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Outmigration, Human Development and Trade: A Central American Case Study

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Abstract Controversy surrounds the large increase in international immigration, but little is known about the many drivers of this mobility. While most migration studies have focused on economic motivations, a small literature addresses the impact of human development and, indirectly, capability deprivation. This case study of southern Honduras examines migration patterns between 1988 and 1997 to assess the impacts of human development, non-traditional agricultural exports (NTAX), and other factors. We develop a time-based census analysis replicable in other countries lacking specialized household surveys. Our review of the region's population census data between 1988 and 1997 suggests net outmigration in 75% of the villages. Econometric treatment of village-level net migration rates before Hurricane Mitch is undertaken. Improved living standards reduced mobility and melons, rather than shrimp mariculture, played a more positive role in labor attraction. Comparisons of census data after and before the mobility pattern suggest improvements in education, yet greater gender divisions, in some areas that by implication undertook international migration.

Key words: Migration, Human development, Non-traditional exports, Land use, Employment

Introduction

A large economics literature has focused on the push and pull factors driving migrants' decisions, yet few links have been made to the human development background and outcomes of migrants. Such knowledge is important to immigration and international economic development policy. Additionally, understanding the socio-demographic effects of trade is relevant as new agreements are under debate. Trade expansion in a region can affect potential standards of living and thus be a driver of migration. The promotion of non-traditional exports has been a central strategy of foreign aid donors in recent years, and its link to migration has not been widely explored. On the one hand, exports may provide additional employment to people working

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below their potential; on the other, the changing land-use patterns may impose hardship on some residents whose livelihood options are reduced.

The current paper examines the links between human development, land use for exports and migration in southern Honduras. Most sources suggest between 300 000 and 600 000 Hondurans living in the United States by the year 2000, most of which were undocumented *economic* immigrants (Puerta, 2002). The United Nations Development Programme reports 217 569 Hondurans, 655 165 Salvadorans, 372 487 Guatemalans and 177 684 Nicaraguans in the United States then (UNDP, 2006), although statistics from the neighboring countries also reflect outmigration due to civil wars in previous years. Historically Honduran internal migration movements have managed labor imbalances, but migration in recent years has been international, with Hondurans following Salvadoran networks to the United States (Reichman, 2004).[1] The case-study region of southern Honduras is an area impacted by many concerns common to low-income countries of the developing world; namely, it has suffered low levels of human development, environmental vulnerability, and expansion of links with the world economy.

First, the paper reviews the common drivers of migration from an origin (or sending) location. It next examines how non-traditional exports and human development have affected short-term to medium-term migration trends significantly, apart from other socioeconomic factors in the sending communities. While this study is situated in a prior decade, its lessons can inform human development specialists analyzing new alternatives amidst the changing global economy.

We also demonstrate the use of intercensal contextual community analysis supplemented by geographic information systems (GIS) data; this type of data integration offers a relevant methodology for developing countries with good mapping but limited household surveys. Our approach complements other recent multilevel regional approaches (Gray, 2008), although that study combines household and GPS data. Overall we conclude that development levels and measures of capabilities play an important role in human movement, particularly in attraction villages; on top of this, non-traditional exports and changes in employment opportunities served as small, contradictory, drivers in the process.

Migration and development policy

Population movements and migration models

Traditional microeconomic theories of economic migration consider push factors (low wages and high unemployment) prompting residents to leave a sending area against pull factors (high wages and low unemployment) attracting them to a receiving location. Movements could occur if the net present value of migration is positive (Sjaastad, 1962); the Todaro variation focuses on the probability-adjusted *expected* wage elsewhere (Todaro,

1969). Additionally, personal attributes and migration travel costs (based on distance) play a role in observed migration (Fields, 1982; Schultz, 1982).

Parallel to this, broader aggregate models view migration as balancing income differences between areas (Mazumdar, 1987) . Regional trends (such as unequal land tenure and population density) are behind migration flows (Shaw, 1974; Zipf, 1946). Origin or receiving zone wages and unemployment *per se* play a mixed role in migration trends (Beals *et al.*, 1967; House and Rempel, 1980). Average personal attributes of the population can matter in a human capital perspective; more education could be associated with higher work earnings in a new location, younger populations would be more mobile, and male populations usually move first. Other (municipal) net migration models have included "economic opportunity", local government policy variables, and national policy variables (Lundberg, 2003).

An interesting variation explores the links between land-use change for trade, investment and human movements. Vent-for-surplus models suggest that surplus labor is 'mopped up' by foreign capital invested in profitable land-use patterns such as export cropping (Myint, 1959). This presumes a land base either unexploited or 'underused'. Foreign capital supposedly increases labor demand in a region, so that previously idle residents are now employed with emigration by others.[2] However, Martin and Taylor (1996) show relaxing other assumptions of the neo-classical trade model (in particular, the inclusion of historical migration networks) could present the opposite results. A 'migration hump' could result with short-term and medium-term changes from trade reform being associated with additional immigration. The adjustment effects of changed land use, together with attractive job opportunities in the United States, mean that trade agreements would not immediately reduce international migration flows (Martin, 1993). The migration hump is usually a temporary phenomenon, with less international migration expected in the long term; however, a permanent migration plateau is also possible. Foreign direct investment *per se*—a trend often interlinked with changing land-use patterns—also has had a mixed impact. Sanderson and Kentor (2008) point out that new business growth through investment could substitute for migration by job creation and create upward wage pressures; however, capital-intensive foreign investment could also displace populations and expand transnational cultural ties. Their international panel regression analysis finds that foreign investment stocks have significantly increased international migration between poorer and richer countries during the 1985–2000 period after a decade lag.

Historical studies of pre-industrial Europe have focused on land enclosures and land-use changes; these analyses offer a methodology to guide current developing country analysis. Changes over time in village net population levels signal whether enclosure of the commons caused outmigration or provided new employment to attract newcomers (Chambers, 1953; Crafts, 1978; White, 1969; Boyer, 1997). The profound social change of enclosure clearly offered profitable opportunities for some, while increasing the vulnerability of others accustomed to deriving livelihoods from common pool

resources. However, overall the effects were unclear: as existing rural populations lost access to land for foodstuffs, their market labor supply would be increased. But the resulting new land-use patterns could then be accompanied either by labor-using or labor-saving technologies. While Chambers (1953) and White (1969) find no significant relationship between enclosure and internal outmigration, Crafts (1978) finds 'exclusionary enclosure' pushed outmigration.

