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Endogenous Selection, Migration & Occupation Outcomes for Rural Southern Mexicans

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Endogenous Selection, Migration and Occupation Outcomes for Rural Southern Mexicans

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Abstract: We explore how migration and return migration shape occupation outcomes for rural Mexicans. We extend the Roy Model to account for unobserved migration motives and link it to a novel empirical method – a Mixed Nonlinear Endogenous Switching Regression. This approach exploits non-linear outcomes to generate estimates of the direct impacts of migration and return migration on occupation outcomes while controlling for selection associated with unobserved heterogeneity. This combination is not recoverable using a standard sample selection method or instrumental variables. Occupation outcomes are directly and positively influenced by both migration and return migration, especially for females. We also provide evidence of negative selection driven by unobserved heterogeneity for both genders, which we attribute to non-pecuniary motives such as family reunification or forced returns. These results highlight the positive welfare effects of labor mobility for the rural poor, particularly women, and conversely the losses associated with forced returns.

Keywords: gender, migration, return migration, occupation, selection, and Mexico

JEL Codes: C-34, J-61 and O-15

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1. Introduction

Domestic and international migration are essential components of livelihood strategies for rural Mexican households in response to persistent poverty and high levels of inequality (Chiquiar and Hanson, 2005; Hanson and McIntosh, 2010; McKenzie and Rapoport, 2007, 2010). Rural households shift investment decisions towards migration based on resource constraints, market imperfections, networks, shocks and risk coping strategies, as well as differential access to opportunities (Stark and Bloom, 1985; Rozelle et al. 1999; Barham et al. 2011). Since the 1980s, migration choices in Mexico have also been significantly affected by major economic and policy shifts including stabilization and adjustment programs (Lustig, 2000), liberalization of trade and foreign investment (Hanson and Harrison, 1998), reforms of rural property rights and agrarian programs (de Janvry et al. 2015; Gordillo et al. 2015), economic crises, and social programs (Angelucci, 2015).

Occupation prospects for migrants and return migrants are drivers of migration choices and the subsequent welfare effects on individuals as well as their households and sending communities (Sjaastad, 1962, Munshi, 2003; Bertoli et al 2013; Kaestner and Malamud, 2014; Dustmann and Görlach, 2016). However, only a handful of migration studies directly examine domestic or international occupation outcomes associated with migration or return migration for working-age populations from specific sending communities (Jasso and Rosenzweig, 1995; Akresh, 2006, 2008; Campos-Vazquez, 2012; Reinhold and Thom, 2013; Carrion-Flores, 2018). Our focus on occupation outcomes of migrants and return migrants is motivated in part by necessity (we do not have earnings or wage data on migrants) and empirical relevance (return migrants account for 63% of the individuals who have ever migrated in our survey of rural Southern Mexicans). This focus is also motivated by advances in the 'temporary migration' literature (Dustmann and Görlach, 2016), which explicitly link migration and return migration choices.

Previous research demonstrates the need to consider the inherent selection process associated with migration in order to avoid biased estimates of migration decisions and multi-stage estimations of other key welfare outcomes (Borjas, 1987; Barham and Boucher, 1998; Chiquiar and Hanson, 2007; Mirsha, 2007; McKenzie and Rapoport, 2010; Bertoli et al. 2013; Kaestner and Malamud, 2014; Wahba, 2015). Yet, none of these multi-stage estimations incorporate selectivity beyond including selection correction terms in a Heckman-style model. As such, they do not allow for hypothesis tests of the direct impact of migration choice on the labor outcome of interest after accounting for the influence of selection on the migration decisions. Instead, they capture the impact of selection correction coefficients, or unobserved correlated outcomes on the outcome of interest. The same characterization holds for return migration examinations, though recent work probes the theoretical and empirical basis for self-selection and contributes to a richer understanding of 'temporary migration' (Dustmann and Görlach, 2016, Wahba, 2015).

This article jointly incorporates the endogenous migration choice and a sample selection term into the migration and return migration occupation analyses by estimating a non-linear endogenous-switching system to support identification of both selection and direct migration effects. The estimation strategy was developed by Rabe-Hesketh et al. (2004, 2005), along with Miranda and Rabe-Hesketh (2006) and Bratti and Miranda (2010, 2011). We apply it to garner insights into pecuniary and non-pecuniary factors shaping migration-occupation outcomes for rural Mexicans. Based on observed gender differences in labor allocations, access to networks, and migration experiences (Amuedo-Dorantes and

Pozo, 2006; Cox-Edwards and Rodríguez-Oreggia, 2009; Feliciano, 2008; and Garip, 2012), we conduct separate empirical analyses for women and men.

Our theoretical approach builds on a standard Roy Model of migration and selection adopted from Chiquiar and Hanson (2008) and McKenzie and Rapoport (2010) that includes the role of networks in mediating migration decisions. It also builds on a dynamic model of assets and skills developed by Dustmann and Görlach (2016) that probes the role of temporary migration in shaping skills and occupational advancement which can, in turn, enhance occupational outcomes and future returns in the home labor market. Their dynamic model of 'temporary migration' incorporates other pecuniary and non-pecuniary factors that may not be easily observed but can also shape migration choices. We link these theories to our econometric design to explore the endogenous selection aspects of migration, return migration, and occupational attainment. The ensuing results are not recoverable from previous estimation strategies, such as identifying the role of non-pecuniary motives like family reunification (Gibson and McKenzie, 2011).

