Networks versus Need: Drivers of Urban Out-Migration in the Brazilian Amazon

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Introduction

In 2000 nearly half of the world's population lived in urban areas, and by 2030 over 60% of the global population is expected to live in cities (Cohen 2006). As levels of urbanization rise throughout the world, and as growth is concentrated in small and mid-sized cities (Cohen 2006), the character of internal migration has the potential to fundamentally change. The past three decades have seen a revolution in research on migration in the developing world, most of it focused on the predominant flows, those from rural areas. This paper builds on the theoretical advances of recent decades, and contributes to the small but growing literature on urban out-migration.

Past research in several developing country settings has argued that differences exist in the correlates of urban and rural out-migration (Fussell and Massey 2004; Reed, Andrzejewski and White 2010; Shefer and Steinvortz 1993). These studies indicate that macro-level factors (e.g., unemployment rates) and micro-level factors (e.g., educational attainment) impact urban and rural out-migration streams differently, and that migrant networks function differently in large cities versus small cities and towns. From a macro perspective Shefer and Steinvortz (1993) find that in Colombia the income ratio between the origin and destination correlates with rates of rural-urban migration, but not urban-urban migration. In addition, among rural-urban migrants, rates of unemployment in the urban destination are not associated with migration flows, while among urban-urban migrants, rates of unemployment in the destination have significant negative effects on migration. A micro-level study in Ghana found that among men, educational attainment is significantly associated with urban-urban and urban-rural moves but

not with rural-urban or rural-rural moves (Reed *et al* 2010). Additionally, Fussell and Massey (2004) found that migrant networks function as a mechanism sustaining Mexico-US migration in rural communities and small cities, but not in large urban areas because social networks are more diffuse in those settings (Fussell and Massey 2004). Further research into how drivers of migration and migrant selectivity operate in urban settings will shed more light on the factors associated with urban out-migration, the ways in which migration processes differ between urban and rural areas, and future migration streams that developing countries might anticipate.

Our study communities are located within the Brazilian Amazon, a region that has quietly experienced steady urbanization for decades. Data from the 2010 census indicate that 72% of the population of the legal Amazon is concentrated in urban areas (Instituto Brasileiro de Geografia e Estatística (IBGE) 2012). In addition, there is evidence of high levels of inter-urban movement within the Amazon region, suggesting that urban networks may be an important driver of migration between the region's cities (Costa and Brondizio 2009). In this paper we examine urban out-migration among youth and young adults from two medium-sized cities in the Amazon region: Santarém and Altamira, located in the state of Pará. Both Altamira and Santarém are regional hubs in Pará, but are substantially smaller than the largest cities in the Brazilian Amazon, Belém and Manaus, which have populations greater than one million. Because of the relatively small size of Altamira and Santarém as compared to Brazil's larger urban areas, limited opportunities for employment and upward mobility exist, creating conditions for labor and educational out-migration among the young adult population.

The state of Pará, including both Altamira and Santarém, is better known as a migration destination than as a source of migrants. The region experienced dramatic growth during the Brazilian military government's Amazon settlement scheme in the 1970's, which sought to

promote development of the interior of the country and alleviate poverty in the Northeast region (Alonso and Castro 2005; Browder and Godfrey 1990; Fearnside 1984; Yoder and Fuguitt 1979). This brought large numbers of people to Pará, particularly those from drought-prone Northeastern Brazil, offering them opportunities to develop rural agricultural land and leading to the growth of urban areas in the region (VanWey, D'Antona and Brondizio 2007). Between 1970 and 1996 the population in Pará more than doubled, from 2.2 million to 5.5 million (Perz 2002). Yet by the 1990's migration shifted from predominantly in-migration to the Amazon from other regions of Brazil to intraregional migration within the Amazon (Perz et al. 2010).

The two cities provide distinct urban experiences within the Amazon. While Altamira had a population below 6,000 prior to the government settlement scheme, Santarém has been a city of substantial size for hundreds of years (Alonso and Castro 2005; Prefeitura de Santarém 2012). This difference is likely to correlate with the extensiveness of intra- versus extra-city family networks. DaVanzo (1981) argues that intra-city social networks are an important component of location-specific capital, or the non-transferable assets that people accumulate in the place in which they live, while the extensive work of Massey and colleagues (for example, Massey and García España 1987; Massey and Aysa 2005; Palloni et al. 2001) shows the importance of extra-local networks in migration. Santarém is more likely to contain families who have lived in the city for many generations, while the majority of families in Altamira have migrated to the region within the past 40 years. These two cities therefore capture a large range of local and non-local social connections. There are also differences between the cities that we expect to affect level and possibly selectivity of migration. Santarém is a larger city than Altamira, but has higher levels of poverty and inequality, and has greater problems of

unemployment during the study period (Instituto Brasileiro de Geografia e Estatística (IBGE) 2011; WinklerPrins 2002).

In this paper we examine the characteristics of young urban out-migrants between 1980 and 2008 to examine how drivers of out-migration – specifically the roles of extra-local family networks, human capital, and demographic and socioeconomic characteristics – function differently in the two cities. We test whether and to what degree drivers of internal urban out-migration in the Brazilian Amazon support theories on the roles of family migrant networks as well as economic theories on migration (neoclassical and the new economics of labor migration (NELM) theories). We use an event history model to study multivariate relationships between the risk of migration and several individual- and household-level factors, including sibling location, sex, education, migrant's place of birth, parents' place of birth, whether the household is headed by a single female, and number of children in the family. Because widely supported theories of migration point to the role of remittances as a motivation for migration, we also use a binary logit model to examine factors associated with whether or not migrants remit money back to their parents' household. We find that in Altamira migration tends to be an individual-level opportunistic strategy fostered by extra-local networks while in Santarém migration tends to be a need-based household-level income generation strategy accompanied by remittances back to the parents' household.

