more than 25 per cent of Haitian households receive remittances either from a relative or a friend abroad, representing slightly more than 17 per cent of total income. This figure is above the 15.32 per cent of GDP reported by the IMF balance of payment statistics for the same period. The difference may

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[18] In fact, some households (2 per cent) only have remittances as their sole income source.

be attributable to our definition of remittances, as we included cash, in-kind transfers, and gifts from relatives and friends abroad. In that sense we believe there is no risk of important downward biases in the coefficients capturing the impact of remittances. However, there is no over cautiousness in bearing in mind that informal channels can be used to transfer a non negligible amount of remittances and that households members are more likely to remember whether they have received remittances or not than the exact amount of transfer received from family or friends abroad. Average remittances amount to HTG 4,831 with a Gini index among recipient households of 0.72.[19]

## 3. Methodology and econometric issues

A serious concern in estimating the impact of international migration on labor market outcomes through remittances is the potential non randomness of the treatment group, i.e. the migrants. As the kernel density estimates and the K-S tests in Section 1 above suggested, migrant and non-migrant households seem to be systematically different. If this is the case, the possibility of self-selection in migration exists and therefore the sample of migrants and remittance senders are not random. Tables A2 in annex provide further evidence on the systematic difference between migrant and non-migrant households in two key observables, namely education and wealth.

In line with the NELM hypothesis advanced by Stark and Bloom (1985), we can construe remittances as jointly determined with migration, whereby the former is generally a pre-condition for the latter. In such a case, remittances will not be the result of altruistic considerations, but rather inter-temporal inter-vivos transfers motivated by contractual arrangements between migrants and relatives left behind. So, the best approach to modeling migration is to tackle it as the outcome of a joint utility maximization by the prospective migrant and other household members (Hoddinott, 1994). Furthermore, migration and remittances may be simultaneously determined with other income sources that will have an impact on labor supply behavior of recipient households. That simultaneous determination of migration and remittances could lead to synchronic correlation across the equation for remittances and the focus equation, namely labor supply. This sets forth a serious

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[19] The average exchange rate during the survey data collection period (May-August 2001) is HTG 24.03/USD1; HTG = Haitian gourde, USD = US dollar. Source: *Banque de la République d´Haïti,* www.brh.net.

endogeneity problem that is to be addressed properly.

To address the selectivity bias problem, a migration process model is estimated in a first stage and the predicted number of migrants per household is used as an instrument in the remittances equation.[20] To take advantage of the structure of the outcome variable (since a non negligible percentage of households have more than one migrant), the migration equation is estimated via a count model.

Traditionally, count regression models have appealed to Poisson, which assumes equidispersion of the first and second moments (i.e. the conditional mean and the conditional variance are equal). A Poisson process for the migration (M) equation could be represented as in Equation [1] below:

$$[1] \qquad \Pr\left(M_i = m_i\right) = \frac{e^{-\lambda} \lambda_i^m}{m_i!}, m = 0, 1, 2...$$

We carried out a first test of mean and variance comparison and found some evidence of overdipersion, which casted doubt on a true Poisson data generating process of the outcome variable. In fact, many households have more than one migrant. The number of households participating in migration amounts to 2124, sending between 1 and 14 close relatives abroad. This represents about one third migration participation rate. Moreover, of those households participating in migration approximately 48 per cent of them send more than one migrant and some 24 per cent have more than 2 relatives living abroad. Accordingly, unobserved heterogeneity was introduced in the above equation to account for the fact that certain households have higher counts than others and proceed with the estimation via a Gamma-Poisson mixture model, giving rise to a negative binomial model (which we assume is of type 1). The preference of the negative binomial model over the Poisson was further ascertained with a likelihood ratio test. Thus, under the negative binomial distribution we can posit the probability of observing a number *m* of migrants in household *i* in the following manner:

$$[2] \qquad \Pr\left(M_i = m_i \mid \mu\right) = \frac{e^{-\lambda \exp(\mu)} \lambda_i^m}{m_i!}, m = 0, 1, 2...$$

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[20] See Taylor, Rozelle, and de Brauw (2003) for a similar for an early application of this procedure.