The basic economics analysis has focused on welfare (income) maximization in migration decisions. Alternatively, a multidimensional analysis of poverty could be linked to migration. Poorer households and areas deprived of capabilities could choose to move temporarily or permanently to a different location in which they could better transform resources. Violence and civil wars promote migration, and safety is emerging as an important driver of outmigration in other countries. Recently in Honduras 20% of respondents reported insecurity as a reason to exit (UNDP, 2006).

A debate surrounds whether basic needs indicators (and public infrastructure provision in general) are associated with decisions to stay or exit. Early studies of internal migration found electrification could improve life quality and permanence (Bilsborrow *et al*., 1987), and community attachment and quality of life has reduced rural migration intention among Taiwanese populations (Liao, 2001). But more recent work in Africa suggests the opposite, with piped water and the diffusion of health centers having an apparent repellent effect (Beauchemin and Schoumaker, 2005).

Returning to basic needs indicators offers a first step towards measures of realized capabilities. When families have achieved a physical minimum of food, shelter, and education, they are on a path towards development and more capable to fulfill their life goals (Sen, 1999). Of course many of the original basic needs indicators (Streeten, 1980) only treat a minimum threshold of physical requirements; for instance, many families would prefer to live beyond the adequate calorie supply threshold of just achieving a minimum amount of food. However, the basic needs indicators are often captured in census and representative household surveys throughout the developing world. For instance, Gammage (2009) uses time poverty as a multidimensional measurement of capability deprivation, and finds time poverty is associated with other poverty characteristics such as housing conditions, lack of water access, energy source and income per capita. The Human Development Index (HDI) would offer an ideal single composite in which to consider capabilities and migration, yet its measurement has only advanced to subnational levels (i.e. department and municipal indices).

Our approach is to consider many factors of deprivation that may serve as drivers of outmigration. We use a variation of the macro approach discussed above to analyze how non-traditional exports have affected economic opportunity between 1988 and 1997, in light of measures of existing levels of realized capabilities. Since many smaller countries lack individual migration modules or regionally representative surveys, we use census data (1988 and 2001). We focus primarily on village-level variables in the

analysis below since households participating in (illegal) international immigration cannot be identified. Municipal measures of human development also are considered.

Honduran case-study population movements and data

Historical issues in human movements

The Honduran study zone shown in Figure 1 traditionally has experienced some of the highest rates of unemployment, population densities and environmental damage in the country (Stonich, 1989). It is one of the more capability-deprived zones of the country in many dimensions of poverty. The Choluteca and Valle department HDIs for this period are 0.548 and 0.564, below the national average of 0.575 (UNDP, 2006). The 1993 Agrarian Census (Secretariat of Planning, Coordination and Budget, 1994) reports the mean corn yield (metric ton per hectare harvested) in Choluteca department was 0.85 metric tons (m.t.) and was 0.77 m.t. in the Valle department, well below the national mean of 1.40 m.t. The region sits along the Pan American highway between El Salvador and Nicaragua and has been a source of international exchange and expulsion to other departments of Honduras (Stonich, 1992). Internal migration of −10% for Choluteca and −20% for Valle occurred

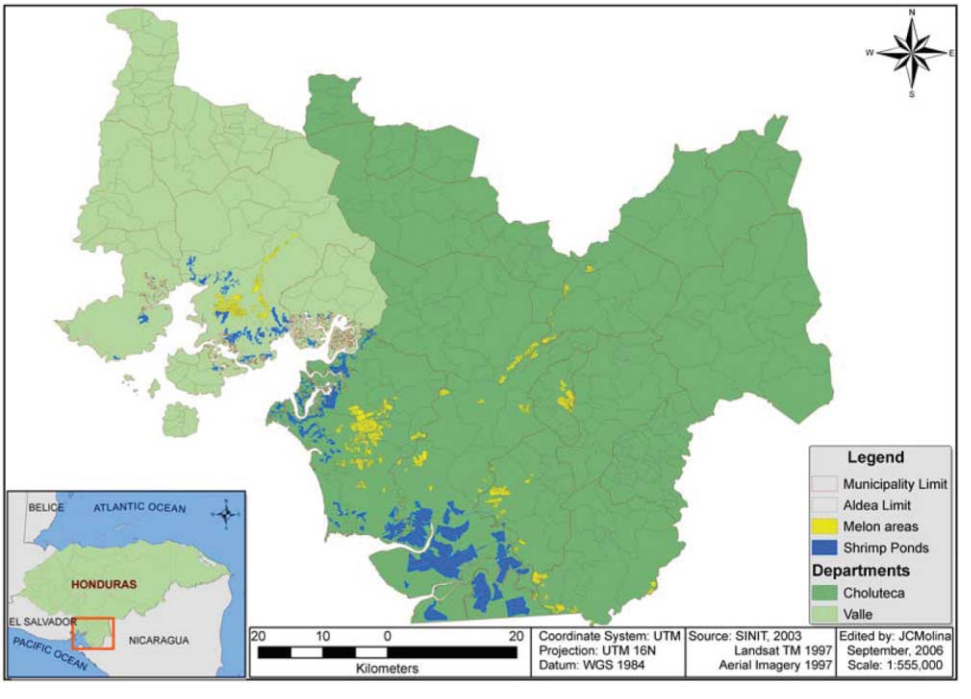

FIGURE 1. Southern Honduras Melon Plantations and Shrimp ponds, 1997.

throughout the 1961, 1974, and 1988 census periods (Unidad de Docencia e Investigación en Población, 1992).