Our core empirical findings are: (i) Direct evidence that female occupational outcomes are positively influenced by both migration and return migration. Evidence is similarly positive for male migrants, but is weaker for male return migrants with inconsistent statistical significance. The average positive marginal effect of migration on occupation outcomes ranges from 72% for females and 70% for males, while the average positive marginal effect on occupation outcomes of return migration ranges from 44% for females to 21% for males; (ii) Evidence of negative endogenous selection of migration and return migration on occupation outcomes for both genders driven by unobserved heterogeneity, associated with family reunification efforts or other non-pecuniary factors such as forced return from the US. The negative selection associated with non-pecuniary motives for migration ranges from -0.64 for females to -0.68 for males (for a -1 to +1 interval), while the negative selection for return migrants ranges from -0.41 for women and close to zero for males; and, (iii) Migration within Mexico is more clearly linked to occupational mobility, while migration to the US has more ambiguous effects,[1] especially for males migrating to US farm work.[2] These findings highlight both the value of the non-linear endogenous selection estimation strategy and a gender specific empirical approach.

The manuscript is organized as follows. Section 2 reviews related literature on migration (return migration), selection, and occupational mobility. Section 3 presents the theoretical framework and three hypotheses, while Section 4 describes the econometric approach and identification strategy, adding two more hypotheses. Section 5 introduces the data, study context, and descriptive evidence. Section 6 reports the empirical results, and Section 7 summarizes findings and implications.

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[1] Ideally, it would also be possible to disaggregate this analysis by migration destination, namely, within Mexico versus the U.S., to tease out this pattern. Unfortunately, this is not feasible with our data because of a lack of sufficient observations in each occupation category for female and male migrants, return migrants, and non-migrants across locations.

[2] A fourth finding that is secondary to the main three, is discussed in the hypotheses and results section. Human capital characteristics and household endowments play a predictable role in enhancing occupational mobility and this relationship is stronger for women than for men (Lewis Valentine et al., 2017; Curran and Rivero-Fuentes, 2003).

2. Related Literature

Migration and Return Migration

Recent research on 'temporary migration' (See Dustmann and Görlach, 2016 for a review) encourages a fundamental shift in how to model the impacts of migration on a wide range of welfare outcomes. While migration obviously holds the potential for expanding opportunities at the host destination, just as importantly it can also transform opportunities back in the sending community for the migrants themselves (Co et al. 2000). Ongoing comparisons shape whether the migrant finds opportunities in the host destination or back home more attractive, and many factors (asset acquisition, liquidity constraints, target savings, skill acquisition, relative returns to skills, relative consumer prices, family networks, locational preferences, laws and norms toward migrants, to name a few) could tilt the balance in a dynamic model. These comparisons can apply to both international and domestic migration experiences in a context like Mexico where both are common.

The other conceptual plank of this article centers on the recognition that migration (and return migration) choices are inherently a self-selection process that include factors that researchers may struggle to observe (Wahba, 2015; Reinhold and Thom, 2013). Unobserved motives that shape migration and occupation outcomes include factors that are positively correlated, such as ability, ambition, and willingness to take risks, and other factors that are negatively correlated, such as family reunification, forced displacement, illness, or forced return. Yet, few analyses of occupational outcomes associated with migration or return migration explicitly address these selectivity issues. When they do, the estimation strategies they feature do not provide direct estimates of migration or return migration's impacts on occupational outcomes net of the aforementioned unobserved factors.

Mexican migration to the US (and domestically) has long included 'temporary' or 'circular' features (Massey et al. 2015). Indeed, the Bracero Program (1942-1964) and two more decades of minimal border enforcement meant that for much of the mid to late 20th century, Mexican migrants to the US moved fluidly between jobs and the US and their families and communities back in Mexico. During this era, most Mexican migration was temporary (Massey et al. 2002; Massey and Pren, 2012). Subsequent US policy changes, starting with the Immigration Reform and Control Act of 1986 and continuing to the present, dramatically increased border enforcement, and largely militarized the US-Mexico border (Massey et al., 2015; Carrion-Flores, 2018). Nonetheless, Mexican migration, especially unauthorized migration to the US continued to expand well into the 2000s, before slowing (Massey et al 2015; Passel et al. 2012). The pattern of return migration shifted accordingly, with two disparate trends arising. Documented migrants continued historical patterns of cyclical movements, while those without authorization were more likely to stay in the US longer because of the costs/risks associated with subsequent returns. Still, the basic observation that Mexican migration to the US is often temporary is evident across both groups (Carrion-Flores, 2018), and highlights the value of attending to occupation outcomes associated with migration and return migration.

Occupational Mobility and Selection

Economists have studied the labor market outcomes of Mexican migrants in the US for some time (Chiswick, 1977, 1978; Borjas, 1985, 1987; Kaushal et al. 2016). From early on, issues of migrant selection have been a central feature of empirical analysis (Lalonde and Topel, 1991; Duleep and Regets, 1992, 1997a,1997b; Chiswick, 1999; Chiquiar and Hanson, 2005; Mirsha, 2007; McKenzie and Rapoport, 2010). Two types of selection processes have been examined, one on observed characteristics, such as education and skills, and the other on unobserved characteristics, such as innate ability and drive. Studies that focus primarily on observed characteristics were often attempting to identify the impacts of migration (or return migration) on wage and income distribution in home and host labor markets. Meanwhile, those focusing on unobserved characteristics were probing whether estimates to returns to migration and return migration were biased by unobserved selection factors and hence in need of correction. Of course, some studies integrate the two into the empirical analysis but generally with some restrictive assumptions to accommodate the data or estimation strategy (e.g., Lacuesta, 2010; Reinhold and Thom, 2013).