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where the conditional mean and conditional variance are respectively given by:

[3]     $E(M) = \lambda_i$

[4]     $Var(M) = E(M)\big[1 + \alpha E(M)\big]$

with $\ln \lambda_i = X'\beta$ and $X$ a vector of covariates capturing individual, household, and regional characteristics. As can be deducted from Equation [4], when the dispersion parameter $\alpha$ equals zero the model boils down to a standard Poisson. While a considerable percentage of households that participate in migration have more than one migrant relative abroad, many households do not send migrant. This results in a large amount of zeros in the outcome variable. So, to account for the excess zero counts we estimate a zero-altered negative binomial model with logit inflation to contrast it with a standard negative binomial model. A Vuong test favored the zero-inflated negative binomial (ZINB) model over the standard one.[21]

A key issue in estimating Equation [2] is the identification of the migration process. As has been established in several works in the literature, networks development reduces settlement costs (i.e. the expenses associated with migration are less onerous) and therefore makes financing the travel abroad less constraining.[22] Moreover, contact with individuals with a certain experience abroad provides useful information to potential migrants, resulting in lowering the risk and uncertainty that migration involves. Both regional migration rates and the presence of returned migrants in a household are used as regional and household levels network variables for identification of the migration equation.[23] The regional migration rate is derived by finding the ratio of the total number of migrants to the population of a particular region, while for household network we take into consideration individuals that have spent more than three months abroad and have returned. To assure the variability of the former (i.e. the regional migration rate) across households, we interact it with household size. Finally, the validity of the model´s specification to predict the probability of migration was

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[21] See table A3 in annex for the result of the likelihood ratio test and the Vuong test favoring the negative binomial model over Poisson and the ZINB over the standard Negbin. For further discussion on count data models see Greene (1994) and Cameron and Trivedi (1998).

[22] See for instance Massey and Lindstrom (1994); Perdersen, Pytlikova, and Smith (2004).

[23] Correlation between these two network variables are low (0.1167), avoiding therefore potential risk of collinearity between them.

also assessed using Pregibon's (1980) goodness of link test.

As regards the remittance equation the following functional form is adopted:

$$[5] \qquad R_i = \delta_0 + \delta_1 \widehat{M}_i + \delta Z_i^{'} + \varepsilon_i$$

where $R$ is the monthly adult equivalent remittances received, $\widehat{M}$ is the predicted number of migrants from Equation [2] above, $Z'$ is vector of individual and household characteristics, and $\varepsilon$ is an error term. The labor market response of remittance income recipient households, which is the focus of the analysis, is given as follows:

$$[6] \qquad L_i = \phi_0 + \phi_1 \widehat{M}_i + \phi_2 R_i + \phi_3 \Omega_i^{'} + \eta_i$$

where $L$ is the number of hours worked, $\Omega'$ is a vector of individual and household characteristics, and $\eta$ is the error term. The estimation of Equation [6] raises another issue, in that the dependent variable has both a discrete and continuous nature and can also be zero-inflated since many individuals will report zero hours of work. So, to account for the structure of the dependent variable, a Tobit model is estimated to assess the behavior of remittance recipient households in the labor market.[24] As stated earlier, remittances can be endogenously determined and, as is rightly pointed by Amuedo-Dorantes and Pozo (2006a), a reverse causality may arise as the number of hours worked (or simply participation in the labor market) may influence the decision of remittance senders. To address this endogeneity issue, the regional migration rate variable is interacted with the percentage of non-migrant household members with secondary and tertiary education and used, along with the predicted number of migrants, as instruments for remittances. Exogeneity condition compliance of these instruments to the labor equation is assessed by regressing per adult equivalent remittances on these three instruments. They yield a joint significance F-statistics = 183 (Pr > F = 0.000) for men, while their correlation with hours worked are, respectively, -0.008, 0.045, 0.047. For women these values are, in the same order, 249, 0.000, 0.026, and 0.003.

As understated previously, the costs associated with migration may inhibit certain

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[24] In the case of a Probit estimation $L$ would be a dichotomous variable taking the value 1 if the household participates in the labor market and 0 otherwise. So, an IV-Probit model is later estimated to assess the robustness of the results.

households to undertake such an enterprise, particularly in a context of imperfect credit markets which permeate developing countries such as Haiti. Accordingly, household wealth and its square are considered to control for the fact that wealthier households are less liquidity-constrained to finance migration costs and therefore migration probabilities will increase with wealth. However, after a certain threshold wealthy households may face higher opportunity costs of migration and therefore will be less likely to migrate.

