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International Migration, Remittances and Labour Supply

The Case of the Republic of Haiti

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Abstract

The Republic of Haiti is a prime international remittance-recipient country in the Latin American and Caribbean (LAC) region, relative to its gross domestic product (GDP). The downside of this fact may be that Haiti, based on population size, is also the largest exporter of skilled workers in the world. The present research uses a zero-altered negative binomial (with logit inflation) to model the international migration decision-process of households, and endogenous regressors' Amemiya generalized least squares method (instrumental variable Tobit, IV-Tobit) to account for selectivity and endogeneity issues to assess the impact of remittances on labour market outcomes. The results in terms of a decline of labour supply in the presence of remittances are in line with those observed thus far in the literature. However, the impact of international remittances does not seem to be important in determining the labour participation behaviour, particularly for women, in the recipient households.

Keywords: Republic of Haiti, international migration, remittances, labour supply

JEL classification: C39, F22, F24, J22

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Acronyms

DR   Dominican Republic

FDI   foreign direct investment

GDP   gross domestic product

HTG   Haitian gourde

KMO   Kaiser-Meyer-Olkin index

LAC   Latin American and Caribbean region

NELM new economics of labour migration

ODA   development assistance

PCA   principal components analysis

ZINB   zero-inflated negative binomial model

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1 Introduction

International migration of workers is a constant factor in the relatively short history of Haiti as a free republic. Important waves of emigration can be dated to the early twentieth century when Haitians travelled to Cuba to work in the *zafra*.[1] It is estimated that between 1910 and 1930, some 200,000 Haitians, pushed by economic hardship, migrated to Cuba to work on sugar cane plantations (Proudfoot 1950). The migration flows to Cuba went unabated until the Batista regime when an amendment of the Cuban immigration law in 1939 banned black workers and started the massive deportation of Haitians (ibid.: 50). During the same period, the migration of Haitians also started to the Dominican Republic (DR) for the same reason: seeking work. Although actual numbers are not readily available, several authors concur that the Haiti-DR migration corridor was far more important than the Haiti-Cuba movement (see, for instance, Castor 1971: 88; Lundahl 1979: 625). The flow of Haitian workers to the DR was halted in 1937 by the '*perejil*' massacre under the Trujillo regime.[2] But as incredible as it may seem, Haitian workers in 1939 resumed their exodus to the DR (Perusek 1984), and it is estimated that to date about one million Haitians live in the country (Ratha and Shaw 2007).

Ironically, while thousands of Haitians were leaving for Cuba and the DR at the turn of the twentieth century facing various hardships throughout their journey, the hundreds of Catholics from the Near East (mainly Lebanese, Syrians, and later Palestinians) arrived in Haiti in search of a better fortune.

The second important wave of Haitian emigration occurred at the beginning of the Duvalier era in the early 1960s. In contrast to earlier waves, migration during this era was primarily motivated by political reasons. Most of these departing Haitians were middle and upper-middle class families and were in general very well-educated.[3] Regular destinations were Canada, United States, France, and the newly independent African nations.

The emigration of Haitians persists to date and has become even more widespread. Destination countries have not changed much, except for Cuba and the African nations. The result of these migration outflows is that Haiti ranks fourth in the world (82 per cent) among the countries losing their tertiary-educated migrants, after Surinam (90 per cent), Guyana (86 per cent), and Jamaica (83 per cent) (Docquier and Marfouk 2006). Based on population size,[4] Haiti ranks as the foremost exporter of skilled migrants (Ratha and Shaw 2007).

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[1] *Zafra* refers to the sugar cane harvest period in Cuba.

[2] The word, *perejil*, meaning parsley in Spanish, could determine the fate of a black person living on the borderlands between Haiti and Dominican Republic whether or not he would be spared by the Dominican officials. As it was believed that those of Haitian origin were unable to pronounce the word, its correct pronunciation became the deciding factor. Trujillo's movement to expel Haitians from the Dominican Republic became known as the Parsley Massacre: *Operación Perejil*, or *El Corte*, according to its popular name.

[3] See, for instance, Jadotte (1977) for an early research on Haitian immigrants moving to Quebec in Canada.

[4] In countries with populations in excess of five million.