Our theoretical approach developed below builds on the observed selection Roy Model approach of Chiquiar and Hanson (2005) for the migration decision and links it to the Dustmann and Görlach (2016) approach to temporary migration, which additionally considers the prospect of skill/experience acquisition. The temporary migration model also explicitly accounts for selection with respect to unobservable factors in a manner consistent with our estimation approach. The importance of incorporating both types of selection into our temporary migration-occupational mobility framework is underscored by recent research on labor market outcomes and return migration in Mexico, which find contradictory evidence on the effect of return migration. Specifically, Lacuesta (2010) finds evidence of a wage premium for return migrants associated with positive selection on unobserved characteristics, while Reinhold and Thom (2013) and Campos-Vazquez and Lara (2012) find that some of 'the unobserved' premium in Lacuesta may be due to human capital skill accumulation associated with migration. Because our econometric framework allows for an explicit hypothesis test for both migration (or return migration) and endogenous selection on occupational mobility outcomes, our results provide additional evidence on the questions at hand. In fact, we find evidence that supports the argument that migration and return migration directly and positively affect occupational outcomes, through access to better jobs and skill acquisition, while unobserved characteristics driving migration and return migration, such as non-pecuniary factors, may negatively affect it.

Other previous studies that examine occupational mobility also inform our approach, especially in terms of highlighting mobility outcomes and the effects of both gender and family reunification. When comparing labor market outcomes for employment-preference and family-preference migrants, Jasso and Rosenzweig (1995) find no significant differences in occupational mobility between these groups. This may be explained by migrant-quality screening on the part of the receiving families living in the US (a host family selection process), as well as their existing access to social and employment networks. Meanwhile, Powers, Seltzer, and Shi (1998), as well as Powers and Seltzer (1998), describe a pattern of substantial upward mobility in terms of earnings and occupation outcomes for undocumented Mexican migrants who became legal permanent residents in the US, but that the gains were often limited to males working in select industries. The possibility of gender differences raised here are also reflected in return migrant experiences explored in Campos-Vazquez and Lara (2012).

Akresh (2006, 2008) explores the relationship between migration and labor market outcomes in the US, with a focus on the occupation trajectories of legal migrants over time as they assimilate and receive green cards. In the 2006 article, she finds evidence of occupation downgrading, particularly among the high-skilled migrants from Latin America and the Caribbean (LAC) motivated by family reunification, while in the 2008 article Akresh demonstrates that legal migrants in the US experienced a U-shaped pattern of occupational change over time (i.e., downgrading following by recovery), similar to what Chiswick (2003), Chiswick et al. (2003, 2005) found in Australian data. Akresh attributes the bulk of this recovery to the accumulation of US labor market experience.

Few studies (with the exceptions of Jasso and Rosenzweig, and Munshi) explicitly address selection **and** endogeneity issues.[3] The importance of this issue is underscored by Wahba (2015) and by Gibson and McKenzie (2011). In particular, Wahba shows that while earnings of return Egyptian migrants were 16% higher than those for non-migrants, failing to control for compound-selection overstated the earnings gap by more than double.[4] Gibson and McKenzie (2011), meanwhile, examine migration and return migration among the "best and the brightest" from three Pacific Island countries. They utilize a mix of stated and revealed preference data to illustrate the importance of non-pecuniary factors (related to job, family, and community satisfaction) in shaping choices. Non-pecuniary factors are likely to be critical in the Mexican context for similar reasons but also because of illness (Arenas et al., 2015) and forced return migration from the US. The could also be related to marital status changes as studied in Bijwaard and van Doeselaar (2014). These studies inform our effort to control for both selection and endogeneity issues in a joint framework.

3. Theoretical Framework and Hypotheses

Modeling the relationship between migration and return migration decisions and occupation outcomes requires an approach that explicitly features the presence of selection – the non-random and endogenous process by which migrants with observed and unobserved characteristics, such as ability, ambition, and non-pecuniary motives, self-select into migration or return migration. Roy's Model (1951) on the distribution of earnings over occupations provides a natural foundation for this exercise. Borjas (1987, 1991) applies the Roy Model to establish the conditions under which positive or negative observed selection are plausible, zeroing in on (i) the distribution of returns to skills in origin and receiving countries and (ii) the correlation of returns to skills over origin and receiving countries, as the influential mechanisms.[5]

Chiquiar and Hanson (2005) enrich Borjas' and Roy's contributions by modeling migration and labor market outcomes while allowing migration costs to vary. In particular, they introduce the possibility that migration costs may be negatively correlated with skill or earnings to demonstrate that in some cases negative selection may actually be reversed

[3] Akresh (2006) does test for the robustness of ordinary least squares (OLS) estimates via an instrumental variable approach designed to address endogeneity, though the results are not presented to the reader and the exclusion restriction is questionable.

[4] Wahba (2015) strives to control for compound-selection in terms of: (i) individuals' decisions to migrate, (ii) individuals' decisions to return, (iii) individuals' decisions to engage the labor market, and (iv) individuals' occupation choices. Wahba refers to this as quadruple selection.

[5] According to Borjas, positive selection will be observed when the receiving country has a wider income distribution than the origin country and there is a strong positive correlation between returns to skills across the two countries. On the other hand, negative selection will be observed when the origin country has a wider income distribution than in the potential host country and there exists a strong positive correlation between returns to skills across the two countries. Though insightful, these results do not necessarily hold when the assumption that costs are constant is relaxed.

(positive). Following Chiquiar and Hanson's approach, McKenzie and Rapoport (2010) further extend the model by incorporating the size of community migration networks (n) as a means to flesh out the heterogeneity in selection dynamics across the size of community migration networks and education levels.[6]

With the McKenzie and Rapoport (2010) framework in mind, we additionally feature the influence of unobservable traits like ambition and ability. This model (and a parallel one on temporary migration from Dustmann and Görlach, 2016) consider the wage (w) for an individual (female or male) who has completed educational attainment to be a function of a base return to labor, a return to observable characteristics in the destination and origin economy, such as age and schooling, and unobserved factors.[7] In this context, costs of migration can also be shaped by observed and unobserved factors. Given educational attainment and network size, individuals decide whether to migrate or not based on a comparison of expected benefits of migration versus the associated costs, i.e. net wage profiles wage profiles $q = \{\mathcal{A}, \mathcal{B}\}$.