Theoretical Background

In this section we review migration theories, focusing on economic theories (neoclassical theory and the new economics of labor migration) as well as theories on the role of migrant networks. In each case, we focus on the theoretical predictions regarding the importance of individual- and family-level characteristics for out-migration, and on how theories might suggest

differences in the patterns of out-migration between the two cities. Important factors in these theories that change over time or across large spatial or political units (e.g. destination wage rates, macroeconomic policy) are constant across our sample, and year-to-year variation in migration rates captures a mix of many such factors. We thus discuss the importance of these factors in the description of the sites, but do not suggest that our models can speak to their importance.

Economic Theories of Migration

Neoclassical migration theory focuses on migration as an individual-level strategy to maximize income and economic opportunities (Massey et al. 1993; Todaro 1969), and therefore points to the importance of individual and community characteristics that impact income and employment in the origin community and in potential destinations. According to neoclassical theory, an individual considers the potential income gains in a destination area, and is predicted to migrate if those economic gains, discounted over time, are sufficiently higher than the earnings in the origin area (White and Lindstrom 2005). Migration is viewed as an investment accompanied by costs (e.g. costs of moving, costs of finding housing and employment in the destination area, and psychic costs of leaving one's home and family), and it is assumed that among migrants these costs are outweighed by the income returns in the destination area or by returns to the human capital acquired in the destination (Sjaastad 1962). Income returns combine those due to a wage differential and to the probability of finding a job in the destination area (Todaro 1969). Therefore, neoclassical theories predict that migrants may move to cities and temporarily work in the low-paying informal sector with the knowledge that they will eventually find higher paying formal sector employment. Traditional formulations of this assume a 100% probability of employment in the origin because migrants are assumed to come from a rural

sector in which labor is readily incorporated (though not well-compensated) in the familial agricultural sector. To adapt this approach to urban out-migration, we consider how individual characteristics and the context of the city influence the probability of employment in each of our study communities.

The new economics of labor migration (NELM) perspective builds off of and departs from neoclassical theory, arguing that labor migration in low- and middle-income countries results not from effective functioning of labor markets but instead from non-functional credit and insurance markets. Migration serves as a household-level strategy to diversify income sources and increase household cash income through remittances received by the migrant members of the household (Hoddinott 1994; Stark and Bloom 1985; Stark and Lucas 1988; Taylor 1999). According to NELM theory, households send migrants as a cooperative strategy to insure against loss of income due to local economic or environmental shocks (e.g. a surge in food prices or crop failure due to drought), and to generate additional income to invest in local production activities in light of imperfect credit markets. Migrants tend to be either the household head or children of the household head who pursue new employment opportunities in destination areas and remit back to their families in the origin household either on a regular basis to provide income or in response to an origin community economic shock (Taylor and Martin 2001). In this approach, as in the neoclassical approach, earning power in destinations is important for access to cash, but the covariance of wages and shocks between origin and destination is also important. Ideally, migrants go to an area whose economy is free from the shocks or independent of the secular changes of the home community's.

Remittances, an implicit component of NELM theory, assume a level of cohesiveness and trust between migrants and their family members who remain in the origin community (Sana and

Massey 2005). Stark and Lucas (1988) argue that migration and its associated remittances serve as part of a contractual arrangement between family members. The migrant may receive support from the family during the initial period after migration when employment opportunities are uncertain or while obtaining schooling, and the family is expected to receive support from the migrant once the migrant has established him or herself in the destination area's employment market. In addition, there is evidence that the propensity for an individual to remit depends on the level of economic need in the origin household, with poorer households more likely to receive remittances than wealthier households (Osili 2007; VanWey 2004). Understanding how the propensity to remit differs between the two study cities as well as by individual- and household-level characteristics further helps us to characterize the urban out-migration stream in this region.

Migrant Network Theories

Theories on migrant networks can be used to explain both migration decisions and destination choices (Deléchat 2001; Massey 1990; Massey and Aysa 2005; Massey and García España 1987; Winters, De Janvry and Sadoulet 2001). The presence of migrant networks (family members and friends) in a destination area substantially reduces the costs of migration, as family and friends act as sources of information and resources to a potential migrant. Most of the work in this tradition has focused on parents, children, spouses or community members (e.g. Cerrutti and Massey 2001; Kanaiaupuni 2000; Massey 1987; McKenzie and Rappaport 2007). There is also clear evidence that sibling networks play an important role in fostering migration. Massey and Aysa (2005) compare the relationship between migrant networks and US migration from six Latin American countries. They find that in four of the six countries, having a sibling migrant in the US significantly increases a household head's odds of migrating to the US for the first time.

Palloni et al. (2001) also find evidence in support of sibling networks in the case of Mexico-US migration. They find that having a migrant older sibling reduces time to migration, lessens the likelihood of an individual not migrating by age 30, and lowers the age of first migration. We are able to draw on this work and compare the relationship between sibling migration and own migration to that of parent migration and own migration. While our study does not explicitly test migrant network theory in its strictest sense, we take the notion of family networks as extra-local social capital and combine it with DeVanzo's (1981) theory on location-specific capital in order to test the role of extra-local family networks in fostering urban out-migration. We diverge from migrant network theory because an individual's extra-local networks may or may not be composed of friends and family who migrated from the origin area. As such, we examine how an individual's extra-local networks – measured by whether an individual was born in another part of Brazil, whether his or her parents were born in another part of Brazil, and whether his or her siblings live in another part of Brazil – as well as an individual's location-specific capital, measured by the number of years his or her parents have lived in the study city – encourage or hinder migration.