Honduras, like many countries of the developing world, faced numerous problems causing outmigration throughout the decade of the 1990s. At the beginning of our study period (1988), the US *daily* minimum wage rates were nearly $27, nearly eight to 10 times that of the Honduran daily minimum wage of 4.6–7.10 lps. (2 lps. = $1) (Infoplease, 2007; Ministerio de Trabajo, 1988). High interest rates blocking credit use and declining purchasing power occurred since a continual devaluation of the Honduran lempira against the US dollar contributed to higher relative inflation rates (Puerta, 2004).[3] Earnings in dollars clearly became an attractive option. Finally, the Category 4 Hurricane Mitch, which devastated Honduras in 1998, could have served as an ecological stimulus to outmigration. Subsequent changes in US migration policy in early 1999 attracted migrants. The approval of the Temporary Protected Status program offered to Hondurans attracted over 82 000 enrollees by 2006 (Congressional Research Service, 2006). So below we focus more squarely on a first 'boom' of population movements prior to the hurricane.

Specific employment policies also enter into the case-study migration analysis. The promotion of non-traditional agricultural exports (NTAX) began as a development strategy following the passage of the Caribbean Basin Initiative by the US Congress. The countries of sub-Saharan Africa have also developed NTAX channels and niche markets in Europe (Hallam *et al.*, 2004). By 1995 nearly 100 000 hectares of land across Honduras were dedicated to the new crops. Minimal 'rural industrialization' and linkages followed with the establishment of regional packing plants, and, in the case of mariculture, some seed laboratories (Stanley, 2002b).

One NTAX, farm-raised shrimp, usually is sited in wetland areas while melons have been planted in previous cotton, sugar and corn farming areas. Ecological factors have driven much of the mariculture (shrimp) expansion in Honduras and the developing world; mangrove and salt-flat areas were deemed particularly suitable for mariculture (and 'useless' in traditional hunting and gathering activities). Thus villages involved in export promotion were chosen in part due to their natural resource endowments; the NTAX boom cannot be seen solely as a targeted poverty-reduction public policy. In some instances, land rights were transferred from public common use to privately-held concessions for shrimp farms, with fences preventing passage to fishing and gathering spots (Stonich, 1989). By 1996 between 26 000–31 000 hectares in Honduras were under concessions (Dewalt *et al.*, 1996; Pratts and Quijandria, 1997).

The relationship between this realignment of property rights, land-use changes and human movements in coastal zones of the developing world has not been explored fully. Theoretically new export job demands could attract labor in a vent-for-surplus manner by improving land use away from extensive gathering to intensive use. But enclosure could create an increased supply of displaced workers (Stonich and Bailey, 2000). By losing access to

gathering spots, local populations lose the ability to transform their time into income and food sources and become more vulnerable to agricultural, price and other shocks. Fishermen who are forced to travel greater distances around fences also would see a more unfavorable transformation of time into valuable activities. Regional outmigration could be expected in an exclusionary pattern.

Calculating the *net* job creation of the enclosure and new crops is nearly impossible. The local labor market affected by the NTAX has probably remained in disequilibrium, with new contracts and mechanisms benefiting only some (Stanley, 2002a). Previous research on mariculture and melons suggests the industries create approximately one full-time equivalent job per hectare, an amount higher than cattle ranching but lower than other local industries (Stanley, 2002b). Finally, measuring the jobs from the traditional pattern of land use (wetland gathering or cotton farming) is difficult since household surveys were not completed in the 1980s.

Data sources and summary statistics

The Honduran Population Census (Government of Honduras, 2004), undertaken in 1988 and 2001, follows a format similar to the short form administered in the United States. We use the full sample covering the 279 villages of the relevant departments of southern Honduras. The villages were spread out across 16 municipalities in Choluteca and nine municipalities in Valle. Three new villages which sprung up by 2001, as well as one earlier village that disappeared by 2001, were omitted.

Dependent variable and its trends. We first consider the dependent variable m_i as the village net migration rate (the observed population change across the intercensal 1988–2001 period, minus the natural rate of population increase).[4] The net migration residual does not allow separate estimates of immigration and emigration, and it misses short-cycle return migration events (Voss *et al.*, 2001). But it allows implication of trends by its sign, with positive net migration signaling emigration and negative net migration signaling immigration. Since we do not have village births and deaths for each year, we use the natural rate of increase of 2.57% for Valle and 2.7% for Choluteca (INE National Statistical Institute of Honduras, 2005), for an expected 39.6% and 42% natural rate of increase across the 1988–2001 period.[5] Thus we calculate the 1988–2001 gross net migration level M for each village i as:

$$M_i = \text{2001 census population} - (\text{1988 census population} + [0.42 \text{ or } 0.396] \text{ x 1988 population}) \quad (1)$$

Or:

$$\text{2001 census population} - \text{2001 projected population}^6$$

An initial review suggests net outmigration in 84% of the villages between 1988 and 2001. This provides some evidence of a short-run migration hump following trade expansion. We can convert this to a percentage rate by dividing M_i by a base population. The mean rate of this calculation of village net (out)migration using the 2001 population base is −13% in the Choluteca department and −17% in Valle. Other studies (Lundberg, 2003) focus on a scaled variable, with a proportion greater than one implying emigration and less than one outmigration:

$$m_i = [(1988 \text{ population} + M_i) / (1988 \text{ population})] \quad (2)$$

Lastly, we adjust this for the effects of Hurricane Mitch (in 1998) to omit ecological migrants unrelated to the effects of non-traditional exports. The census provides data on household members who left between 1998 and 2001 following the natural disaster. We find numbers of family members exiting after Mitch reported in the 2001 census to be quite small.[7] Our final dependent variable is the net migration rate between 1988 and 1997 as:

$$m_i^* = [(1988 \text{ population} + M_i - \text{total village Mitch refugees}) / (1988 \text{ population})] \quad (3)$$

Table 1 shows that 1988–1997 net migration is negative in most cases. In fact, only 19% of the villages attracted labor before Hurricane Mitch, with a total of 74 625 people leaving the region (primarily for international migration) and 21 125 arrivals during the 1988–1997 period.