Those net benefit comparisons are reflected in Figure 1 to portray the migration (or return migration) decision. Specifically, the black curve ($\mathcal{B}$) describes the (natural log of) migration wage profile net of costs associated with observable characteristics x and unobservable characteristics a, whereas the red dotted line ($\mathcal{A}$) represents the returns in the origin economy.[8] Note that in Figure 1 migration is associated with a concave increasing net wage profile, but that the minimum wage differential is not high enough to motivate individuals with exceedingly high migration costs (due to a lack of schooling, ability and motivation, or access to migration networks) to migrate (x_l or a_l). Likewise, as depicted in Figure 1, there is an upper threshold above which returns to local education or skills outweigh returns to migration (x_u or a_u). In the context of return migration, these cutoffs could represent the threshold of experience, skill, and resource accumulation needed to motivate return migration, which might also be reflected in upward shifts in the earnings line in the origin economy.

[Figure 1]

Similar to network size (n),[9] increasing ambition and ability, i.e., unobservable characteristics (a) positively associated with returns to migration, may shift wage profiles upward in all (potential) locations. Viewed as complements to 'education' or 'skill', they can reinforce the potential for migration and comprise part of the endogenous selection process that shapes migration/return migration and wage/occupation outcomes. Other unobservables, such as family reunification, could be a basis for migration or return migration but might be negatively associated with occupation outcomes, and thus might be

[6] The size of migration networks has been shown to mediate the costs of migration and labor market outcomes (Massey, Goldring, and Durand, 1994; Munshi, 2003; and Cuecuecha, 2005).

[7] Wages (w) are defined as a function of the return to labor in the absence of education (μ), the return to observable characteristics (δ) like schooling (x), and the return to unobservable traits (a), such that: $w = \mu + \delta x + a$.

[8] The net minimum wage profile that individuals can earn in an origin community in southern Mexico ($\mathcal{A}$) is defined as: $q: \ \mathcal{A} = \mu_0 + \delta_0 x + a_0$. The concave net wage profile of a migrant ($\mathcal{B}$) is defined as $q: \ \mathcal{B} = \mu_1 + \delta_1 x + a_1 - e^{(\mu_\pi - \gamma_1 x - \gamma_2 a - \gamma_3 n)}$.

[9] McKenzie and Rapoport (2010) point out that wage profiles are increasing in network size (n), which shifts the solid curve upward through reductions in the cost of migration.

a factor that helps to explain why people migrate or return home but do not advance occupationally. Controlling for both of these types of unobservables, along with observable factors, is integral to our econometric strategy, which we describe in the next section. Thus, in this model it is apparent that shifts in net wage profiles, whether they be due to observable characteristics, network size, or unobservable traits, have bearing on the thresholds mediating migration and return migration decisions.

This theoretical framework is presented with both domestic and international migration and females and males in mind without loss of generality, though the conceptual framework could be tailored to one or the other. Labor market outcomes are ideally measured by a combination of employment status, wage (w), net wage (q), and overall earnings information, occupational attainment, working conditions, as well as job specific skill requirements. In our article, primary occupation status is the best measure of labor market outcomes available in our migration rich data. Although it is intuitive that a superior occupation should correlate with increased earnings, income may not always correlate directly with occupation status.[10] Nonetheless, in our data, the move out of agricultural labor into construction, industry, and commerce are likely to be correlated with higher wages for rural Mexicans (Hanson et al. 2017). Moreover, occupation status influences a broad range of outcomes beyond earnings including education and skill acquisition, health status, and overall welfare. This research is predicated upon the argument that the above theoretical framework also applies to occupational attainment.

Given this backdrop, we offer three hypotheses related to the migration or return migration choice and subsequent occupational outcomes. We add two more on the unobserved selection effects at the end of the econometric section.

H1: Based on access to a wider set of employment opportunities outside of their rural origins, we hypothesize positive effects of migration on outcomes for both genders, though again the strong potential for males to migrate to the US for agricultural work (lower on the occupational ladder) might reduce the strength of that positive influence.

H2: Based on skill acquisition and acquisition of resources (Dustmann and Görlach, 2016), we hypothesize positive effects of return migration on occupation outcomes for both females and males.

H3: We hypothesize that observable human capital characteristics, such as age and education, will play a stronger role in shaping migration for females than males, especially in the case of US migration, where males often migrate from agricultural labor in Mexico to similar work in the US.

4. Econometric Strategy

This section describes our empirical strategy for estimating the direct impact of migration and return migration on labor market outcomes in a manner that also explicitly accounts for selection. We start by linking the theoretical Roy Model with a two-stage selection-adjusted model of occupational outcomes. We observe occupation outcomes for

[10] Details of how occupation outcomes are indicative of wages are discussed further in the data section and others as well.

all adults in the sample, whether they stayed in their village or migrated elsewhere. Occupational outcomes are categorical and ordered, which makes the second-moment estimation non-linear. We exploit these features to specify a non-linear endogenous switching regression. This framework allows inclusion of both the selection coefficient from the migration outcome in the first-moment and the observed 'endogenous switching' migration outcome in the second-moment regression on occupation outcomes. Recent health economics research (Bratti and Miranda, 2010, 2011) has deployed this strategy to examine the impacts of education on preventive behavior, specifically smoking intensity conditional on higher education attainment. Our application of this method to the migration-labor market nexus is new, and it permits a deeper explication of the role of migration and selection in labor market outcomes.