Cognizant of the potential endogeneity problem with this variable, since wealth may be positively correlated with contemporaneous remittance flows, we approximate wealth using households' durable goods and amenities (e.g. refrigerator, vehicle, running water and access to electrical network, quality of wall, floor and roof of the house, etc.) that can more likely represent a household long term economic status. The approach adopted to construct the wealth index is the principal components analysis (PCA) and we followed closely the procedure developed by Filmer and Prichett (2001). The value of the wealth index, $W$, for household $i$, under the PCA approach can be represented as follows:

$$[7] \qquad W_i = \sum_j \omega_j \frac{\left[ A_{ij} - \overline{A}_j \right]}{\sqrt{\sigma_j^2}},$$

where $A_{ij}$ is a binary indicator expressing whether household $i$ possesses asset $j$, $\overline{A}_j$ and $\sigma_j^2$ are, respectively, the sample mean over all assets and the sample variance of asset $j$ across households; finally, $\omega_j$ is the weight assigned to asset $j$ and is based on the eigenvalues of the first components. The first and second moment of the index are expected to satisfy the condition, $W \sim N(0,1)$. The validity of the assets used in the PCA is ascertained through the KMO (Kaiser-Meyer-Olkin) index of sampling adequacy. The PCA yields a KMO measure that is equal to 0.9131 (the maximum is unity), guaranteeing in that sense a high degree of acceptance of the thirty components used in building the wealth index.[25]

Now, a robust appraisal of a household long term economic status based on this index would require that information on wealth before migration takes place is used since the self

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[25] Lubotsky and Wittenberg (2005) contend that the PCA approach may bewilder the lines between wealth differences and taste differences when the full set of proxy variables are not used. Using the full set of proxies did not improve much our measure of sampling adequacy.

selectiveness of migration and the remittances that ensue could lead one to envisage the possibility of remittance income being used to purchase such assets (Acosta, 2006). Table A1 in annex compares household income, wealth (using the proxy above), migration participation rate, and remittances receipts as a ratio of income per adult equivalent. Indeed, the wealth index increases monotonically with income quintiles but as can be observed the share of remittances as a percentage income follows an almost opposite pattern, despite the fact that low quintile households are less likely to participate in migration and receive remittances compared to their high quintile counterparts.[26]

## 4. Results and discussion

Table A3 in annex presents the results of the ZINB model that includes 6,070 observations on working-age population between 15 and 64 years old inclusively. Different specifications were explored and our criterion for selecting this model has been based mainly on the lowest values of Akaike and Bayes information. As mentioned in Section 4 above, the data support the negative binomial over a Poisson model with a likelihood ratio test for $\ln \alpha = -\infty$ that is equal to 438 and significant at the 1% level. Furthermore, a Vuong test ($z = 3.82$, Pr $> \chi^2 = 0.000$) established preference of a zero-inflated negative binomial over a standard negative binomial model. As to the covariates, except for age all the variables kept in the chosen model have the expected signs and are significant at either 5% or 1% level.[27] The level of schooling does not seem to have an important impact on the migration probability. An additional year of education is associated with a 1 per cent higher probability of migration while a one unit increase in the wealth level of a family increases this probability by almost 11 per cent. For this last variable the inflexion point would take place at a wealth level approximately equal to 14. Interestingly, with the exception of three observations found in the second richest quintile, all households beyond this threshold belong to the first quintile of the distribution. Both network variables have as the expected positive impact on the probability of migration and are significant. The strongest effect however is found in the presence of a returned migrant in the household, which is consistent with the theoretical

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[26] For similar application to El Salvador see Acosta (2006).
[27] We expected that age and age squared follow a U-shaped pattern, whereby migration probability would increase with age but too young and very old adults would be less likely to migrate, except for (primarily) family reunification motive.

prediction in the literature. Households in the semi-urban and rural areas exhibit a higher emigration probability compared to the metropolitan area of Port-au-Prince (MAPaP). Livestock and landholding, which we entered as substitute for perfect credit markets, show positive effect on migration probability. As can be observed from the table, the impact of livestock is almost seven-folds compared to land. This may be depicting the fact that the former is a more marketable, liquid, and fungible asset than the latter. Consistent with the previous observation, households dedicated to agricultural activities and fisheries have a lower emigration probability. The same applies to nuclear family.