Studies of internal migration in Mexico (Davis, Stecklov and Winters 2002), and of internal rural-urban migration in Thailand (Garip 2008) show that the type or strength of network tie is important for predicting migration and destination selection. Davis et al. argue that migration networks must be disaggregated, and Garip goes on to hypothesize about the information contained in different networks. She argues that family ties in this context generally serve as information on low paying agricultural or construction opportunities, while community ties to other young migrants offer information on higher wage opportunities in cities. In addition, a study among smallholder farmers in rural Santarém finds that individuals with a close family

member or friend working off of the farm increases the likelihood of off-farm work (VanWey and Vithayathil 2012) and a study in the Ecuadorian Amazon finds that the number of migrants within an individual's household strongly predicts one's likelihood of migration (Barbieri, Carr, and Bilsborrow 2009). These studies indicate that close extra-local networks influence labor mobility in the Amazon region and we suggest that part of the variation in information provided by family ties reflects the life course nature of networks. That is, potential migrants are likely to get information on high-probability but lower status jobs from siblings and age-peers (from own past migrations), and information on lower probability but potentially higher status jobs from networks through parents.

As suggested above, in an urban origin, networks also matter for wages and probability of employment in the origin (and therefore the value of not migrating). We assume that social network ties in the origin community, e.g. family members living there for a long time, operate as a form of location-specific social capital and have the potential to reduce the probability of migration. This effect, or the balance between the importance of local ties and ties to destinations, could depend on city size. Regarding Mexico-US migration, Fussell and Massey (2004) test the assumption that the impact of migrant networks on an individual's likelihood of migration functions differently in small communities versus large cities. They find that cumulative causation functions as a mechanism sustaining Mexico-US migration in rural communities and small cities, but does not function in large urban areas (cities with 75,000 or more inhabitants) because social networks are more diffuse in these settings. They do, however, still find an important role for strong family networks in migration out of large cities. Our study does not contain adequate variation in city size to explicitly test the impact of city size, but we

are able to examine the differences in the importance of networks between two cities and speculate on the social and economic processes underlying these differences.

Study Area

Figure 1 shows the region encompassing our two study cities. The region is located roughly in the center of the state of Pará, including the intersections of key North-South and East-West transportation corridors. The Amazon and Tapajós Rivers are historical access routes to the farther interior Amazon, including Manaus, the capital of Amazonas state and home to an international free trade zone. Santarém has historically capitalized on its location at the confluence of these two important rivers, and in modern times on its location at the northern terminus of the BR-163, the key highway connecting the prosperous agricultural regions of the Center-West of Brazil to the Amazon region. Altamira lies on the BR-230, the TransAmazon Highway, a centerpiece of the military government's program of national integration undertaken in the 1970s.

Each city has a long history and recent changes. Santarém has long housed substantial populations, and been an economic center for a series of waves of extractive industries in the Amazon. Santarém experienced economic booms and busts associated with the gold, rubber, jute, and most recently soy industries (Prefeitura de Santarém 2013), and its strategic port location allowed for the development of Brazil nut and cacao export industries (Amorim 2000). Along with the economic booms came population growth. In 1970, Santarém had a population of 51,123, which grew to 111,023 in 1980 and 186,297 by 2000 (de Sá, da Costa and de Oliveira Tavares 2006). Today the urban population (approximately 75% of the county population) is approximately 294,000 (Instituto Brasileiro de Geografia e Estatística (IBGE) 2011). The current rural economic base is agriculture, mixing some soy or rice production with a large crop of

manioc and related products. The urban economy is based largely on trade, services to regional populations, and government employment. While periodic booms have promised a transformed economy, Santarém remains a city with limited employment opportunities, and un- and underemployment is a problem among the urban population (WinklerPrins 2002). The poverty rate in urban Santarém is 45%, with a Gini coefficient for household income of 0.43 (Instituto Brasileiro de Geografia e Estatística (IBGE) 2011; Sistema de Informações de Indicadores Sociais 2012b).

Altamira was founded by missionaries, but its less strategic location meant less recent population growth. It is situated just upstream of non-navigable rapids on the Xingu River, eliminating the possibility of it providing a stop on a waterway from the upper Xingu to the Amazon. Altamira remained a small town until the Brazilian government's National Institute for Colonization and Agrarian Reform (INCRA) began a settlement scheme in the early 1970's, which sought to reduce landlessness and poverty as well as develop the interior of the country (Alonso and Castro 2005; VanWey, D'Antona and Brondizio 2007). Through INCRA, families were settled in Integrated Colonization Projects (PICs), and Altamira alone received nearly 3,000 families during this period (Arruda 1978). Other settlers migrated into the area spontaneously to the settle unclaimed land. The Altamira settlement area, west of the city on the TransAmazon Highway, was a model settlement founded in 1970 (Moran 1981). In 1970, Altamira had a population of 5,374, but with the settlement scheme the population grew rapidly, to 26,911 in 1980 and 62,285 in 2000 (Alonso and Castro 2005). Today the municipality has a population of 99,000, with 84,000 living in the urban area (Instituto Brasileiro de Geografia e Estatística (IBGE) 2011). The economy of Altamira centers around agriculture, livestock production, and agribusiness (Confederação Nacional de Municípios 2011). The region houses and processes a

large herd of cattle, and is home to the highest productivity cocoa bean farms in the country (Comissão Executiva do Plano da Lavoura Cacaueira (CEPLAC) 2009). This smaller city also provides employment primarily in the service sector, but has slightly less un- and underemployment than Santarém. The poverty rate in urban Altamira is 37%, with a Gini coefficient for household income of 0.40 (Instituto Brasileiro de Geografia e Estatística (IBGE) 2011; Sistema de Informações de Indicadores Sociais 2012a).