We present the basic structure of the estimation process first and then highlight the exclusion restrictions and identification logic next. We follow this with attention to how the error structure and selection correction coefficient relate to observable and unobservable aspects of the migration-occupation outcomes, which further motivates the remaining two selection hypotheses regarding unobserved characteristics.

Mixed Nonlinear Endogenous Switching Regression

The Mixed Nonlinear Endogenous Switching Regression (MN-ESR) framework allows analysts to correct for endogenous selection, in a similar fashion to Heckman and conventional endogenous switching regression approaches. Its key additional feature is that it allows for a direct test of the impact of the endogenous migration switching term (m_i) on the occupation outcome of interest (y_i), while controlling for the associated selection (ρ) in the migration outcome as well.

The MN-ESR method was developed by Rabe-Hesketh, Skrondal, and Pickles (2004 & 2005) for mixed response frameworks to deliver consistent results for binary, ordinal, or Poisson ESRs via maximum likelihood estimation when responses are estimated jointly. These, and other related models, are commonly known as Generalized Linear Latent and Mixed Models (GLLAMMs). The details of the empirical strategy presented below draw from the exposition by Miranda and Rabe-Hesketh (2006).

This approach links the migration (or return migration) equation (1) to two possible regimes of occupation outcomes for a migrant or return migrant (2a) relative to a non-migrant (2b). Equations (1, 2a, and 2b) are thus the core equations of the MS-ENR specification:

Migration decision:

$$m_i = \alpha + X_i'\delta + H_h'\gamma + N_{sa}'\eta + S_{hc}'\psi + u_i \ , \tag{1}$$

Migrants regime ($m_i^* = 1$):

$$y_{1i} = X_{1i}'\beta + Z_{1hc}'\zeta + H_{1h}'\pi + N_{1sa}'\xi + \theta m_{1i} + v_{1i} \ , \tag{2a}$$

Non-migrants regime ($m_i^* = 0$):

$$y_{0i} = X_{0i}'\beta + Z_{0hc}'\zeta + H_{0h}'\pi + N_{0sa}'\xi + \theta m_{0i} + v_{0i} \ . \tag{2b}$$

We begin by reviewing the details of the migration switching equation (1), which is analogous to the migration decision rule in a standard Roy model. The migration (m_i)

decision rule (the first-moment of the MN-ESR) can be specified as a probit for all observations at the individual level (subscript *i*). Equation 1 serves as the migration switching-stage that distinguishes between migration (return migration) regimes. Occupation outcomes (y_{1i} for migrations and y_{0i} for non-migrants) are specified in equations (2a and 2b, the second-moment of the MN-ESR) based on observed migrant regime (1). The occupation equations are estimated using an ordinal probit that is constructed based on the observed occupation categories for female and males in our data. These categories and their ordering are detailed below in the data section.

The comparison group in this framework consists of individuals who have neither migrated nor return migrated at any point in the past. The specification of these equations is as follows: X_i is a vector of individual characteristics mediating migration and labor market outcomes (such as age and schooling); this represents the set of observable characteristics that serve as common influences of migration and labor market outcomes. As noted earlier, we do not include individuals who describe their main activity as being a student so as to focus on the direct effects of migration and return migration on occupation outcomes for a sample of observations that has completed its (formal) educational attainment.[11] Similarly, H_h is a vector of household characteristics representing the economic unit's productive endowment (land and labor), access to capital, and engagement in income generating activities (agricultural and non-agricultural). A vector of indicator variables (N_{sa}) are incorporated to account for any systematic effects of age cohorts (subscript *a*) and states (subscript *s*) on migration outcomes.

S_{hc}, which is unique to equation 1, is a vector of historical community based measures (i.e., the exclusion restrictions) included to improve identification – these are discussed in more detail in the next sub-section. Z_{hc} is a vector of household and community-level measures characterizing the occupation landscape, which is distinctive to equations 2a and 2b. This vector includes measures of household participation in local institutions and social programs, such as Oportunidades, that additionally shape occupation outcomes (y_i). The unobserved residual terms in (2a and 2b) denoted by v_i are assumed to be categorically distributed.[12] We present the identification strategy and associated exclusion restrictions next, prior to detailing the error structure.

Identification strategy

As mentioned above, equation (1) includes a vector of historical community-level measures (S_{hc}) to improve identification. Instruments are not formally required to identify the model (Heckman, 1978; Wilde, 2000; Miranda and Rabe-Hesketh, 2006), but are preferred to avoid tenuous identification (Keane, 1992).[13] A valid exclusion restriction

[11] It remains a possibility, as McKenzie and Rapoport (2011) show, that expansion of migration networks prior to 2005 reduced the educational attainment of individuals in our analytical sample, particularly among those who previously migrated. This is a potential source of endogeneity with respect to education choices that we do not address explicitly. It may have the effect of biasing the coefficient on years of education downward. This is not a first order concern, because here we strictly rely on schooling as a readily observable measure of educational achievement that we control for. This allows to focus our attention and the interpretation of results on the direct and indirect effects of migration net of observable characteristics and any correlated unobserved heterogeneity associated with migration and occupation outcomes (i.e., selection).

[12] This is a special case of the multinomial distribution that is also commonly referred to as a generalized Bernoulli distribution.

[13] The associated exclusion restriction can be expressed accordingly: $\mathbb{E}[S_{hc},\ u_i] = 0$.

should be correlated with the potentially endogenous independent variable of interest (i.e., current migration or return migration status) while being uncorrelated with the dependent outcome variable of interest (i.e., occupational attainment).