The results for the instrumental variable Tobit model are displayed in Table 3 below, with the number of monthly hours worked censored below and above at 53 and 240 hours, respectively. Separate estimations are implemented for working-age men and women. The coefficients for both sex on remittances show a negative sign and are significant at the 1% and 5% level, respectively. That negative sign though is not to be construed as if remittances exerted a large influence on labor market outcomes in Haiti. In fact, the negative influence is on average negligible and this is quite understandable given the high level of unemployment that characterizes Haiti´s economy, where the formal unemployment rate is set at 60-70%.

**Table 3. IV-Tobit model of labor supply (hours worked) by headship (working age 15-64)**

| | Men | z-Stat | Women | z-Stat |
|---|---|---|---|---|
| Monthly equivalent remittances | -0.068*** | -4.750 | -0.052** | -2.640 |
| Years of schooling | 3.141*** | 4.430 | 1.521 | 1.570 |
| Wealth index | 9.205*** | 4.470 | 11.679** | 2.600 |
| Experience | -0.568 | -0.490 | 6.319*** | 5.800 |
| Experience squared | 0.019 | 1.130 | -0.085*** | -5.270 |
| Married (1 if married, or lives in common-law union = *Plase* in Haitian Creole) | -0.879 | -0.150 | -6.294 | -0.900 |
| Presence of returned migrant | 21.053* | 1.870 | 4.520 | 0.320 |
| Home (1 if property is owned *de jure)* | 8.571 | 1.400 | 17.197** | 2.380 |
| Household size | 2.639 | 1.500 | 3.222** | 2.170 |
| Hardship | -28.820*** | -3.630 | -12.809 | -1.520 |
| Livestock (number of large animals) | -12.576** | -1.960 | -14.291* | -1.640 |
| Hectare (land holding in hectares) | 0.807 | 1.080 | 1.390 | 0.990 |
| Semi-urban | 30.819*** | 3.030 | -10.210 | -0.890 |
| Rural | 24.819** | 2.560 | -9.164 | -0.810 |
| Male (1 if migrant is male) | 29.610*** | 3.450 | 16.933 | 1.520 |
| Female (1 if migrant is female) | 18.103* | 1.870 | 14.904 | 1.190 |
| Number of obs | 3,256 | | 2,814 | |
| Wald $\chi^2$ (16) | 103.38 | | 65.65 | |
| | ( Pr > $\chi^2$ = 0.000) | | (Pr > $\chi^2$ = 0.000) | |
| Exogeneity test: Wald $\chi^2$ (1) | 25.86 | | 4.63 | |
| | (Pr > $\chi^2$ = 0.000) | | (Pr > $\chi^2$ = 0.032) | |

*, **, ***, imply significance at 10%, 5%, and 1%, respectively.

From the table we can read that a HTG 100 increment in the adult equivalent monthly remittances drives men monthly hours worked down by 7 units on average. In other words, an almost 50 per cent increase in the monthly equivalent adult remittance income only causes, ceteris paribus, a 7 per cent decline in the average monthly hours worked for men. The same nominal increment is associated with a 5 hour decline for women. In relative term however the same extension of women equivalent adult monthly remittance income would represent a 10 per cent decay of labor hours worked. This is quite a sensible observation insofar as female-headed households receive almost twice as much remittances as their male counterparts and that it is expected that women reallocate hours of wage to home production.[28] As regards the other variables considered in the estimation certain of them

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[28] Or, albeit not very plausible in the Haitian context, simply consume more leisure (considered to be a normal good).