Explanatory variables and trends. The 1988 census provide data for the calculation of the population density figures, urbanity, open unemployment rates, hours worked and most of the poverty and socioeconomic drivers of migration at the beginning of the study period, following other studies (Lundberg, 2003).[8] We also use print maps to calculate the distance of each village to the border with El Salvador. Average farm size and basic grains yields at the municipality level were calculated from the country's 1993 Agrarian Census (Secretariat of Planning, Coordination and Budget, 1994). The United Nations Development Programme's Honduran office (UNDP, 1998) provided HDIs at the municipality level, which include its three components (life expectancy, literacy, and adjusted Gross Domestic Product per capita). The 1996 index components were calculated from the 1988 population census and 1992 national household survey data.

Regarding the policy variables, we use GIS analysis to measure the extent of non-traditional export agriculture in each village before Hurricane Mitch. Interpretation of 1997 aerial photographs in Figure 1 (Molina, 2006) demonstrated 14 215 hectares in shrimp ponds and 7566 hectares of melon farms across specific villages in the Choluteca and Valle departments before Hurricane Mitch. These figures are slightly greater than published reports of

TABLE 1. Summary statistics of attraction and expulsion communities

Variable	Predicted sign emigration	Attraction (n = 47)	Expulsion (n = 230)	All villages (n = 277)
M_i net migration levels 1988–1997		+20 807	−74 307	−53 500
m_i percentage net migration 1988–1997		1.41	0.69	0.81
Village geography				
Village internal migration 1983–1988	+	0.0326 (0.057)	0.0332 (0.048)	0.033 (0.050)
Distance to El Salvador border (km)		77.59 (27.83)	82.5 (43.00)	81.68 (40.84)
Urban (1 = yes,0 = no)	+	0.04 (0.20)	0.03 (0.16)	0.03 (0.17)
Demographic and living conditions				
Population density (person/km^2)	−	97.66 (107.76)	108.54 (133.41)	106.71 (129.33)
Mean age (years)	+	20.5 (1.45)	21.35 (1.43)	21.19** (1.44)
Median age (years)	+	13.98 (1.15)	14.52 (1.30)	14.45** (1.30)
Percentage literacy rate	−	51.23 (9.54)	53.07 (9.96)	52.76 (9.80)
Mean school years completed	−	4.15 (0.70)	4.25 (0.69)	4.23 (0.70)
Percentage of female-headed households	−	18.51 (6.78)	21.3 (7.31)	21** (7.23)
Percentage of houses no potable water	−	41.06 (42.82)	54.92 (29.42)	53.1** (32)
Percentage of houses poor state (earthen)	−	4.34 (9.12)	3.18 (8.64)	3.35 (9)
Percentage of houses without sanitation	−	76 (22.5)	77 (20.5)	76.5 (20.5)

	Predicted sign	Attraction (n = 47)	Expulsion (n = 230)	All villages (n = 277)
Employment trends				
Weekly hours work (PET)	+	31.58 (12.29)	30.30 (13.23)	30.51** (13.06)
Weekly hours work (PEA)	+	12.30 (7.37)	9.60 (6.55)	10.06** (6.75)
Unemployment rate %	−	12.74 (21)	16.71 (27.79)	14 (22)
Village-level export land changes (ha)				
1997 village melon	+	35.84 (104.71)	25.35 (147.72)	27.31 (141.78)
1997 village shrimp	+	8.02 (29.86)	59.64 (626.47)	51.31 (573.57)
1997 village NTAX	+	43.86 (108.84)	84.99 (693.57)	78.63 (636.225)

(*continues*)

TABLE 1. Continued.

	Predicted sign	Attraction (n = 47)	Expulsion (n = 230)	All villages (n = 277)
1997 village melon employ/ village PET	+	0.045 (0.15)	0.022 (0.11)	0.03 (0.12)
1997shrimp employ/ village PET	+	0.04 (0.13)	0.07 (0.72)	0.06 (0.65)
1997 Total NTAX employ/ village PET	+	0.083 (0.20)	0.088 (0.76)	0.09 (0.70)
Municipal fixed effects				
Average farm size (hectares)	–	11.07 (7.15)	10.79 (9.21)	10.84 (8.89)
Corn yields (TM/hectare)	+	0.99 (0.42)	0.81 (0.33)	0.84** (0.36)
HDI (0–1 range)	+	0.55 (0.05)	0.53 (0.06)	0.54* (0.05)
Life expectancy (years)	+	68.14 (0.45)	68.05 (0.43)	68.07 (0.43)
Literacy rate (%)	+	64.98 (6.85)	64.81 (6.97)	64.84 (6.94)
GDP per capita (PPP$)	+	1857.89 (161.80)	1801.96 (130.53)	1811.38** (137.58)

*,**Subsample means show statistically significant differences at 90% or 95% confidence level.

Sources: Honduran Population Census 1988 and 2001 (INE National Statistical Institute of Honduras, 1988, 2001); aerial photographs of land area, 1997 (see Figure 1); Atlas of Honduras (Central Internacional de Agricultura Tropical); print map Instituto Geographico de Honduras.

the NTAX industry status in this period (Unidad de Analisis de Politicas Economicas, 1995; Pomareda *et al*., 1997; Pratts and Quijandria,1997), and it is notable that the area in productive shrimp farms is well below the area under leaseholds during that period. Overall the GIS data show 8% of the 279 sample villages participated in shrimp farming and 10% in melon farming, with some villages showing both. We assign a fixed labor generation coefficient per each hectare of land planted to determine the amount of local employment creation by NTAX.[9] To make this comparable across villages with different labor force levels, we also consider the number of new jobs created as a proportion of the villages' 1988 working-age population (PET). So Table 1 includes measures of both 1997 hectares and local job proportions within a village in the variables *Village NTAX has., Village Total NTAX Employment/Village Working Age Population PET.*

We present the full list of available census and policy variables in Table 1, with a sign to predict that variable's impact on a village's (positive) net migration rate. For instance, villages in which a large majority of the population has achieved the basic needs of water and education (literacy) demonstrate realized capabilities and a lower level of one dimension of poverty. On the other hand, villages with a high proportion of female-headed households represent locations of high vulnerability. We presume villages nearer the Salvadoran border could have more community-level networks (and smaller travel costs) promoting international migration. The right-hand column of Table 1 demonstrates which variable means were significantly different across the attraction and expulsion villages in the sample.