Data & Analysis

This study utilizes survey data from a household survey of 1000 households in urban Altamira and Santarém (500 households from each city). Data were collected in 2009 in Santarém and 2010 in Altamira. In each city, we drew a stratified random sample of households. We first selected 10 census tracts with probability proportional to size (number of households).[i] In each census tract, we then created a sampling frame by physically enumerating all occupied houses in the tract. From this frame, we surveyed a randomly selected 50 households, creating a self-weighting sample. Households were surveyed in-person by local interviewers and university students from the University of Campinas. Interviewers sought to interview the female head of household, or, in cases in which there was no female head, the male household head. The interview covered standard sociodemographic information, with special effort devoted to the migration history of the female and male heads of household, and the locations of and relationships with non-coresident children and parents.

Our analysis focuses on the out-migration of youth and young adults from these two cities, as young adulthood is the period of most intense migration activity. We generate a sample of young adults at risk of out-migration from the reproductive histories of the interviewed heads of household. These reproductive histories include information about the location of residence of

non-coresident children, and the date at which the child left the parents' household, for all living children. We restrict analysis to internal migration, defined as leaving the municipality of Santarém or Altamira (equivalent to crossing a county boundary in the US).[ii] The majority of migration from Altamira and Santarém occurs when the migrant is between the ages of 13-30, and we consider this age range the at-risk period for migration. We further limit the time at risk to migrations between 1980 and 2008 among individuals whose parents arrived in the survey city at least one year before a potential migration event. We thus exclude information from interviewed households with no living children aged 13-30 during the 1980-2008 time period. Children can contribute different numbers of years at risk, based on aging into the risk period at different times during the 1980-2008 period, and based on censoring. Individuals were right-censored either upon migrating or in 2008. We chose to right censor the analysis in 2008 because surveys in Santarém were conducted in 2009 and thus we did not have a full year of data for that year. Using this sample of individuals and years at risk, we built a person-year dataset to estimate a discrete-time hazards model for each city.

This approach to creating a sample at risk of out-migration maximizes our ability to estimate the effects of sibling and parent networks. We have complete information on the migration histories of parents, allowing us to create measures of their places of birth and duration residing in the study city. We also have complete sibling sets with information on the date of out-migration for each sibling, allowing us to create a time-varying measure of extra-local sibling networks. The drawback is that we have left censoring, a common drawback in studies of migration. Of the young adults growing up in our study cities, we miss those whose parents have also left the city by the time of our surveys. We suggest that the most likely consequence of this left censoring is underestimation of migration rates (assuming parents who left also have

children who are more likely to have left), but no systematic misestimation of the importance of networks. That is, we do not anticipate that the population of parents who have left contains an over- or underrepresentation of people for whom networks are important in the migration process. We cannot test these arguments, but we find that the value of being able to construct time-varying sibling networks and have linked parent and child information outweighs the potential sample selectivity bias in this analysis.

Descriptive statistics of the entire sample as well as destination choices of migrants are listed in Table 1 and Figure 2, respectively. We use a number of variables as proxies for family networks, including whether or not an individual has a sibling living in another part of Brazil, the individual's place of birth, the parents' places of birth, and the length of time the parents have lived in the study city. The sibling location variable is time-varying and was constructed by determining the year that the first sibling within a household left for another location outside of the municipality in which the study city is located. An individual is coded as having at least one sibling living in another location during all of the person-years equal to or later than the year in which the first sibling left the municipality. Also included in the model is a set of dummy variables indicating the individual's place of birth. Options include within the survey city, outside of the survey city but within the state of Pará, within the Northeast Region, and within all other regions of Brazil. Parents' birthplaces are included as well, using the above location categories. An individual is coded with a one if at least one of his or her parents was born in a given location. Lastly, a measure of location-specific capital is included in the model, represented by the year in which the parents first arrived in the survey city. For two parent households, this value is calculated as the average of the years in which the mother and father arrived. In female-headed households this value is the year in which the mother arrived, and in

households with only a male head, this value is the year in which the father arrived. If the parent was born in the study city, year arrived is indicated by his or her birth year.[iii]

Human capital variables include education and parents' education, and demographic and socioeconomic variables include age, sex, whether the household is female-headed, and the number of siblings in the family. The variable measuring parental education was calculated by estimating the average years of schooling for the mother and father in two-parent households,[iv] and then creating an indicator of whether that average was below or above primary school during the time period most respondents were children: four years or less, or greater than four years.

Lastly, given that the time period during which we examine migration spans 28 years, we control for national-level political and macro-economic changes during the 1980-2008 study period. We divide the period into four categories based on three major political and economic events: the 1988 implementation of Brazil's new constitution; the 1994 implementation of *Plano Real*, a measure enacted by President Fernando Henrique Cardoso to stabilize Brazil's economy; and the 2003 election of President Luiz Inácio Lula da Silva.