require some attention. It is quite remarkable that men's experience does not account for their participation in the labor market and bears an opposite sign to what one would expect. In contrast, hours worked tend to increase with experience for women, up to certain threshold. The years of schooling of individuals and household wealth also increase the number of hours worked, while married household heads unexpectedly supply less labor (the coefficient is not significant however). Households with returned migrants understandably offer more labor hours since returnees´ decision is assumed to be rational, in that their presence implies that the opportunity cost of staying abroad outweighs that of returning (unless in the case of deported individuals). But this coefficient is not significant though among women. Both households whose property is owned *de jure* and the ones with greater size supply more work hours, but their effect is only significant for women. A variable (hardship) to control for the presence of households in regions under harsher conditions in Haiti is included, namely the regions with the highest poverty prevalence, highest unemployment rate, and highest inequality level. The two regions that comply with the above conditions are Départment du Nord-Est (Northeast) and Départment du Nord-Ouest (Northwest). Total hours supplied by households in these two regions are inferior compared to households in other regions of the country.

To contrast the robustness of the main findings in the instrumental variable Tobit estimation above, an instrumental variable probit model is estimated where the dependent variable is 1 if the household is employed and 0 otherwise. The results are reported in Table A4 in annex. The same behavioral pattern is observed on account of remittance income, whereby remittance income causes a decline in the probability of labor market participation for both men and women. It is worth emphasizing that such negative impact of remittances on the probability of labor market participation is almost nil given the very low magnitude of the decline. These average results are to be analyzed cautiously though.

Haiti sends out migrants to different countries with very unequal economic situation, and therefore with different potential impact of remittance income on labor market outcomes. For instance, a considerable number of Haitian go to settle in the Dominican Republic, which ranks second after the United States (while Canada by itself ranks third) in terms of stock of migrants Haitian households have in these countries. Albeit information on certain characteristics of the migrants (e.g. education level, amount of money remitted) is not available from the survey, given the different level of average income between these

countries, the US and Canada and the Dominican Republic, assuming that Haitians who migrate to the DR are in general low skilled with poor educational background compared to the US and Canada is plausible. Therefore, their capacity to remit should be much lower and their presence could be blurring the average results obtained thus far.[29]

Thus, we control for the presence of migrants in this country to estimate the same models as posited previously. We further refine to take into consideration migrant households from the US and Canada only using the same functional forms. The results are displayed in Table A5 in annex. Only the impact on the variable of interest is reported as in general there has been no change in the signs of the control variables and that all other statistics of the goodness of fit of the regression models perform much better under these two sub-samples.

As expected, under both the IV-Tobit and IV-probit estimations, the impact of remittance income on labor market outcomes is more acute, particularly for men. For this group, controlling for the DR the decline in the number of hours worked is about 50 per cent greater while this drop is almost twofold in the US and Canada sub-sample. Women in turn exhibit a consistent pattern with practically no variation in the number of hours worked or labor force participation.

Nonetheless, a closer look at the Haitian labor market may provide us with some useful insights. If we adopt a quite conservative stance and assume that workers in migrant households earn twice the minimum wage and furthermore use as benchmark the prevailing official minimum wage of 2001,[30] the impact of (say) HGT 100 increase would represent in the case of men almost HTG 61/month forgone. While for women, that opportunity cost is just about HTG 47 per month. These forgone incomes are more than requited by the increment in remittance income. Nevertheless, using the sub-sample of the US and Canada only that opportunity cost for men would go up to HTG 115 monthly. This may be indicative of a greater response of men's labor hours to remittances without implying however that a real decline of working time is operated in the presence of remittances income. A

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[29] About 1 out of 5 migrants are in the Dominican Republic and only one third of them send remittances back home as reported by the recipients. And among those who remit from this country, we could assume that their remittances on average represent approximately 10 per cent of remittance income coming from the US and Canada, to fairly reflect the difference in average income between the countries.

[30] Official minimum wage as of 2001, established by the May 4th 1995 bill, was at HTG 36/day. See *Le Nouvelliste*, 2003.

disaggregation of working time into different types of employment would provide us with more useful information to assess the impact of international remittances on labor market outcomes.

## 5. Concluding remarks

Accounting for selectivity bias in household migration decision and endogeneity in the determination of remittances, this paper analyzes the nexus international migration, remittances, and labor market outcomes in the Republic of Haiti. Different econometric methods are used to model the migration probability, the decision to remit, and labor market participation of remittance recipient households. First, a count model using a zero-altered negative binomial with logit inflation is chosen to estimate migration probability, while a 2SLQ methodology is adopted for investigating the decision to remit and the effects on labor market.