Figure 1

Haiti international remittances inflows, ODA, and FDI, 1971-2005 [5]
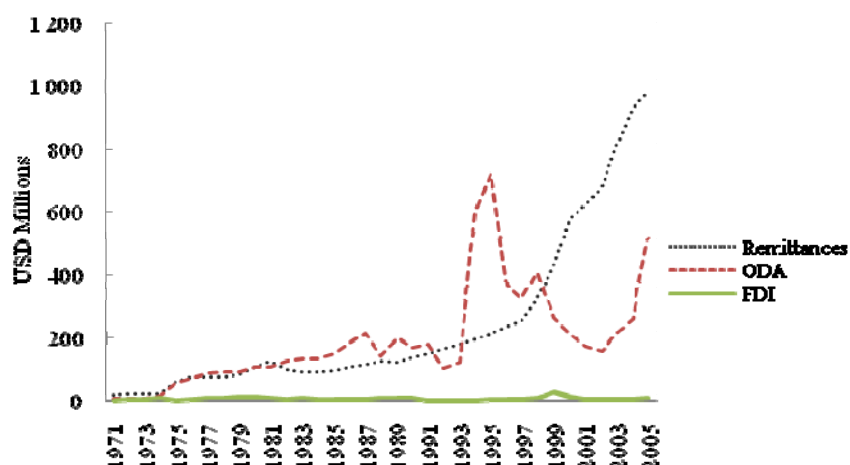
Source: World Bank (WDI).

A frequent outcome of emigration, particularly with regard to the developing countries, is remittances. Remittance flows to developing countries totalled US$251 billion in 2007, an increase of almost 14 per cent over the previous year, US$221 billion.[6] For the developing countries, the magnitude of external resources from remittances surpasses official development assistance (ODA) and is second to foreign direct investment (FDI), which reached US$379 billion in 2006. In the case of Haiti, remittance inflows, after a record high of 52.4 per cent relative to GDP in 2004, totalled US$1,184 billion in 2007. This non-labour income flow from remittances represents not only a source of better livelihoods to many Haitian households living on the brink of poverty, but has also infused the country's economy with much needed capital. As can seen in Figure 1, remittances now surpass both FDI and ODA combined, and seem to be unaffected by politics, as is often the case with ODA.

The figures indicate the magnitude of the impact this income source has for Haiti. Despite the relevance of international migration and remittances to Haiti's economy, research in the field is scanty and largely descriptive. Insufficient 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, and 31 per cent of these households receive on average US$150 in remittances, of which almost 80 per cent is spent on consumption. Orozco (2006) perceives remittances in Haiti as a vehicle for social inclusion, as these enable greater participation in the market process through the higher demand capacity bestowed by remittances on deprived recipient households.

According to Lamaute-Brisson (2002: 175-6), whenever remittance resources are targeted to financing economic activities, they are generally allotted to informal operations in the service sector with its low level of productivity. Moreover, Lamaute-

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5   Remittance values are missing for the years 1990 to 1997 and are thus extrapolated, based on the assumption that remittances increased during this period at the growth rate averaged for 1971-89. All data are from the World Bank (World Development Indicators, WDI), except data on remittances, which are from the IMF's balance of payments.

6   See Ratha and Xu (2008).

Brisson (2003) maintains that even though remittances allow some households to escape poverty, they do not necessarily reduce inequality in Haiti, as these transfers generally accrue to the top income distribution deciles. This argument is in line with Jadotte (2006).

Figures 2 and 3, with their associated Kolmogorov-Smirnov (K-S) tests, corroborate this fact and are also in line with Jadotte (2006). First, we estimate kernel densities for migrants (i.e., households with relatives abroad) and non-migrant households with the counterfactual of ex ante remittance per equivalent adult income;[7] then, the same assessment is done with the inclusion of remittance income. The results show that migrant households fare better than their non-migrant counterparts, and the difference between the two groups widens once 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 these effects can extend beyond the initial recipient of the transfer. An extensive body of literature presents evidence on the importance of international migration and remittances, and their micro and macroeconomic links. Although it has traditionally been established that outmigration, particularly the south-north pattern,[8] causes depletion of human capital stock in the developing countries through the so-called braindrain effect,[9] emigration in some quarters is perceived as a bonus, as it is often accompanied by remittances that may attenuate some of the possible negative impacts of population outflows. In addition to the claim that poverty rates decline in recipient households,[10] remittances allow liquidity-constrained families to free up resources for investment, say, in 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 Woodruff 2003; Cox-Edwards and Ureta 2003; López-Córdova 2005; Acosta 2006;[11] McKenzie and Rapoport 2006). Using anthropometric measures, height-for-age and weight-for-age Z-scores as proxies for health status, Acosta, Fajnzylber and Lopez (2007), and Mansuri (2007) note that children in

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7   The equivalence scale used is the one proposed by Jadotte (2006).