Results

Descriptive Statistics

Table 1 presents descriptive statistics for the entire sample of young adult children from Altamira and Santarém, which includes 705 individuals from 238 households in Altamira and 854 individuals from 275 households in Santarém. Our family network variables show that a greater percentage of individuals in Santarém (44%) have siblings living outside of the study city than in Altamira (36%). Individuals from Altamira, in contrast, have more networks to other places through their parents. Approximately half of individuals from Altamira had at least one parent born in the city or elsewhere in Pará, and nearly 75% had a parent born in the Northeast or

elsewhere in Brazil. In Santarém nearly 80% of individuals had a parent born in the city or elsewhere in Pará while only 30% had a parent born in another region of Brazil. In addition, the parents of individuals in Santarém arrived in the city on average five years earlier than in Altamira. Similarly, individuals in Altamira have more migration experience of their own; 51% of them were born in the city, while 22% were born in another part of Pará, 16% were born in the Northeast, and 11% were born in other regions of Brazil. In Santarém, a greater proportion of individuals were born in the city (66%), while only 6% were born in the Northeast and 3% were born in other parts of Brazil. These data reflect the recent settlement history of the Altamira city and countryside. Individuals and their parents are more likely to have migrated into the city from other regions of Brazil, giving them more extra-local ties and stronger family networks elsewhere in Brazil.

We used educational attainment of the individual as well as that of his or her parents as proxies for human capital. The majority of individuals in both cities had between seven and twelve years of schooling (60% in Altamira and 68% in Santarém), while the educational attainment among parents is higher in Santarém than in Altamira. In Santarém 60% of parents have more than four years of education while in Altamira only 37% do so. The age of individuals in 2008 was roughly the same in both cities (26 years in Altamira and 27 years in Santarém) and both samples were split evenly between males and females. Approximately one-third of parental households in both cities were female-headed, and there were an average of five siblings per family.

Migrant Destinations

Figure 2 presents the destination locations of the 255 migrants in the sample. Among migrants in Altamira, half remained within the state of Pará, 3% migrated to the state of

Amazonas, 15% migrated to another state in the North region, and 32% migrated to another part of Brazil. In Santarém, 37% remained within Pará, 43% migrated to Amazonas, 8% migrated to another state in the North region, and 12% migrated to another part of Brazil. These data indicate that though the two cities are located only a few hundred kilometers from one another, their migration flows are quite different. The difference between migration flows to the state of Amazonas is striking, as it serves as a destination for over 40% of migrants from Santarém and only 3% of migrants from Altamira. Santarém is located closer to Amazonas than Altamira, and Santarém is connected to Manaus (the largest city in the Amazon) by the Amazon River, suggesting marginally lower transportation costs. In addition, migrants from Altamira were more than twice as likely to make moves to distant locations within Brazil than were those from Santarém. Nearly one-third of migrants from Altamira moved to other states in Brazil instead of remaining within Pará, Amazonas, or other states in the North region, while only 12% of migrants from Santarém did so. These two facts together suggest, as would be expected from the history of the two cities, that residents of Santarém are oriented to the Amazon region because of their deep roots in the region while residents of Altamira are oriented to the rest of Brazil because of their recent family experience of migration and strong network ties.

Multivariate Results

Factors Associated with Out-Migration

Table 2 presents the results of a discrete-time event history model predicting the odds of out-migration from the two cities. Results indicate that sibling networks play an important role in fostering out-migration in Altamira. Individuals with a sibling living outside of the municipality are 2.6 times as likely to migrate in any given year as those whose siblings live within the municipality. In addition, an individual's birthplace can be used as a proxy for family networks,

as individuals who migrated to the study city after birth are likely to have stronger extra-local networks than those born within the city. In Altamira we find that individuals born outside of the state of Pará are significantly more likely to migrate in a given year than those born in the city, and this relationship is particularly strong among those born in the Northeast region or others regions of Brazil. Similarly, the birthplaces of parents can also serve as a proxy for extra-local networks. We find that in Altamira the birthplace of an individual's parents does not impact his or her likelihood of out-migration. Lastly, we examine the relationship between location-specific capital and migration using the year in which the parents arrived in the study city. In Altamira, we do not find support for the theory that greater location-specific capital (as measured by a longer time living in the city) is inversely correlated with the likelihood of migration (DaVanzo 1981). Individuals whose parents arrived in the city in earlier years are no more likely to migrate than those whose parents arrived more recently.

In Santarém we find a very different relationship between family networks and migration. Individuals with siblings living outside of the municipality are no more likely to migrate than those without, and an individual's birthplace is not significantly associated with his or her likelihood of migration. In contrast, we find that individuals with at least one parent born outside of the study city – whether in another part of Pará, the Northeast region, or other parts of Brazil – are significantly more likely to migrate than those without. Additionally, we find support for DeVanzo's theory regarding location-specific capital. Individuals whose parents arrived in Santarém more recently are more likely to migrate in a given year than those whose parents have lived in the city longer. These results indicate that individuals whose parents have more extra-local networks and less location-specific capital within Santarém are more likely to migrate, yet

one's own extra-local experience and sibling networks do not play a role in fostering out-migration.

We then examine the relationship between human capital and migration using an individual's educational attainment as well as that of his or her parents. We find that in Altamira those with higher levels of education or with parents with higher levels of education are more likely to migrate, but these results are not statistically significant. In Santarém, while an individual's educational attainment is not significantly correlated with the odds of migration, parental education is highly correlated. Individuals with parents who have less than four years of education are 40% more likely to migrate in a given year than those with parents with four or more years of education. In urban areas parental educational attainment is associated with the household's earning potential, therefore these findings indicate that in Santarém individuals from households with a lower earning potential may be migrating to supplement household income.