To partially control for other long-term (hidden) village factors and dimensions of poverty that could impact net migration during the 1988–1997 period, we consider each village's previous internal in-migration (1983–1988) as a lagged endogenous variable (Menard, 2002). While internal migration contacts are unlikely to assist international travel, villages with previously strong internal attraction could serve as sources of stable employment, realized capabilities, and less future migration. On the other hand, the attraction villages could also have provided their members with the necessary income to pursue future international movement. In the 1988 Census we can observe the number of 1988 new residents in each southern village who did not live in the southern region in 1983 and calculate this as a rate compared with the 1988 population. This allows us to establish which villages were previously sources of attraction for internal migration. This measure of historical in-migration is logically negatively correlated with historical outmigration.[10]

The summary statistics suggest negative net migration villages saw a few significant differences when compared with the attraction villages. The initially-younger age structure appears to be associated with the growth villages. This is somewhat contradictory to a human capital perspective, which suggests younger populations are more likely to exit. Table 1 presents logical results regarding employment opportunities; villages in which households were employed for more hours in 1988 would have less population outmigration in the subsequent years.

The physical measures of basic needs achievement vary dependent upon the indicator derived from census data. Whereas most houses in this zone did have sanitation, very few were constructed with modern building materials. Safe drinking water is closely associated with human development and realization of capabilities, particularly a reduced time burden for women. We find water status of the attraction villages is significantly different across the migration subsamples.[11] In addition, the household head gender matters; while about 20% of all households were run by single-mothers, this phenomenon demonstrates diminished capabilities to achieve well-being and is linked to population exits.

We also provide municipal-level data on other measures of human development and factors that affect realized capabilities. In 1990 employment in agriculture accounted for 50% of total employment in Honduras, so we focus on farm activities (World Bank, 2007). Although insignificant, the larger average farm size could be a sign of a more skewed land distribution pattern and limited capabilities. At the municipal level, the expulsion villages were marked by significantly lower basic grains yields, and, by implication, lower farmer earnings. The United Nations Human Development Index represents a composite measure of income, health, and education potentials based on earlier data (UNDP, 1998). We note that overall higher levels of municipal human development are associated with (positive) net migration. In particular, the statistics indicate significantly higher Gross National Product per capita (PPP$) in the attraction villages.

Table 1 suggests that village-level shrimp farming is associated with expulsion while melon farming is associated with attraction (although the means are insignificantly different). Several explanations may underlie the different trajectories of the two main non-traditional exports. The slightly stronger backward linkages of melons as compared with shrimp have been noted (Stanley, 2002b); these linkage effects could account for indirect employment and labor attraction possibilities in villages planting melons. Additionally, semi-intensive aquaculture is associated with economies of scale and higher use of feeds and seed compared with traditional methods (Lee and Wickins, 1992; Rosenberry, 2009). Thus the capital and land-intensive form of Honduran mariculture created a social reality less favorable to job creation. Finally, large areas of land were transferred to private mariculture leaseholds, with not all areas placed into production but some left idle.

Statistical analysis

Empirical specification

For the regression analysis we focus on the most significant variables presented in the Table 1 descriptive statistics and how they affect net migration. High correlation statistics between many of the employment and demographic factors forced us to choose one significant variable in each category.[12] Our explanatory variables include:

- *Village Geographic factors* (urbanity, URBAN; distance to the Salvadoran border, DISAMAT; previous internal migration, INTERMIG).
- *Village 1988 Demographic and Origin Living Conditions variables* (population density, PD88; proportion female-headed households, PERJM88; median age, EDMN88; houses lacking potable water, PSINAG88; mean school years, ANOESC88).
- *Village 1988 Employment Trends* (mean hours worked in the previous week by the economically-active population, HRPEA88).
- *Village Export Policy Variables* (number of NTAX village jobs created relative to the village working-age population, NTXEALPT; total hectares converted to new land-use patterns by 1997, NTXHAALD).

A semi-log specification allows for the interpretation of the marginal effects of each explanatory variable approximately in percentage terms and avoids the errors of simple ordinary least squares (Schultz, 1982). Hence, the net migration rate by the later period develops in a cross-sectional regression (with corrections for heteroskedasticity) as:

$$\ln m_i^* = \alpha + \beta_1 \text{INTERMIG} + \beta_2 \text{URBAN} + \beta_3 \text{DISAMAT} + \beta_4 \text{PD88} + \beta_5 \text{PERJM88} + \beta_6 \text{EDMN88} + \beta_7 \text{PSINAG88} + \beta_8 \text{ANOESC88} + \beta_9 \text{HRPEA88} + \beta_{10} \text{NTXHAALD} \quad (4)$$

Net migration rates

Table 2 reports the effects of the selected explanatory variables, with different variations of the policy variable. The last row shows only the marginal effect of the job creation variable. Across all specifications, villages that previously attracted internal migrants now were more associated with negative net migration (expulsion), controlling for other factors. Previous internal migration rates were small (around 3%), so that increasing this by 1% would only be associated with a 1% increase in the future negative net migration. Basic needs achievement—as a multidimensional measure of poverty reduction–is significant. Outmigration falls by 2.2 percentage points for a 10-point increase in the proportion (0.10) of houses with potable water. Demographics matter. Villages with a higher percentage of female-headed households generally continued to expel people. We note that since the population mean is just over four years of schooling, most households across the region suffered an education deficit depriving their capacity for fuller human development and lowering the significance of the education variable. Villages with older populations tended to expulse labor; for each year increase in age, the net migration rate fell 8%. These trends are generally consistent throughout all specifications.