In light of what is established in the labor economics literature, namely the supply of labor is a negative function of reservation wage, remittances are expected to exert a negative influence on the labor supply of households that have access to them, given the increase in their reservation wage. The regular conjecture is that in a developing country context such as the Republic of Haiti this negative effect will be strong among women, especially when dependency ratios are high. The rationale for such a conjecture is that the shadow value of women's market wage lowers in the presence of remittances and may be more sensitive to remittance flows than that of men. The results show indeed a negative impact of remittances on labor market outcomes using both the IV-Tobit for hours worked and the IV-probit for labor market participation. This negative impact notwithstanding, the evidence does not support the conjecture of greater sensitiveness of women labor in the presence of remittances. As we have demonstrated, the simulated drop in labor income using the official minimum wage is more than requited by the increment in remittance income (except for men using the US and Canada migrant households only). In fact, it may well be the case that a reallocation of labor time is under operation with respect to men's labor.

So, a better picture of the dynamics between international migration, remittances, and labor market outcomes and determine the possible impact of remittances on the development of entrepreneurship in the Republic of Haiti is called for. We undertake such a task of assessing the impact of remittances on various types of labor hours in a subsequent exercise.

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**Annex**

**Table A1. Income quintiles, education, migration and international remittances**

| Quintile (from poorest to richest) | %Household members with secondary education | %Household members with superior education | Wealth index | Migration participation | Percentage of recipients | Ratio remittance/ income |
|---|---|---|---|---|---|---|
| 1 | 7 | 0.07 | -1.02 | 0.16 | 11 | 0.53 |
| 2 | 9 | 0.2 | -0.79 | 0.25 | 20 | 0.44 |
| 3 | 12 | 0.3 | -0.59 | 0.27 | 24 | 0.38 |
| 4 | 17 | 0.4 | 0.10 | 0.34 | 31 | 0.37 |
| 5 | 32 | 0.4 | 3.04 | 0.52 | 48 | 0.39 |

*Source:* Author's own calculations based on the ECVH-2001

**Table A2. Migration and remittance recipient status, education, wealth, and income**

| Household Status | %Household members with secondary education | %Household members with superior education | Wealth index | Percentage recipients | Ratio remittance/ income |
|---|---|---|---|---|---|
| Migrant | 22 | 1.9 | 1.30 | 66 | 28 |
| Non-migrant | 11 | 0.3 | -0.55 | 8 | 3 |
| Recipient | 25 | 1.7 | 1.56 | NA | 41 |
| Non-recipient | 11 | 0.4 | -0.53 | NA | NA |

*Source:* Author's own calculations based on the ECVH-2001

**Table A3. Zero-altered negative binomial-Logit inflation model ( working age 15-64)**

| | Coef | z-Stat | Marginal effect | z-Stat |
|---|---|---|---|---|
| Years of schooling | 0.025*** | 4.600 | 0.012*** | 4.600 |
| Wealth index | 0.222*** | 12.320 | 0.109*** | 12.290 |
| Wealth index squared | -0.008*** | -6.730 | -0.004*** | -6.770 |
| Age | -0.035** | -2.400 | -0.017** | -2.410 |
| Age squared | 0.001*** | 3.140 | 2.7E+04*** | 3.140 |
| Married (1 if married, or lives in common-law union = *Plase* in Haitian Creole) | 0.235*** | 4.170 | 0.122*** | 3.960 |
| Presence of returned migrant | 0.897*** | 9.900 | 0.684*** | 6.730 |
| Interaction Migration rate and Household size | 0.175*** | 5.800 | 0.086*** | 5.790 |
| Livestock (number of large animals) | 0.191** | 2.760 | 0.094** | 2.770 |
| Hectare (land holding in hectares) | 0.028** | 2.290 | 0.014** | 2.280 |
| Semi-urban | 0.361*** | 4.030 | 0.199*** | 3.600 |
| Rural | 0.382*** | 4.380 | 0.180*** | 4.540 |
| Intercept | -0.931*** | -3.170 | | |