Lastly, we examine the relationship between demographic and socioeconomic characteristics and migration, focusing on an individual's age and sex as well as the number of siblings in the family and whether the household is female-headed. In Altamira we find no significant relationship between these factors and the likelihood of migration. In contrast, demographic and socioeconomic characteristics play an important role in determining the odds of migration among those in Santarém. We find that age is positively correlated with migration. This reflects findings in the literature that as young adults age they accumulate more skills and earning potential and are therefore more likely to migrate (Massey et al. 1993; Taylor 1987). Additionally, we find that individuals from female-headed households are 1.8 times as likely to migrate in a given year as those from two-parent households and each additional sibling in the family increases an individual's likelihood of migration by 11%. These variables both serve as

proxies for household need, as female-headed households in Brazil and Latin America as a whole have been found to have a lower earning potential and a greater risk of living in poverty (Barros, Fox and Mendonca 1997; de la Rocha and Gantt 1995). In addition, having more children often correlates with poverty due to larger expenditures on food, school supplies, clothing, etc. (Musgrove 1980; Rose and Charlton 2002).

Lastly, the right-hand column of Table 2 shows the significance of difference between Altamira and Santarém on each independent variable. We find significant differences between the cities in the role of extra-local sibling networks, whether an individual has a parent born elsewhere in Pará, parents' level of education, sex, and migration during the *Plano Real* period.

Factors Associated with Remitting Behavior

Past research suggests that remittances are more often seen in cases in which migration is part of a strategy intended to benefit the origin household. We look descriptively now at the ways that the probability of remittances relates to individual and family characteristics, and varies between the two cities. Table 3 presents results from a binary logit regression predicting whether a migrant remits money back to his or her parents' household. In general, we find that family network variables are not significantly associated with remitting behavior. Regarding human capital, we find that though an individual's educational attainment is not significantly correlated with remitting, parental educational attainment an important predictor of remittances. Migrants whose parents have more than four years of education are 62% less likely to remit back to their parents than are those whose parents have four or fewer years of education. Again, this reflects the fact that urban households headed by parents with less education are likely to have a lower earning potential, and thus a greater need for supplemental income from migrant children.

Moving onto demographic and socioeconomic characteristics, we find that age and number of children within a household are not correlated with remitting, and that while males are more likely to remit than females, the difference is not statistically significant. Individuals from a female-headed household are 4.2 times as likely to remit as those from two-parent households, and those from Santarém are nearly 5.5 times as likely to remit as those from Altamira.

Lastly, we examine the relationship between migrant destination and remitting behavior. We find that compared to migrants who move to regions of Brazil further from the study cities, those who remain within the state of Pará are 6.3 times as likely to remit and those who move to the state of Amazonas are 8.4 times as likely to remit. This indicates that remittances are associated with closer, less costly migration destinations.

Discussion

In this paper we set out to understand the determinants of urban out-migration in the Brazilian Amazon by comparing young adults in two medium-sized cities – Santarém and Altamira - located within the state of Pará. Santarém is a larger city than Altamira, has an older settlement history, and has higher levels of poverty and inequality. In addition, individuals in Altamira as well as their parents are more likely to have been born in distant regions of Brazil, while those in Santarém are more likely to have been born within the city or elsewhere in the state of Pará. Our results indicate that these factors have shaped migration flows and drivers very differently between the two cities.

In Altamira we find that extra-local social capital, rather than human capital or socioeconomic deprivation, is the primary driver of migration among youth and young adults. Extra-local networks – the ties that link a potential migrant to friends and family in other parts of Brazil – play an important role in determining migration in this context. Individuals with at least

one sibling living in another part of Brazil were 2.6 times as likely to migrate as those whose siblings live in the municipality of Altamira. In addition, individuals born outside of the state of Pará –and who therefore have direct ties with friends and family members in other parts of Brazil – were significantly more likely to migrate than those born within the Altamira and Pará. In contrast parental networks, represented by an individual's parents' places of birth, did not affect the likelihood of out-migration from Altamira. In addition, we found no significant relationship between human capital variables (as represented by an individual's educational attainment as well as that of his or her parents) or demographic/socioeconomic variables and the likelihood of migration. These results indicate that an individual's own networks – the family members and friends that he or she knows personally – play the strongest role in fostering out-migration from Altamira.

In Santarém the picture is quite different. Human capital and socioeconomic deprivation are important drivers of migration, while family networks play a more minor role. We found that individuals with siblings living in other parts of Brazil are no more likely to migrate than those whose siblings live within the municipality of Santarém. In addition, we found no significant relationship between an individual's birthplace and his or her likelihood of migration. In contrast to Altamira, an individual's parents' extra-local networks as well as local-specific capital did influence the likelihood of migration. This indicates that within Santarém, the extra-local ties of parents foster migration while location-specific capital hinders it.

In addition, we found important relationships between human capital, deprivation, and migration in Santarém. Age was directly correlated with the likelihood of migration, indicating that as young adults age and gain more marketable skills, they are more likely to move. Furthermore, individuals whose parents had four or fewer years of education were 40% more

likely to migrate than those whose parents had more than four years of education, those from female-headed households were 1.8 times as likely to migrate as those from two-parent households, and the likelihood of migration increased with increasing family size. These three variables can be used to proxy deprivation, as less-educated household heads as well as female-headed households often have lower earning potential in urban areas, and larger households face greater costs of living (Barros, Fox and Mendonca 1997; Musgrove 1980; de la Rocha and Gantt 1995; Rose and Charlton 2002). These results indicate that poverty and deprivation play a much larger role than social capital in driving out-migration among young adults in Santarém.