Table 2 shows few significant linkages between village hectares planted (and jobs created) and village net migration rates when considering non-traditional export crops in general. Turning to the effects of the two non-traditional export crops separately, we find the area converted to

TABLE 2. Effect of non-traditional exports on village net migration rates (whole sample, n = 277 villages)

	Total NTAX land changes		Shrimp land changes		Melon land changes	
Constant	1.16*	(0.58)	1.11*	(0.58)	1.14*	(0.58)
Internal migration 1983–1988	−1.01**	(0.49)	−1.01**	(0.49)	−0.99**	(0.48)
Urban	0.57**	(0.16)	0.57**	(0.16)	0.55*	(0.16)
Population density	−0.0004	(0.0003)	−0.0004	(0.0003)	−0.0003	(0.0003)
Distance to border	−0.0006	(0.0008)	−0.0006	(0.0008)	−0.0006	(0.0008)
Proportion no potable water	−0.23**	(0.10)	−0.23**	(0.10)	−0.22**	(0.10)
Weekly hours worked	0.0017	(0.004)	0.002	(0.004)	0.001	(0.004)
Percent female-headed households	−0.57	(0.41)	−0.58	(0.41)	−0.53	(0.41)
Median age	−0.08*	(0.04)	−0.08*	(0.04)	−0.08*	(0.04)
School years Completed	0.01	(0.05)	0.010	(0.05)	0.01	(0.05)
Hectares export land	−0.0002	(0.0002)	−0.0003**	(0.00014)	0.00015*	(0.000096)
[Or: Export employment/PET]	[−0.015	(0.02)]	[−0.03**	(0.01)]	[0.37	(0.30)]
	Breusch–Pagan χ^2_{10} = 105.59; F[10,266] = 2.97, P value = 0.0015; R-squared = 0.10		Breusch–Pagan χ^2_{10} = 105.67; F[10,266] = 3.00, P value = 0.0013; R-squared = 0.10		Breusch–Pagan χ^2_{10} = 104.27; F[10,266] = 3.01, P value = 0.0013; R-squared = 0.10	

Standard errors corrected for heteroskedasticity using White's correction. *,**Coefficient statistically significant at 90% or 95% confidence level.
Sources: See Table 1.

shrimp farming is associated with negative net migration (expulsion) while that planted in melons is weakly associated with positive net migration (attraction). Specifically, for each 100 hectares in mariculture production in a village, that village's net migration rate fell 3% significantly, implying outmigration. This could represent the exclusionary effects of enclosure when nearby residents lose wetland access. The same effect appears in measuring shrimp farming employment relative to the economically active population. Melon farming is clearly positive; for each 100 new hectares planted in a village, its net (in)migration rate rises by 1.5%. Although important, these crops have a smaller relative impact than other regressors.

Attraction or expulsion

We next consider whether the interaction between export cropping, basic needs achievement, and population movements followed different processes across the attraction and expulsion villages. That is, we split the sample into those villages associated with positive or negative net migration between 1988 and 1997 (pre-Hurricane Mitch):

$$\ln m_i^* = \begin{Bmatrix} \alpha_a + B_a' X_i + \varepsilon_a \text{ if } M_i > 0 \quad (a)\,(\textit{for attraction}) \\ \alpha_e + B_e' X_i + \varepsilon_e \text{ if } M_i \le 0 \quad (b)\,(\textit{for expulsion}) \end{Bmatrix} \tag{5}$$

We use municipal-wide indicators of farm structure, grains yields and human development contribute by including these as regressors *in lieu* of the associated village variables (hours worked, school years completed, potable water) so each equation becomes:

$$\ln m_i^* = \alpha + \beta_1 \text{INTERMIG} + \beta_2 \text{URBAN} + \beta_3 \text{DISAMAT} + \beta_4 \text{PD88} + \beta_5 \text{PERJM88} + \beta_6 \text{EDMN88} + \beta_7 \text{YIELD} + \beta_8 \text{FARMSIZE} + \beta_9 \text{HDI} + \beta_{10} \text{NTXHAALD} \quad (6)$$

where YIELD is municipal corn yields, FARMSIZE is the municipal average farm size, and HDI is the municipal HDI.

In Table 3 we find that there are statistically significant differences across the village types.[13] In general, the regressions better explain the process in the attraction villages. Corn yields are an indicator of the previous employment picture in the municipality of the attraction villages; higher yields logically mean more attraction but the effect is only significant in one instance. The municipal HDI is a measure of overall basic needs achievement. Clearly those areas with higher capacities for a longer life attract population.[14] Since the index is scaled between zero and one, a 0.10 increase in municipal human development would be associated with a 29% increase of inmigration in the attraction villages. The index is not associated with expulsion.

Most importantly, non-traditional export cropping is relevant to attraction but not expulsion. In those villages that otherwise would attract people, the expansion of shrimp farming had a reverse role. For each 100 hectares of shrimp ponds created, outmigration rates there rose by 0.4%. As the number of jobs created in melon farming relative to the economically-active population increases, immigration rates rises significantly in the attraction zones. And melon farming land expansion served to brake the trend towards expulsion in other villages.

Population movements and subsequent living conditions: an initial view

As migrants leave an area to improve their choices and their standard of living, those left behind can be affected. Subsequent capital flows (remittances) and cultural interchanges, as well as how those patterns affect local employment opportunities and decisions, are part of the web of globalization and village analysis. Long-term views of how human development and multidimensional measures of poverty change in a location change over time would integrate not only population and financial changes but also changes in opportunities and capabilities.

We work with data from the 2001 Population Census of Honduras for initial observations on the impacts of mobility and migration. In Table 4 we

TABLE 3. Effect of non-traditional exports on village net migration rates: attraction and expulsion villages, including municipality effects