8   South-south migration flows are also important. For instance, Ratha and Shaw (2007) estimate that some 74 million migrants live in the developing countries, representing about 47 per cent of all migrants, but these authors also conclude that the remittance impact of this group is negligible, accounting for only 9 per cent of the remittance amounts received by developing countries.

9   A growing body of the literature has contemplated the possibility of a brain gain (or 'beneficial' braindrain) as a result 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).

10   The 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 become inverted when these are treated as a substitute for one of the household income sources, rather than an exogenous increase in household income. See, for instance, Acosta et al. (2007) and the literature therein for evidence on Latin American and Caribbean countries.

11   Acosta (2006) finds no significant effect of remittances on schooling after wealth has been controlled for.

Figure 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)

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.

Figure 3
Kernel density estimates

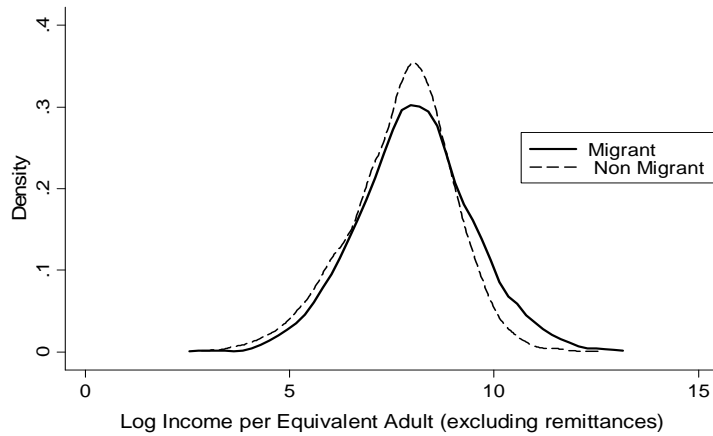Log Income per Equivalent Adult (including remittances)

Table 2
Kolmogorov-Smirnov (K-S) test
rejecting the hypothesis of equal distribution functions (Figure 3)

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.

remittance-receiving households in Guatemala and Nicaragua and rural Pakistan have a higher index in both measures. Infant mortality also appears to be lower in these recipient households. Similar results are noted for Mexico (López-Córdova 2005) and Uganda (Ssengonzi, De Jong and Stokes 2002). In addition, remittances can enable small entrepreneurs in developing countries, where access to credit markets is generally more restricted, to undertake riskier, yet more profitable activities.[12]

On the other hand, international migration may also have negative impacts on the educational attainment of children in migrant households, due to the lack of positive parental influence on a child's assiduity. At the macroeconomic level, large inflows of foreign exchange can have serious consequences resulting from the advance effects on tradable commodities and on relative competitiveness due to an appreciation of real exchange rates in the receiving country.[13] This may be particularly true in the case of small economies where remittance inflows are large in comparison to the country's GDP. A type of 'Dutch disease' effect may arise from the appreciation of the real exchange rate and can eventually result in a balance-of-payment crisis, as currency appreciation will most likely restrict the country's ability to export.[14]

Furthermore, it is often asserted that remittances reduce the shadow value of market wages (particularly for women) in recipient households. As is established in the labour economics literature, the supply of labour declines concurrently with an individual's reservation wage (see Killingworth 1983). Thus, if remittances increase the reservation wage of individuals in remittance-receiving households, the impact on labour force participation behaviour can be expected to be negative. According to the standard conjecture, this negative effect in a developing country context will be strong among women, particularly in households with high dependency ratios. This is based on the premise that in the presence of remittances, which are a non-labour source of income, the shadow value of market wages is low. Consequently, remittances may allow individuals to exit the labour market in favour of either home production or simply to increase the consumption of leisure. On the other hand, if remittances relax credit constraints and allow households to engage in entrepreneurial or commercial activities, the impact on labour may be positive. In addition, migration in itself will exert upward pressure on the home-country wage rates, with potential positive effects on labour supply. Thus, the ultimate effect of international remittances on labour market outcomes is somewhat ambiguous, becoming an empirical issue.