Results indicate that extra-local networks function differently between Altamira and Santarém, lending support to both Garip (2008) and Davis, Steklov, and Winters' (2002) work on the importance of disaggregating networks due the roles that different types of networks play in transferring information and resources to potential migrants. In the Thai context of rural-urban migration, Garip argues that the migration experience of parents tends to provide information about more traditional employment opportunities (e.g. farm or construction work) while peer networks provide information on higher paying factory or service jobs. Our results suggest that in Altamira migrants are utilizing their own ties as well as those of their siblings, which supports Garip's concept of peer networks that provide information about more popular, higher paying jobs. In contrast, in Santarém, migrants are utilizing their parent's networks in order to find jobs that will assist with generating additional household income.

In order to test how out-migration from Altamira and Santarém support economic theories of migration (neoclassical theory and NELM) we modeled the determinants of remitting money among migrants. We found that migrants from Santarém were 5.5 times as likely to remit money to their parents' households as those from Altamira. In addition, controlling for city of

origin, migrants from female-headed households were 4.2 times as likely to remit and migrants whose parents had four or fewer years of education were 62% more likely to do so. Furthermore, migrants who moved to closer destinations (within Pará or to Amazonas) were significantly more likely to remit than those who moved to further destinations in Brazil. These data indicate that migrants from households facing greater deprivation and economic stresses are more likely to remit. As such, we find that poorer households tend to move to less costly locations and act cooperatively in order to diversify and bolster household income, which supports NELM theory. Additionally, migrants from Santarém are much more likely to remit than those from Altamira, which indicates that they are more likely to migrate as part of a cooperative household-level income generation strategy (also supporting NELM theory) rather than as an individual-level income maximization strategy.

These results illustrate that urban out-migration in Brazil is a diverse social process, and that the relative roles of migrant networks versus economic deprivation function quite differently between these two geographically proximate but historically and socioeconomically distinct cities. In Altamira, migration is by and large an individual-level opportunistic investment strategy. Young adults with greater amounts of extra-local social capital are able to capitalize on family networks elsewhere in Brazil and are therefore more likely to migrate to pursue education or better employment options. In addition, migrants from Altamira are able to make costlier moves to distant destinations within Brazil, as the costs of moving are balanced by the information and assistance that networks provide with regard to housing options and job opportunities. In Santarém, our results indicate that migration is generally a function of necessity. Young adults from poorer, more economically marginalized households migrate in search of better income generation opportunities in light of Santarém's limited employment

market. Migrants tend to move to the adjacent state of Amazonas, presumably to work in Manaus (the Amazon's largest city) rather than to more distant locations within Brazil. Making closer moves is less costly and risky, particularly in the absence of family networks in the destination area. We conclude that in a middle-income country such as Brazil, urban out-migration ranges from a household-level strategy driven by poverty and deprivation to an opportunistic individual-level strategy driven by social capital. With increasing development, economic growth, and levels of mobility around the country, we expect a transition toward the latter in most cities.

Endnotes

[i] We used the size of the tracts (as well as tract boundaries) from the 2007 population count. This count is an inter-censal count of population that applies a short-form survey to all households to describe the population of the country and its administrative units on size and a limited set of characteristics (Instituto Brasileiro de Geografia e Estatística (IBGE) 2007).

[ii] Only two international migrants were observed in our sample. These were excluded from the analysis.

[iii] We estimated alternative models using the earliest year in which any parent arrived, and using the latest year in which any parent arrived. Substantive results did not change.

[iv] We estimated alternative models using the highest education completed by either parents, and using the lowest education completed by either parent. Substantive results did not change.

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Table 1. Descriptive Statistics

		Altamira				Santarém			
Variable	Time varying?	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max
Family Networks:									
Has a sibling living in another location	Yes	0.360		0	1	0.439		0	1
Birthplace:									
Survey city	No	0.511		0	1	0.657		0	1
Elsewhere in Pará	No	0.223		0	1	0.252		0	1
Northeast region	No	0.156		0	1	0.060		0	1
Elsewhere in Brazil	No	0.111		0	1	0.032		0	1
Parent birthplaces:									
At least one parent born in survey city	No	0.150		0	1	0.261		0	1
At least one parent born elsewhere in Pará	No	0.372		0	1	0.523		0	1
At least one parent born Northeast region	No	0.535		0	1	0.261		0	1
At least one parent born elsewhere in Brazil	No	0.217		0	1	0.046		0	1
Year parents arrived in city for first time	No	1980	11.094	1928	2006	1975	14.023	1925	2007
Human Capital:									
Education:									
0-6 years	No	0.330		0	1	0.204		0	1
7-12 years	No	0.591		0	1	0.678		0	1
>12 years	No	0.078		0	1	0.118		0	1
Parents' education:									
4 years or less	No	0.635		0	1	0.400		0	1
More than 4 years	No	0.365		0	1	0.600		0	1
Demographic & Socioeconomic Characteristics:									
Age in 2008	Yes	26.362	9.357	13	54	27.066	9.497	13	55
Sex [1=male]	No	0.491		0	1	0.506		0	1
Female-headed household	No	0.312		0	1	0.355		0	1
Number of siblings in family	No	5.098	2.704	1	13	5.246	2.737	1	12
N		705				854			