The first exclusion measure is a historical community-level migration share variable based on individual migration experiences in the past. It is calculated as the number of individuals who have ever migrated (taking place prior to 1950) over the total number of individuals enumerated in the community.[14] This measure reflects the influence of networks on migration in the share of individuals with community migration experience. The second measure interacts the aforementioned historical community migration variable with the number of adults in the households at the origin location to reflect that individuals from households with more adults are likelier to engage in migration based on the potential to exploit community migration networks.[15]

Including these variables is consistent with accounting for differences in migration costs across communities and households as discussed in in many migration models. Rozelle, Taylor, and de Brauw (1999), McKenzie and Rapoport (2010), Taylor and Lopez-Feldman (2010), illustrate how community-level variables can serve as strong exclusion restrictions as they capture the influence of exogenous historical, cultural, and geographic factors.[16] These studies use historical community migration propensities to reflect the opportunity to engage in migration (and return migration), which can be conceived as a reduction in the cost of migration. And, accordingly, the intensity of these historical opportunities is magnified for each household based on the number of adults (who are most likely to take advantage of migration opportunities) that are a part of the unit.

Identification is therefore achieved via two distinct mechanisms. First, the MN-ESR is identified based on the structure of the model, both because the configuration of the model incorporates selection correction procedures and because of the non-linearities associated with migration and occupation outcomes. Second, identification is improved via variation across the community-based migration (and return migration) variables (S_{hc}) associated with the exclusion restrictions.[17]

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[14] The following measure is constructed for each community: $s_c = \frac{\#\ ever\ migrated}{total\ \#\ from\ community}$

[15] In the case of return migration, the aforementioned historical community-level migration variable are included, as well as a comparable set of two return migration measures. The two migration variables are maintained in the switching-stage to reflect that return migration is conditional on migration in the first place. Subsequently, the third exclusion restriction variable is similar to the first community migration measure in form, but is calculated as the community proportion of historical individual-level return migration. Similarly, the fourth exclusion restriction variable interacts this measure with the number of children in the household at the origin location to reflect that individuals from households with more children are more likely to engage in return migration. Thus, the return migration switching-stage involves four exclusion restrictions to implicitly address compound selection.

[16] Other noteworthy examples of identification in migration research via historical community-level measures include Woodruff and Zenteno (2007), McKenzie and Rapoport (2007) de Brauw (2010), and Gitter et al. (2012).

[17] One natural question is what advantages the MN-ESR approach (and related sample selection techniques) affords relative to the more common IV strategy. First, with an IV approach it is not possible to measure the degree of selection, it can only be partialed out. This leaves the analyst with an incomplete picture as to what is driving occupational outcomes. Second, while similar exclusion restrictions can be imposed for IV and sample selection methods, they are not formally required for sample selection techniques. As a result, the burden of the exclusion restriction is greater for the IV approach. On the other hand, one undeniable drawback of the MN-ESR approach is its computational intensity.

Readers may be concerned that historical community-level migration rates also influence occupational opportunities within the communities, which thereby affect migration decisions. While, in principal, this is a valid concern, we do not observe substantial variation in occupations and wages across these rural communities that is correlated with the size of migration networks. Readers may also worry that (S_{hc}) remains endogenous because it incorporates observations up until the time of the survey. We address this by testing the robustness of results to alternative versions of S_{hc} that: (i) strictly reflect the opportunity to engage in a first migration journey up until 1995 or (ii) reflect the length of time that a community has had access to a sizable migration network. Both of these measures are based on the argument that the more historical the exclusion restriction variable, the less likely that current migration or return migration predicted by S_{hc} is endogenous. We discuss this in more detail at the end of the results section.

Error Structure and Selection Correction Coefficient

In order to obtain consistent estimates of parameters, equations (1, 2a, and 2b) are estimated jointly, based on the novel approach developed by Rabe-Hesketh, Skrondal, and Pickles (2004, 2005), as described by Miranda and Rabe-Hesketh (2006). Joint estimation of mixed level responses of migration decisions (m_i) and occupation outcomes (y_i) involves stacking both outcomes (vertically) into a single vector f_{ji}, where j indexes the levels of the mixed model for each individual accordingly:[18]

$$j = 0 \quad for\ migration\ outcomes\ m_i\ , \tag{3}$$

$$j = 1 \quad for\ occupation\ outcomes\ y_i\ . \tag{4}$$

It is assumed that f_{ji} is distributed Bernoulli for migration outcomes $(when\ j = 0,\ corresponding\ to\ m_i)$ and is distributed multinomial, a generalization of the Bernoulli when the number of trials exceeds one, for occupation outcomes $(when\ j = 1,\ corresponding\ to\ y_i)$. Each level ($l$) of the model is also associated with an indicator function I_{lji}, such that:

$$I_{0ji} = 1 \qquad if\ l = 0\ \&\ j = 0\ , \tag{5}$$

$$I_{0ji} = 0 \qquad if\ l = 0\ \&\ j = 1\ , \tag{6}$$

$$I_{1ji} = 1 \qquad if\ l = 1\ \&\ j = 1\ , \tag{7}$$

$$I_{1ji} = 0 \qquad if\ l = 1\ \&\ j = 0\ , \tag{8}$$

then the linear predictor of the mixed model within each occupation outcome alternative ($f_{j\kappa i}$) can be expressed in equation (9):

$$f_{j\kappa i} = \quad I_{1ji}(X_i'\beta + Z_{hc}'\zeta + H_h'\pi + N_{sa}'\xi + \theta m_i - \omega_\kappa + \lambda\epsilon_i) +$$

[18] In other words, migration and occupation outcomes can be considered to be clustered (vertically) for each individual (subscript i).

$$+ I_0 ji(X_i^{'}\delta + H_h^{'}\gamma + N_{sa}^{'}\eta + S_{hc}^{'}\psi + \epsilon_i) \quad , \tag{9}$$

where λ is the factor loading parameter that scales ϵ_i.[19]