Finally, some authors question the much heralded benefits of remittances, asserting that a pattern of idleness and dependency may be triggered. Other researchers point to the fact that the expected development impact of remittance income through sustained

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

[13] 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.

[14] Some researchers would argue that, as is generally presented in textbooks, labour migration is a substitute for trade and therefore consideration of its negative impact on trade through remittances is pointless. We will not take up the discussion here, as it is beyond the scope of this research.

growth has not been proven, and therefore consider remittances to be the new development mantra or a craze that will soon fade.[15]

Indeed, much is expected from remittance income flows, but their existence and the sheer magnitude of the amounts involved may be indicative of nations that are deeply dysfunctional and void of opportunities for their citizens. Even if it were true that this stable source of income can be leveraged so as to provide greater advantage to the receiving countries, remittances are neither a panacea nor a shortcut solution to their development problems.

In this paper we investigate the effects of international migration and remittances on labour market outcomes and provide evidence for the Republic of Haiti on the behaviour of recipient households. The paper is structured as follows: section 2 covers a brief survey of the pertinent literature. Section 3 presents the data source, while section 4 describes the methodology used for the analysis and discusses the econometric issues pertaining to the estimation procedure. Section 5 gives the results and a brief discussion while section 6 concludes and points to some future lines of research.

2   Brief review of earlier 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 labour migration' (NELM), a number of researchers have attempted to unravel the economic implications of international migration on the developing countries. Amuedo-Dorantes and Pozo (2006a) find that in Mexico remittances do affect the labour response of both female and male workers. The authors calculate that a 16 per cent increase in the monthly per capita remittance income is associated with a 15 per cent decline in the number of hours worked per month in the formal sector in both urban and rural areas. In other words, each addition of 100 Mexican pesos to the remittance income reduces labour in the formal sector by 32 hours. In contrast, they note that a similar addition to the remittance income increases informal sector employment by the same number of hours as the formal sector declines. Their results clearly suggest that remittance income induces a reallocation of labour by among males. On the part of females, Amuedo-Dorantes and Pozo note that remittance accretion triggers a reduction in the hours worked for all types of employment, suggesting that an income effect dominates the substitution effect among Mexican females with respect to remittance income. Acosta's (2006) results are similar for El Salvador, where the author notes that male labour supply remains unaffected while female labour declines as remittances rise. Kim (2006) and Bussolo and Medvedev (2008) find the same conclusion for Jamaica in terms of a general decline of labour outcomes among remittance-recipient households.

Funkhouser (1992) observes that on the part of Nicaragua, remittances promote entrepreneurial activities (self-employment) for men but reducing at the same the labour supply with respect to women. Woodruff and Zenteno's (2004) results for Mexico also seem to indicate that remittances, by increasing small-scale self-employment, help to relax the finance and capital constraints inhibiting the development of small enterprises.

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[15] For further insight on these views see, among others, Kritz, Keely and Tomasi 1981; Durand and Massey 1992; Kapur 2003; de Haas 2005; Bussolo and Medvedev 2007; Grigorian and Melkonyan 2008.

Amuedo-Dorantes and Pozo (2006b) come to a contrary conclusion for the Dominican Republic, noting that remittances are associated with a reduction in the likelihood of entrepreneurial activities among recipient households. Hanson (2007) observes that in Mexico, women in the high-migration states are less likely to work outside their home than men.

The same negative association of labour market participation and the hours worked with remittances is noted for the Philippines by Rodriguez and Tiongson (2001). However, the authors emphasize that the negative labour response to remittances is more acute for men than women. 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 similarly interpreted if extra income from a given source is construed as extra work (i.e., assuming no change in the productivity level of the individual). The authors observe, on average, a decline in income from subsistence agriculture and wage employment while income from farming and own business expands because of remittances. If the foregoing assumption is plausible, this would suggest that labour is being reallocated from subsistence agriculture and wage employment to farming and entrepreneurship, which may imply that a realignment of the economic structure of these two small islands has been induced by remittances.

To our knowledge, no previous study has addressed the issue of international migration and remittances in Haiti through these lenses. The objective of this paper is to promote our understating on the matter and hopefully to fill the void in this research field for Haiti.