	Attraction villages (n = 47)			Expulsion villages (n = 230)		
	All NTAX	Shrimp	Melon	All NTAX	Shrimp	Melon
Constant	−1.46 (0.97)	0.94 (0.91)	−1.49 (0.97)	0.33 (0.66)	0.32 (0.61)	0.34 (0.6)
Internal migration 1983–1988	−1.60** (0.49)	−1.70** (0.48)	−1.62** (0.49)	−0.83** (0.40)	−0.83** (0.40)	−0.83** (0.41)
Urban	0.09 (0.24)	0.23 (0.25)	0.08 (0.24)	0.42** (0.11)	0.42** (0.11)	0.41** (0.115)
Population density	−0.0008* (0.0004)	−0.0009**(0.0004)	−0.0008* (0.0004)	−0.0003 (0.0003)	−0.0003 (0.0003)	−0.0003 (0.0003)
Distance to border	0.003** (0.0015)	0.003** (0.0015)	0.003** (0.0015)	−0.0002 (0.001)	−0.0003 (0.001)	−0.0003 (0.001)
Percentage of female-headed households	2.10** (0.91)	1.81** (0.90)	2.10** (0.91)	−0.09 (0.45)	−0.095 (0.45)	−0.06 (0.45)
Median age	−0.03 (0.05)	−0.08 (0.065)	−0.03 (0.05)	−0.03 (0.04)	−0.03 (0.04)	−0.04 (0.04)
Hectares of export land	−0.0001 (0.0002)	−0.004** (0.0016)	0.00006 (0.0003)	0.00001 (0.0002)	0.00002 (0.0002)	0.0002**(0.0009)
(Or: Export jobs/PET)	0.18 (0.34)	−0.70* (0.36)	0.59** (0.17)	0.002 (0.015)	−0.0004 (0.012)	0.13 (0.18)
Municipal						
Average farm size	−0.001 (0.007)	0.0004 (0.006)	−0.001 (0.006)	0.002 (0.015)	−0.004 (0.007)	−0.004 (0.007)
Corn yields	0.12 (0.12)	0.27** (0.12)	0.12 (0.12)	0.13 (0.08)	0.13 (0.08)	0.10 (0.09)
HDI	2.91* (1.55)	2.91* (1.48)	2.96* (1.55)	−0.40 (0.74)	−0.40 (0.73)	−0.40 (0.73)
	Breusch–Pagan χ^2_{10} = 32.12; F[10,36] = 1.72, P value = 0.10; R-squared = 0.32	Breusch–Pagan χ^2_{10} = 35.24; F[10,36] = 2.34, P value = 0.03; R-squared = 0.39	Breusch–Pagan χ^2_{10} = 30.46; F[10,36] = 1.72, P value = 0.10; R-squared = 0.32	Breusch–Pagan χ^2_{10} = 200.18; F[10,219 = 1.39, P value = 0.19; R-squared = 0.06	Breusch–Pagan χ^2_{10} = 199.69; F[10,219] = 1.39, P value = 0.19; R-squared = 0.06	Breusch–Pagan χ^2_{10} = 200.12; F[10,219] = 1.49, P value = 0.15; R-squared = 0.06

Standard errors corrected for heteroskedasticity using White's correction. *,**Coefficient statistically significant at 90% or 95% confidence level.
Sources: See Table 1.

TABLE 4. 2001 population census characteristics (village effects)

	Attraction village (n = 47)	Expulsion village (n = 232)	All villages (n = 279)
Population density (person/ km^2)	172.60 (175.29)	118.13 (142.75)	127.31** (150)
Percentage of houses no potable water	24.81 (25.79)	41.39 (68.12)	39** (63)
Percentage of houses without sanitation	41.47 (20.6)	42.4 (23.88)	42 (23)
Percentage of houses poor state	0.93 (1.86)	0.49 (2.47)	0.6 (2)
Percentage of female-headed households	20.8 (6.9)	23.4 (8.8)	23** (9)
Mean age	21.16 (1.58)	23.54 (1.96)	23.24** (2.01)
Median age	16.30 (1.47)	16.84 (2.04)	16.73** (1.98)
Literacy rate (%)	70 (8)	69 (9)	69 (9)
Mean school years completed	5.01 (0.62)	8.67 (0.56)	8.04 (0.75)
Absolute poverty rate (1 or more NBI)	71% (12)	73% (16)	73% (15)
Extreme poverty rate (2 or more NBI)	42.5% (64)	37% (18)	38% (32)

Data presented as mean (standard deviations). *,**Subsample means significantly different at 90% or 95% level of confidence.

note that the expulsion villages remain those with worse housing and water access.[15] Households lacking one or more of these measures are classified as 'absolutely poor', and households lacking two or more of five measures are 'extremely poor'.[16] Surprisingly, 2001 poverty rates were not significantly different in villages with and without outmigration.

In comparing the rows of Table 1 and Table 4 across time (the 1988 versus 2001 variables in the beginning and end), some significant differences emerge.[17] Large percentage declines in population, a decrease in the male population, and reduced population densities occur. And in both the attraction and expulsion villages, the dependency ratio increased significantly (nearly 20%) while the mean age grew about 10%. Both the attraction and expulsion villages demonstrated a significant increase in the proportion of female-headed households; this suggests a general trend towards feminization occurring, regardless of migration status.

In all villages, literacy rates, schooling, and housing quality improved over time. The rate of increase of mean schooling years was actually much higher in the expulsion villages (a mean increase of 4.4 years versus 0.8 years elsewhere); international migrants could be sending remittances to these households allowing for greater education opportunities. Edwards and Ureta (2003) found that households with remittances in El Salvador spend more on education and have a higher probability to have a child who finishes school, while Rapoport and McKenzie (2006) find depressed educational attainment from migration. However, the Honduran Central Bank (BCH, 2009) has reported that schooling is the second largest item in remittance spending. However, further study of remittance fungibility with other incomes and spending allocations is needed before linking remittances and improved dimensions of human development.

Conclusions and future research

Here we examine which components of low incomes of southern Hondurans most affected village net migration behavior. In particular, we focus on how the context of previous living conditions and human development can affect human movements during a period of rapid export growth and land-use change. Melons and farm-raised shrimp were the main crops adopted in the study region, with melons replacing cotton, sugar, corn and cattle, and shrimp replacing salt production and wetlands gathering in most instances.

Overall the more attractive urban centers of southern Honduras (including downtown Choluteca) grew and absorbed some internal human movements. Yet the rural communities show a starker picture of outmigration, particularly international migration to the United States. Gender and older age were significantly associated with outmigration. We find the village educational level is insignificant in village migration rates, yet the villages experiencing the highest trend of migration see increases in the average years of schooling.

Basic needs achievement levels were next in importance. We find physical community goods are associated with less mobility. At the village level we find that as the proportion of households without potable water rises, outmigration increases; additionally, as the level of municipal human development increases, villages became centers of attraction during the study period. Clearly, residents in the study zone desired access to clean water and other goods improving health and life capabilities. As Sen (1999) writes, escaping premature mortality is an elementary opportunity linked to human freedom. Likewise, government 'support-led' processes of healthcare and prevention can enhance life expectancy and the quality of life (Drèze and Sen, 1995).