Table 2. Event History Model Predicting Migration, Based on Family Networks and Individual and Household Characteristics

	Altamira		Santarém		
Variable	Odds Ratio	Std. Error	Odds Ratio	Std. Error	Significance of difference between coefficients
Family Networks:					
Has a sibling living in another location	2.561***	0.572	1.119	0.227	***
Birthplace [born in survey city is baseline]					
Born elsewhere in Pará	1.58	0.506	0.743	0.163	
Born in the Northeast region	2.128**	0.769	0.647	0.246	
Born in another region	2.260**	0.910	1.398	0.602	
Parent birthplaces:					
At least one parent born in survey city	1.229	0.650	0.888	0.229	
At least one parent born elsewhere in Pará	0.601	0.242	1.80***	0.398	**
At least one parent born Northeast region	0.975	0.438	1.637*	0.413	
At least one parent born elsewhere in Brazil	1.255	0.612	2.089**	0.771	
Year parents arrived in city for first time	0.982	0.012	1.019**	0.009	
Human Capital:					
Education [0-6 years is baseline]					
7-12 years	1.172	0.292	0.961	0.206	
>12 years	1.543	0.552	1.447	0.406	
Parents' education [4 years or less is baseline]					
More than 4 years	1.393	0.393	0.604***	0.117	**
Demographic & Socioeconomic Characteristics:					
Age	1.013	0.024	1.047**	0.019	
Sex [1=male]	1.371	0.293	0.822	0.137	*
Female-headed household	1.121	0.252	1.767***	0.344	
Number of siblings in family	1.030	0.044	1.100**	0.041	
Time Period: [1980-1988 is baseline]					
1988-1993 - New constitution	0.557*	0.181	0.741	0.209	

1994-2002 - *Plano Real*	0.362***	0.125	0.745	0.200	***
2003-2008 - Presidency of Lula	0.492*	0.199	0.558*	0.179	
Number of person-years	7186		8753		
Likelihood Ratio Chi-Square	66.73***		67.33***		
Pseudo R-Squared	0.064		0.043		

*** p<0.01; ** p<0.05; * p<0.1

Table 3. Binary Logit Model Predicting Whether a Migrant Remits Money

Variable	Odds Ratio	Std. Error
Family Networks:		
Has a sibling living in another location	0.609	0.270
Birthplace [born in survey city is baseline]		
Born elsewhere in Para	0.542	0.290
Born in the Northeast region	0.471	0.344
Born in another region	3.182	2.255
Parent birthplaces:		
At least one parent born in survey city	0.937	0.638
At least one parent born elsewhere in Pará	0.400*	0.213
At least one parent born Northeast region	1.680	0.935
At least one parent born elsewhere in Brazil	1.630	1.287
Year parents arrived in city for first time	1.004	0.019
Human Capital:		
Education [0-6 years is baseline]		
7-12 years	1.600	0.805
>12 years	1.251	0.844
Parents' education [4 years or less is baseline]		
More than 4 years	0.384**	0.175
Demographic & Socioeconomic Characteristics:		
Age	0.981	0.029
Sex [1=male]	1.421	0.557
Female-headed household	4.221***	1.894
Number of siblings in family	0.978	0.080
City [1=Santarém]	5.492***	2.827
Migration Destination [Other regions of Brazil is baseline]		
Within Pará	6.291***	4.411
Other states in the North Region	3.263	2.427
Amazonas	8.387**	7.166
N	255	
Likelihood Ratio Chi-Square	53.180	
Pseudo R-Squared	0.202	

*** p<0.01; ** p<0.05; * p<0.1

Figure 1. Map of Study Cities and Migration Destinations

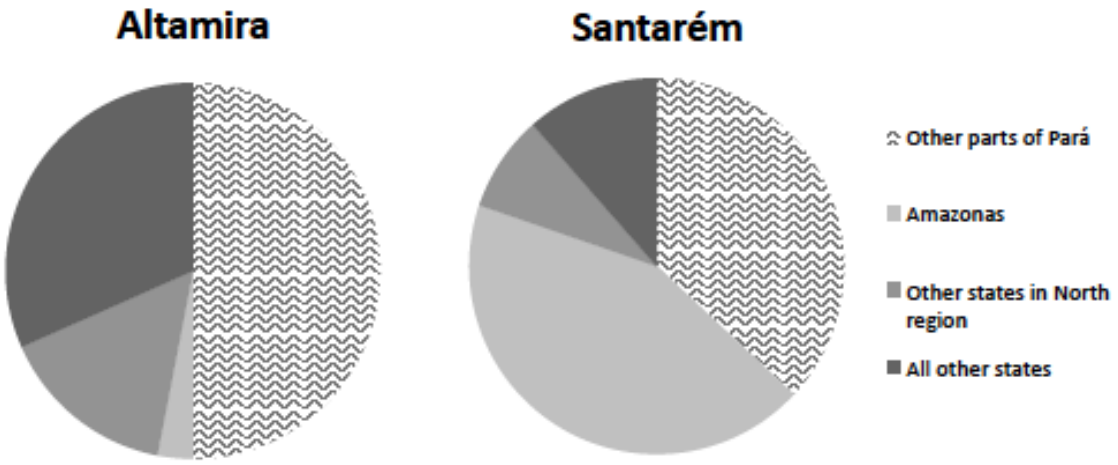

Figure 2. Migrant Destinations