3   The data source

We use the ECVH-2001 (in English, Haitian Living Conditions Survey-HLCS), which contains data on 7,186 households. The survey includes information on both internal and international migration movements, but our focus is on the latter. The questions pertaining to migration and remittances that are of interest for the analysis include: (i) the number of relatives in the household who live abroad and (ii) whether the household receives remittances. Although the survey collects information on returnees, it does not provide data on the schooling of non-returning immigrants.

The data disclose that about one-third of Haitian households have at least one member living in a foreign country. Of this group, approximately two-thirds receive remittances that account for more than 40 per cent of their income.[16] 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 exceeds the 15.32 per cent of GDP reported by the IMF balance-of-payment statistics for the same period. The difference may 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, it is worth bearing in mind that informal channels can be used to transfer non-negligible amounts of remittances and that households are more likely to remember whether or not they have received remittances

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[16] In fact, some households (2 per cent) reported remittances as constituting their sole source of income.

than to recall the exact transfer amount received from abroad. Average remittances amount to HTG 4,831 with a Gini index among recipient households of 0.72.[17]

4 Methodology and econometric issues

A serious concern in estimating the impact of international migration on labour 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 suggested, migrant and non-migrant households seem to be different. If this is the case, the possibility of self-selection exists with regard to migration, and therefore the sample of migrants and remittance senders is not random. Appendix Table A2 provides further evidence on the systematic difference between migrant and non-migrant households in two key observable factors, namely education and wealth.

In line with the NELM hypothesis advanced by Stark and Bloom (1985), we can construe remittances to be determined in conjunction with migration, whereby the former is generally a precondition for the latter. In such a case, remittances are not the result of altruism, but rather intertemporal inter-vivo transfers motivated by contractual arrangements between the migrant and the relatives left behind. Assuming the plausibility of the previous statement, and to paraphrase (Hoddinott 1994), the best approach to modelling migration is to tackle it as the outcome of a joint utility maximization by the prospective migrant and other household members (those who will be left behind). Furthermore, migration and remittances may be simultaneously affected by other income sources that influence the labour supply behaviour of the recipient households. This simultaneous determination of migration and remittances could lead to synchronic correlation across the equation for remittances and the focus equation, namely labour supply. This brings forth a serious endogeneity problem that needs 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.[18] 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 with 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:

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

We carried out a first test of mean and variance comparison and found some evidence of over-dispersion, which cast doubt on a true Poisson data-generating process of the outcome variable. In fact, many households have more than one migrant. The number of

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migration-participating households, with one to 14 close relatives abroad, totals 2,124. This represents about one-third migration participation rate. Moreover, approximately 48 per cent of migration-participating households have more than one relative living abroad and approximately 24 per cent have more than two. Accordingly, unobserved heterogeneity was introduced in the above equation to account for the fact that certain households have higher counts than others, proceeding with the estimation via a gamma-Poisson mixture model, and 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 m number of migrants in household i in the following manner:

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

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

$$E\left(M\right) = \lambda_i \tag{3}$$

$$Var\left(M\right) = E\left(M\right)\left[1 + \alpha E\left(M\right)\right] \tag{4}$$

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 α equals zero, the model boils down to a standard Poisson. While a considerable percentage of migration-participating households have more than one relative abroad, many households have none. This results in a large amount of zeros in the outcome variable. So, to account for the excess zero count, we estimate a zero-altered negative binomial model with logit inflation to contrast it with a standard negative binomial model. The Vuong test favoured the zero-inflated negative binomial (ZINB) model over the standard one.[19]

A key issue in estimating Equation (2) is the identification of the migration process. As has been established in several works in the literature, development of networks reduces settlement costs (i.e., expenses associated with migration are less of a burden) and thus makes the financing of travel abroad less constraining.[20] Moreover, contact with individuals who have had experience from abroad provides useful information to potential migrants, lowering the risk and uncertainty of migration. Both regional migration rates and the presence of returned migrants in a household are used as network variables for identification of the migration equation.[21] The regional migration rate is derived as the ratio of the total number of migrants compared to the population of a particular region, while for the household network we take into consideration individuals who have spent more than three months abroad before returning home. To

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[19] See Appendix Table A3 for the result of the likelihood ratio test and the Vuong test favouring 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).

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

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

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

As regard to the remittance equation, the following functional form is adopted:

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

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

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

where L is the number of hours worked, Ω' is a vector of individual and household characteristics, and η 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 behaviour of remittance-receiving households in the labour market.[22] 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 labour 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 labour 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 the correlation with hours worked is, respectively, -0.008, 0.045, 0.047. For women these values, in the same order, are 249, 0.000, 0.026, and 0.003.