We exploit the correlation between the unobserved characteristics that influence migration and occupational outcomes to correct for endogenous selection. In particular, we take advantage of the mutual dependence on unobserved characteristics by structuring u_i and v_i to share a correlated random effect ϵ_i. The structure of the relationship between unobserved residual terms is

$$u_i = \epsilon_i + \iota_i \quad , \tag{10}$$

$$v_i = \lambda\epsilon_i + \tau_i \quad . \tag{11}$$

The common ϵ_i in equations (10) and (11) represents the shared random effect of unobserved characteristics on migration decisions and occupation outcomes. It can also be interpreted as the shared unobserved heterogeneity. The components of the residual terms, ϵ_i, ι_i, and τ_i, are assumed to be distributed normally and λ is a (free) factor loading parameter that scales ϵ_i in equation (11), which is identified from the correlation (ρ) shown in equation (12):

$$\rho \equiv \frac{\lambda}{2(\sqrt{\lambda^2 + 1})} \quad . \tag{12}$$

A nonzero value of the selection term rho $(\rho \neq 0)$ suggests that migration decisions m_i are correlated with v_i, the residual term of the occupation equation, through the shared correlated effect ϵ_i, which is a function of unobservable characteristics a_i, where $\epsilon_i(a_i)$. In the case of positive selection, ability or ambition may be the driving factors while in the case of negative selection the dominant characteristics may be family reunification or forced return resulting in negative correlation. In this context, $\rho \neq 0$ is indicative of endogenous selection. If $\rho \neq 0$, standard estimation techniques will result in inconsistent estimates due to selection bias and avoiding these biases requires a tailored approach such as an MN-ESR.[20] In practice, we structure errors at the community level to generate robust clustered standard errors.

[19] The cumulative probability for each occupation alternative is determined by the category specific linear predictor (with $j = 1$), such that

$$Pr(y_i > \kappa | X_i^{'}, Z_{hc}^{'}, H_h^{'}, N_{sa}^{'}, m_i, \epsilon_i) \equiv \sum_{k=0}^{\kappa} \phi_{ki} \quad , \tag{14}$$

where $k = 0$, …, $max\{\kappa\}$, the conditional probability that $y_i = k$ is represented as ϕ_{ki}, and ϵ_i is defined further below.

[20] The MN-ESR is fitted by maximum likelihood using the Full Information Matrix to maximize efficiency and draws on adaptive quadrature techniques to integrate out the shared unobserved random effect ϵ_i. This is accomplished by calling on the posterior distribution of the unobserved heterogeneity ϵ_i in each iteration of the optimization routine to adaptively modify the locations and weights of the quadrature points. This is important because quadrature points are crucial to the integration involved in accurately evaluating the likelihood function.

Hypotheses

The structure of the MN-ESR lends itself to testing hypotheses regarding the non-random selection of individuals into occupation outcomes associated with unobserved heterogeneity, controlling for the the positive or negative correlation associated with migration (return migration) decision itself. As a result, we offer two additional hypotheses relating to the selection dynamics shaping occupation outcomes associated with migration, and return migration.

H4: We hypothesize that selection on unobservables associated with the occupation outcomes of migrants and return migrants is stronger for females than for males, owing to the non-pecuniary motives such as family reunification.

H5: For similar reasons, we hypothesize that selection on unobservables associated with occupation outcomes will be stronger for return migrants than migrants because return migration may also result from forced return for legal or poor health reasons.

To highlight the full range of potential outcomes associated with the regression strategy, we briefly summarize the four distinct cases that characterize the aforementioned hypotheses on both the selection coefficient and the influence of migration on the occupation outcome.[21] First, if both of the coefficients are statistically insignificant, then none of the hypotheses about migration, selection, and occupation outcomes provide insight. Second, if the selection correlation coefficient ρ is statistically significant while the coefficient on migration θ is not, then the migration outcome is endogenous and the resulting (non-significant) correlation between migration and occupation outcomes is driven by unobserved heterogeneity. This could be positive or negative selection on unobservables. We do not comment further on these two cases, because we fully expect migration to be positively and significantly related to occupational outcomes.

Third, if the selection correlation coefficient ρ is not statistically different from zero and the coefficient on migration θ is statistically significant, then migration is exogenous with respect to occupation. Based on our hypotheses from the previous section, we might expect this case to be one where migration positively affects occupational outcomes, perhaps distinctively for females and males. Fourth, if both the selection correlation coefficient ρ and the coefficient on migration θ are significant, then although migration is endogenous, it also has an impact on occupational attainment that is accounted for explicitly by the structure of the MS-ESR. We can envision two types of scenarios with this pattern of results. One is a negative selection hypothesis that finds a negative effect on occupation from selection on unobservables, such as family reunification or forced return migration. The other is a positive selection effect that might be associated with unobservables, such as ability or personality attributes.

[21] Bratti and Miranda (2010) provide a parallel explanation in their examination of how higher education produces non-pecuniary returns via a reduction in the intensity of health-damaging substances, specifically cigarettes. Our exploration engages a fuller range of possible outcomes than their study does, because we consider the prospect that migration and occupation outcomes could be both positively and negatively selected depending on the nature of the unobserved factors.