Thus policy-makers with an eye towards reducing outmigration could focus on the direct provision of public goods such as water and sanitation. A focus on income creation offers a less direct measure of capabilities, and here we echo the findings of past studies that have shown mixed findings on the direct link between new jobs and mobility. Land-use changes associated with non-traditional exports played a small, if contradictory, role in global population movements. Crop choice matters. Melons reduced outmigration while each additional 100 shrimp hectares planted was associated with a 3% increase in village outmigration.

The results of this paper can be verified in other developing countries offering human development concerns, trade, and outmigration. An expanded temporal focus to explore the migration hump hypothesis would be ideal, since the Honduran story was truncated by the arrival of Hurricane Mitch and a subsequent decline in both the shrimp and melon sectors. Another project could address the gender component of outmigration—both internally and internationally. Sassen (1988) notes many positions in Mexican rural industrialization are held by women. This suggests a shifting gender composition of regional opportunities and increased male outmigration. And

De Hoyos *et al.* (2009) show that women working in the maquilla industry in northern Honduras have enjoyed a significant wage premium over men employed outside that sector. Since seven of 10 maquilla jobs were held by women during their study period (1991–2006), this would imply that males outside of the maquilla boom did not enjoy many of the poverty-reducing effects of trade expansion. Here calculations from the 2001 census data (showing an increasing proportion of female-headed households) suggest that male migration should be dominating the trends observed in non-maquilla areas of southern Honduras.

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Notes

1 Most recently, Hondurans have migrated to El Salvador to fill rural labor shortages there caused by the massive exodus of Salvadorans to the United States and dollarization (Puerta, 2004).
2 We refer to inmigration (emigration) or outmigration (immigration) to distinguish these two flow directions.
3 The Honduran lempira moved from a fixed exchange rate of 2 lps. = $1 in 1988 to a floating rate of 5.4 lps. = $1 in 1992 and 15 lps. = $1 by 2001.
4 Note that this *residual* measurement of net migration is quite different from the common 'Intercensal Rate of Population Increase', which captures the direct increase of population subtracting the amount in the former census from the later (2001 census population – 1988 census population); the 1988–2001 Intercensal Rate of Population Increase is 1.5% reported by the National Statistical Institute (INE National Statistical Institute of Honduras, 2005).
5 These figures are close to the 2.7% per year natural rate of increase in Honduras (World Bank, 2002). Using a natural rate of increase of 2.7% the expected natural rate of increase in the population between 1988 and 2001 would be $P_t = P_o * e^{0.027*13}$ for a 42% natural increase over time apart from migration.
6 This follows the basic demographic balancing equation cited in Voss *et al*. (2001) in which the difference between inmigration (IM) and outmigration (OM) equals the actual period population change less the natural increase over time (B – D): P1 = P0 + (B – D) + (IM – OM) → IM – OM = (P1 – P0) – (B – D).
7 The 2001 census reports 2535 persons leaving the Choluteca department after Hurricane Mitch and 2443 leaving from the Valle department.
8 CEPAL (2001) outlines the use of unsatisfied basic needs indicators has been incorporated as a direct measure of poverty, given the absence of reliable income data (for the use of international or national indirect poverty line measures). The six basic needs

measures chosen by the Honduran government include lack of potable water, lack of sanitation services, poor housing quality, crowded housing, lack of economic capacity by the household head and lack of educational assistance by primary-age children. Households lacking one or more of these measures are classified as 'absolutely poor', and households lacking two or more measures are 'extremely poor'. The 1988 Census data allowed calculation of the first three of these basic needs measures, which we include in Table 1.

9 Namely we consider 0.75 direct on-farm jobs created per shrimp and melon hectare planted; we assign 0.3 indirect packing jobs for both melon and shrimp. We follow published sources (Pomareda *et al*. 1997), which mention 'jobs created' although these maybe seasonal and part-time in nature (for a discussion of the conversion of jobs to full-time equivalents, see Stanley, 2002a).

10 At the municipal level, calculation of both inmigration and outmigration between 1983 and 1988 is possible. We calculate these rates for the 16 municipalities of Choluteca and the nine municipalities of Valle, and focus on entry and exit to the southern zone rather than movement within it. Using a Pearson correlation coefficient we find municipal outmigration is negatively correlated with municipal inmigration (–0.35).

11 We do not have data on specific international migrant versus non-migrant households within all the villages to verify the literature that frequently reports higher human capital endowments of migrants. However, in separating the 2001 population of southern Honduras between those who undertook *internal migration* within Honduras (between 1996 and 2001) and those who remained, we do find significant human capital differences. Namely, those Cholutecans who left the southern zone were significantly younger and more literate than those who remained (24.28 and 26.71 years and 86% versus 71% literacy, with *t*-statistics of 20.48 and −48.60, respectively). Those from the department of Valle who left the southern zone were older (25.30 years versus 23.50 years) and again more literate (85% versus 74%), with *t*-statistics of −8.55 and −22.65.

12 Using Pearson correlation coefficients, we find the hours worked of the economically-active and working-age populations highly correlated (0.63) and both related to the village unemployment rate. Village literacy rates and mean school years were correlated at 0.50. Age years were highly correlated with each other (0.74).

13 The Chow test *F*-statistics were statistically significant for all groupings to determine whether the process in the attraction villages is significantly different from that in the expulsion ones. Using the dependent variables of NTAX land, NTAX job creation, shrimp farm land, shrimp farm job creation, melon farm land, and melon job creation each produced a *F*-statistic greater than eight, with 266 and 11 degrees of freedom.

14 Similar significant results were found when using the overall HDI in the regressions.

15 CEPAL (2001) outlines the use of unsatisfied basic needs indicators as a direct measure of poverty, given the absence of reliable income data (for the use of international or national indirect poverty line measures).

16 The six basic needs measures chosen by the Honduran government include lack of potable water, lack of sanitation services, poor housing quality, crowded housing, lack of economic capacity by the household head and lack of educational assistance by primary-age children.

17 The *t*-statistics for the cross-period mean differences are available upon request.

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