As stated previously, the costs associated with migration may inhibit certain households from undertaking 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 are therefore less likely to migrate.

Cognizant of the potential endogeneity problem with this variable, since wealth may be positively correlated with contemporaneous remittance flows, we approximated wealth using durable goods and amenities (e.g., refrigerator, vehicle, running water and access

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

to electrical network, quality of walls, floor and roof of the house, etc.) which more likely can represent the long-term economic status of a household. To construct the wealth index, we adopted the principal components analysis (PCA) and closely followed the procedure developed by Filmer and Pritchett (2001). The value of the wealth index, *W*, for household *i*, under the PCA approach can be given as follows:

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

where A_{ij} is a binary indicator expressing whether household *i* possesses asset *j*, $\bar{A}_j$ and σ_j^2 are, respectively, the sample mean over all assets and the sample variance of asset *j* across households; finally, ω_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 Kaiser-Meyer-Olkin (KMO) 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.[23]

Now, a robust appraisal of a household's long-term economic status based on this index would require that information on pre-migration wealth is used since the self-selectiveness of migration and the ensuing remittances could imply the possibility that remittance income has been used to purchase such assets (Acosta 2006). Appendix Table A1 compares household income, wealth (using the proxy above), migration participation rate, and remittance 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 of income exhibits an almost opposite pattern, despite the fact that low-quintile households are less likely to participate in migration and receive remittances than their high-quintile counterparts.[24]

5   Results and discussion

Appendix Table A3 presents the results of the ZINB model that includes 6,070 observations of the working-aged population of 15-64 years, inclusively. Different specifications were explored and our criterion for selecting this model was based mainly on the lowest values of Akaike and Bayes criterion. As mentioned in section 4, the data support the negative binomial over a Poisson model with a likelihood ratio test for ln α = -∞ that is equal to 438 and significant at the 1 per cent level. Furthermore, a Vuong test (z = 3.82, Pr > χ^2 = 0.000) established preference of a zero-inflated negative binomial over a standard negative binomial model. As for the covariates, all the

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[23] Lubotsky and Wittenberg (2006) argue that the PCA approach may blur the distinction between differences in wealth and in taste if the full set of proxy variables are not used. Using the full set of proxies did not substantially improve our measure of sampling adequacy.

[24] For similar application to El Salvador, see Acosta (2006).

Table 3
IV-Tobit model of labour 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)[1]	-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
No. of obs	3,256		2,814	
Wald χ^2 (16)	103.38		65.65	
	(Pr > χ^2 = 0.000)		(Pr > χ^2 = 0.000)	
Exogeneity test: Wald χ^2 (1)	25.86		4.63	
	(Pr > χ^2 = 0.000)		(Pr > χ^2 = 0.032)	

Note: [1] Common-law union = *plase* in Haitian Creole.

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

variables, except for age, maintained in the chosen model have the expected signs and are significant at either the 5 or 1 per cent levels.[25] 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 equivalent to 14. Interestingly, with the exception of three observations found in the second richest quintile, all households beyond this threshold belong to the first distribution quintile. Both network variables have, as expected, a positive impact on the probability of migration and are significant. The strongest effect, however, is noted in the presence of a returned migrant in the household, which is consistent with the theoretical prediction in the literature. Households in the semi-urban and rural areas exhibit a higher emigration probability compared to those in the metropolitan area of Port-au-Prince. Livestock and landholding, which we entered as substitutes for perfect credit markets, show positive effect on migration probability. As can be observed from the table, the impact of livestock is almost seven-fold compared to land, which may be indicative of the fact that the former is a more marketable, liquid, and fungible asset than the latter. Consistent with the previous observation, households involved in

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[25] We expected that age and age squared follow a U-shaped pattern, whereby migration probability would increase with age but the very young and very old adults are less likely to migrate, except for (primarily) family reunification motives.

agricultural activities and fisheries have a lower emigration probability. The same applies to nuclear families.

The results for the instrumental variable Tobit model are given in Table 3, with the number of monthly hours worked censored below and above at 53 and 240 hours, respectively. Separate estimations are implemented for working-aged men and women. The coefficients for both genders on remittances show a negative sign and are significant at the 1 and 5 per cent levels, respectively. The negative sign, however, is not to be construed of as indicative of remittances greatly influencing the labour market outcomes in Haiti. In fact, the negative influence is, on average, negligible, which is rather understandable, given the high level of unemployment characterizing Haiti's economy, where the formal unemployment rate is 60-70 per cent.