***Logit inflation model***
Log likelihood: -5742.47

| | Coef | z-Stat | Marginal effect | z-Stat |
|---|---|---|---|---|
| Farming and fisheries | 1.600*** | 4.430 | -0.102*** | -3.700 |
| Nuclear family | 1.470*** | 4.190 | -0.094*** | -3.590 |
| Intercept | -3.156*** | -6.480 | | |
| α | 1.302*** | 12.414 | | |

| | |
|---|---|
| Number of obs: | 6,070 |
| Nonzero obs: | 1,790 |
| Zero obs: | 4,280 |
| Wald $\chi^2$ (12): | 665, ( Pr > $\chi^2$ = 0.000) |
| LR test, Ho: ln α = -∞ : | $\bar{\chi}^2$ (01) = 438, (Pr > $\bar{\chi}^2$ = 0.000) |
| Vuong test: | z = 3.82, ( Pr > z = 0.000) |
| AIC = 11,519 | |
| BIC = 11,633 | |

\*, \*\*, \*\*\*, imply significance at 10%, 5%, and 1%, respectively.

**Table A4. IV-Probit model of labor market participation by headship (working age 15-64). Marginal effects**

| | Men | z-Stat | Women | z-Stat |
|---|---|---|---|---|
| Monthly equivalent remittances | -1.1E-03*** | -5.720 | -4.1E-04** | -2.550 |
| Years of schooling | 0.026** | 2.870 | 0.028*** | 3.370 |
| Wealth index | 0.152*** | 5.350 | 0.080** | 2.090 |
| Experience | 0.006 | 0.400 | 0.070*** | 7.700 |
| Experience squared | -1.1E-04 | -0.510 | -9.8E-04 | -7.250 |
| Married (1 if married or lives in common-law union, *Plase* in Haitian Creole) | -0.170** | -2.290 | -0.117* | -1.920 |
| Returned migrant | 0.549*** | 3.290 | 0.251** | 1.970 |
| Home (1 if property is owned *de jure)* | 0.079 | 1.010 | 0.138** | 2.240 |
| Household size | 0.048*** | 3.470 | 0.046*** | 3.520 |
| Hardship | -0.731*** | -7.740 | -0.349*** | -4.930 |
| Livestock (number of large animals) | -0.292*** | -3.620 | -0.206** | -2.780 |
| Hectare (land holding in hectares) | 0.127*** | 5.680 | 0.096*** | 5.080 |
| Semi-urban | 0.527*** | 4.100 | 0.105 | 1.080 |
| Rural | 0.444*** | 3.670 | 0.052 | 0.550 |
| Male (1 if migrant is male) | 0.322*** | 2.910 | 0.096 | 1.030 |
| Female (1 if migrant is female) | 0.164 | 1.330 | 0.184* | 1.750 |
| Number of obs | 3,256 | | 2,814 | |
| Wald $\chi^2$ (16) | 180.31 | | 157.36 | |
| | ( Pr > $\chi^2$ = 0.000) | | (Pr > $\chi^2$ = 0.000) | |
| Exogeneity test: Wald $\chi^2$ (1) | 35.93 | | 3.79 | |
| | (Pr > $\chi^2$ = 0.000) | | (Pr > $\chi^2$ = 0.052) | |

*, **, ***, imply significance at 10%, 5%, and 1%, respectively.


**Table A5. Marginal effect after controlling for the Dominican Republic (working age 15-64)**

| | Men | z-Stat | Women | z-Stat |
|---|---|---|---|---|
| *-All migrant households except the ones in the Dominican Republic* | | | | |
| IV-Tobit (hours worked) | -0.097*** | -3.030 | -0.054** | -2.460 |
| IV-Probit (employment probability) | -2.0E-03*** | -3.800 | -6.4E-04*** | -3.050 |
| Number of obs | 3,084 | | 2,595 | |
| *-US and Canada migrant households only* | | | | |
| IV-Tobit (hours worked) | -0.128** | -2.580 | -0.052*** | -3.110 |
| IV-Probit (employment probability) | -3.4E-03*** | -3.040 | -5.8E-04*** | -3.050 |
| Number of obs | 2,992 | | 2,507 | |

*** = significance at 1% level. All other statistics perform much better under these sub-samples

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