From the table we can note that an increment of HTG 100 in the adult equivalent monthly remittances reduces the monthly hours worked by men, on average, by seven units. In other words, an almost 50 per cent increase in the monthly equivalent adult remittance income results, *ceteris paribus*, only in a 7 per cent decline for men in the average monthly hours worked. The same nominal increment is associated with a five hour decline for women. In relative terms, however, the same extension of women's equivalent adult monthly remittance income would represent a 10 per cent loss of the labour hours worked. This is a feasible observation insofar as female-headed households receive almost twice as much in remittances as their male counterparts, and that women are expected to reallocate hours of wage employment to home production.[26]

With respect to other variables considered in the estimation, some of these require further attention. It is remarkable that the experience of men does not account for their participation in the labour market and exhibits a sign opposite to what would be expected. In contrast, the experience of women tends to increase, up to a certain threshold, the number of hours worked. The years of schooling of individuals and household wealth also increase the number of hours worked, while married household heads unexpectedly supply less labour (albeit with an insignificant coefficient). Households with returned migrants understandably provide more labour hours since the returnee's decision is assumed to be rational, in that his return home implies that the opportunity cost of staying abroad outweighs that of returning (except in the case of deported individuals). This coefficient, however, is not significant among women. More work hours are supplied by households whose property is owned *de jure* as well as by households of greater size, but effect is only significant for women. A (hardship) variable is included to control for households being located in Haiti's harsher regions, namely those with the highest prevalence of poverty, of unemployment, and greatest levels of inequality. These conditions affect two regions: Département du Nord-Est (northeast) and Département du Nord-Ouest (northwest). Households in these two regions supply less total hours than households in other regions of the country.

To compare 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 Appendix Table A4. The same behavioural pattern is observed with respect to remittance income, whereby income transfers cause a decline in the probability of labour market participation for both genders. It is worth emphasizing that such a

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26 In the Haitian context, reallocation could simply imply more leisure (considered to be a normal good).

negative impact of remittances on the probability of labour market participation is virtually nil, given the very low magnitude of the decline. These average results, however, should be analysed with cautious.

Haitian migrants relocate to different countries, each with very diverse economic circumstances, so that the potential impact from remittance transfers on labour market outcomes varies. For instance, a considerable number of Haitians settle in the Dominican Republic, which ranks second after the United States in terms of the stock of Haitian households; Canada ranks as third largest destination country. Information on certain characteristics of the migrants (e.g., education level, amount of money remitted) is not available from the survey. However, given the difference in average income between the major destination countries (US, Canada and the Dominican Republic), it seems plausible to assume that compared to Haitians settling in the US and Canada, those relocating to the DR are, in general, low-skilled workers with poor educational background. Therefore, their capacity to remit money home would be much lower and the presence of these low-skilled workers could bias the average results obtained thus far.[27]

Thus, we control for the presence of migrants in Dominican Republic to estimate the same models as posited previously. We further refine the model using only the same functional forms to take into consideration migrant households from the US and Canada. The results are given in Appendix Table A5. 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 all other statistics of the goodness-of-fit of the regression models perform much better under these two subsamples.

As expected, under both the IV-Tobit and IV-probit estimations, the impact of remittance income on labour 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 the decrease is almost twofold in the US and Canada subsample. Women in turn exhibit a consistent pattern with practically no variation in the number of hours worked or labour force participation.

Nonetheless, a closer look at the Haitian labour market may provide some useful insights. If we adopt a rather conservative stance, assuming that workers in migrant households earn double the minimum wage, and furthermore use the prevailing official 2001 minimum wage as benchmark,[28] the impact of (say) HGT 100 increase would represent a loss of almost HTG 61 per month in the case of men, while for women, the opportunity cost is about HTG 47 per month. Foregone incomes are more than compensated by the increment in remittance income. Nevertheless, using the US and Canada subsample only, the opportunity cost for men goes up to HTG 115 per month. This may be indicative of a greater response of the labour hours of men to remittances without implying, however, that a real decline in working time is affected by the

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[27] Approximately one of five Haiti migrants lives in the Dominican Republic and only one-third of these send remittances back home, as reported by the recipients. To imply a fair reflection of the difference in average incomes between North America and the Dominican Republic, we assume that remittances from the DR represent, on average, approximately 10 per cent of the amounts originating from the US and Canada.

[28] Official minimum wage as of 2001, as established by the 4 May 1995 bill, was HTG 36 per day. See *Le Nouvelliste* (2003).

presence of remittance income. The disaggregation of working time into different types of employment would provide more useful information for assessing the impact of international remittances on labour market outcomes.

6   Concluding remarks

Accounting for selectivity bias in household migration-decisions and endogeneity in the determination of remittances, this paper analyses the nexus between international migration, remittances and labour market outcomes in the Republic of Haiti. Different econometric methods are used to model the migration probability, the decision to remit, and labour 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 to investigate the decision to remit and the effects on labour market.

In light of what is established in the labour economics literature, namely that the supply of labour is a negative function of the reservation wage, remittances are expected, *ceteris paribus*, to exert a negative influence on the labour supply of the households with access to this non-market income flow, insofar as it increases the recipients' reservation wage. According to the standard conjecture, this negative effect in a developing country context such as the Republic of Haiti will be strong among women, especially when dependency ratios are high. This assumption is based on the rational that the shadow value of women's market wages decreases[29] in the presence of remittances. Therefore, women's wages may be more sensitive to remittance flows than those of men. Indeed, the results show a negative impact of remittances on labour market outcomes, using both the IV-Tobit for hours worked and the IV-probit for labour market participation. This negative impact notwithstanding, the evidence does not support the conjecture of greater sensitiveness of female labour in the presence of remittances. As we have demonstrated, the simulated drop in labour income in using the official minimum wage is more than offset by the increment in remittance income (except for men in the case of the US and Canada migrant households only). In fact, it may well be the case that a reallocation of labour time develops with respect to men's labour. In this respect, a better picture of the dynamics between international migration, remittances, and labour market outcomes for determining the possible impact of remittances on the development of entrepreneurship in the Republic of Haiti is called for.

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[29] To put it differently, their reservation wage increases.

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Appendix

Appendix Table A1
Income quintiles, education, migration and international remittances

| Quintile (from poorest to richest) | % of household members with | | Wealth index | Migration participation | % of recipients | Ratio remittance/income |
	secondary education	superior education				
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.

Appendix Table A2
Migration and remittance recipient status, education, wealth and income

| Household status | % of household members with: | | Wealth index | % recipients | Ratio remittance/income |
	secondary education	superior education			
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.

Appendix Table A3
Zero-altered negative binomial-logit inflation model
(working age 15-64 yrs)

	Coeff	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)[1]	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				
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		
A	1.302***	12.414		

No. of observations	6,070
Nonzero observations	1,790
Zero observations	4,280
Wald χ^2 (12)	665, (Pr > χ^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	

Note: [1] Common-law union = *plase* in Haitian Creole.

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

Appendix Table A4
IV-Probit model of labour market participation by headship
(working age 15-64 yrs)

	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)[1]	-0.170**	-2.290	-0.117*	
Returned migrant	0.549***	3.290	0.251**	
Home (1 if property is owned *de jure)*	0.079	1.010	0.138**	
Household size	0.048***	3.470	0.046***	
Hardship	-0.731***	-7.740	-0.349***	
Livestock (number of large animals)	-0.292***	-3.620	-0.206**	
Hectare (land holding in hectares)	0.127***	5.680	0.096***	
Semi-urban	0.527***	4.100	0.105	
Rural	0.444***	3.670	0.052	
Male (1 if migrant is male)	0.322***	2.910	0.096	
Female (1 if migrant is female)	0.164	1.330	0.184*	
No. of observations	3,256		2,814	
Wald χ^2 (16)	180.31		157.36	
	(Pr > χ^2 = 0.000)		(Pr > χ^2 = 0.000)	
Exogeneity test: Wald χ^2 (1)	35.93		3.79	
	(Pr > χ^2 = 0.000)		(Pr > χ^2 = 0.052)	

Note: [1] Common-law union = *plase* in Haitian Creole.
*, **, ***, imply significance at 10%, 5%, and 1% levels, respectively.

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

	Men	z-Stat	Women	z-Stat
All migrant houses, excl. those in 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
No. of observations	3,084		2,595	
US and Canadian 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
No. of observations	2,992		2,507	

Note: *** = significance at 1% level. All other statistics perform much better under these subsamples.