5. Data & Descriptive Statistics on Migration Status & Occupation Outcomes

The analysis is based on a multi-topic dataset collected in 2005-2006 from 845 coffee growing households in Oaxaca and Chiapas, the two southernmost states in Mexico.[22] They are historically among the poorest states in Mexico, with more than two-thirds of individuals living in poverty at the time of the survey (CONEVAL, 2005). The study areas were selected for two main reasons: (i) their important role in Mexican migration; and (ii) their representative nature of smallholder coffee growing communities.[23]

Comprehensive household data were gathered regarding all productive activities and income sources. Information was collected for all members of the households, including years of education attainment, employment and occupation status, as well as first and last migratory journeys within Mexico and to the US. Surveys were typically conducted with the primary manager of coffee production, who is generally a male household head, though a wife (if present) or other senior females and males in the household that commonly participated in the interview process.[24]

Table 1 presents a breakdown of individual, household, and community level migration characteristics. It demonstrates (for the sub-sample of working age individuals) that approximately 17% of individuals were reported as a migrant at the time of the data collection. Roughly one-tenth of females in the sample were reported as being migrants, as compared to a quarter of the males, indicating that while migration is considerably more common for men it is reasonably prevalent among females. Approximately 43% of individuals had previously migrated, with 36% migrating within Mexico and 13% migrating internationally to the US, with some overlap involving migration to both destinations. The earliest journeys reported in the data occurred prior to 1950, but the first substantial uptick in migration begins after 1960. Female and male return migration rates at the time of the survey were 19% and 37%, respectively. This highlights return migration as a noteworthy option for females and males alike, though considerably more so for males.

Eighty-four percent of households have a history of migration. Over two-fifths of households report a history of migration to the US while less than two-fifths of households previously engaged in migration to both Mexico and the US.[25] Historical household migration rates calculated at the community-level represent long-term migration propensities for the study area and do not diverge substantially from the household-level measures. Lastly, the average proportion of individuals who migrated at any point in the past relative to the total adult population of individuals from a community, the main

[22] The data were collected in 14 villages of varying size, a number of which are clustered in close proximity to each other and subsequently share many amenities and characteristics. As such, this analysis proceeds with data organized into 9 communities. Households were selected based on a two-stage random-stratified sampling approach accounting for participation in coffee cooperatives and migration histories, respectively

[23] This data has also been used for research on the impact of participation in Fair Trade-Organic (FTO) coffee production and membership in FTO cooperatives on the welfare and human capital accumulation of households (Barham et al. 2011).

[24] Descriptive statistics for key demographic, production, and welfare characteristics at the individual and household levels are available in Table A1 of the appendix.

[25] Receiving remittances is quite common in the study households (48%), and the conditional average for households receiving remittances in the previous year amounted to roughly US$3,500 (MX$38,000), or about 35% of total household income in the sample (Barham et al., 2011; Gitter et al., 2012).

exclusion restriction incorporated into this analysis in order to improve identification, is approximately 30%.

[Table 1]

Data on the primary occupation of all household members (including migrants) was collected as part of the survey. As shown in Table 2, these responses are organized into four mutually exclusive categories for females and three for males. For females, those are: 1 for homemaker, 2 for agricultural or domestic service work including (on and off-farm, including *peasant farmer or daily worker*), 3 for construction, manufacturing, sales, food, service, transport, security, cleaning, etc., industry, and 4 for working in professional or high-skilled industry, including teachers and office workers. For males, those are: 2 for agricultural work (on and off-farm, including *peasant farmer or daily worker*), 3 for construction, manufacturing, sales, food, service, transport, security, cleaning, etc., industry, and 4 for working in professional or high-skilled industry, including teachers and office workers.[26]

This categorization of occupations captures an important dimension of labor market achievement, as opposed to labor market potential. The higher the occupation category the better the earnings stream typically associated with it. This likely reflects superior levels of training and skills (observable characteristics), which earn a higher return, as well as unobservable factors like ability, ambition, entrepreneurship, and personality traits in many cases, as well as unobservable characteristics shaping non-pecuniary motives.

Although alternative approaches to ranking occupation data were considered, we use a standard approach for a number of reasons. First, it is transparent, easily implemented, and replicable. Second, this approach is consistent with the International Labor Organization's (ILO) International Standard Classification of Occupation (ISCO) standards, which Munshi's 2003 study on migration networks and labor market outcomes also relies on. The goal of more sophisticated methods is essentially to reflect the returns to skills, education, and ability, as well as the occupational prestige associated with distinct labor market outcomes (Sicherman and Galor, 1990; Ganzeboom et al., 1992; Hauser and Warren, 1997; Carletto and Kilic, 2010).[27] The monotonically increasing pattern of (years of) education observed in the final column of Table 2 as an individual climbs up the occupation ladder supports the validity of our ordering in reflecting these attributes.[28]

Occupational attainment shares are presented in Table 2. Homemakers exclusively make up the first category, all of which are female, and represent 44% of the sample. The

[26] The male occupation ladder consists of one fewer categories because no males report being a homemaker. The unemployed category is removed because there are an insufficient number of observations to include it as the base category (18 individual observations), and students are excluded because they do not represent occupational attainment and therefore do not fit these occupation categories in a defensible way (376 individual observations). These exclusions reduce the sample size by nearly 11% of the working age sample (ages 15 to 60) or 7% of the entire data sample, resulting in 3,308 observations.

[27] Though there has been considerable debate about occupation classification methods, a clear consensus on how to proceed with more sophisticated methods has not emerged. Indeed, many such approaches still result in a classification system that is consistent with simpler ones. Also see, Ganzeboom and Treiman (1996), Grodsky and Pager (2001), and Akresh (2006, 2008).

[28] Education excludes individuals who report being a student as their primary occupation because they have not completed their formal schooling and, as such, their reported level of education is less reflective of their training than individuals who have already completed the bulk of their human capital accumulation process.

second category – agricultural and domestic service – accounts for 38% of the sample, with 90% of them in agriculture. Altogether, these two groups comprise more than 80% of the working age population. The remainder of working age individuals are classified as having achieved a higher-level, non-agricultural occupation, which typically provides a superior return to labor. Over 13% of individuals work in construction, manufacturing, sales, food, service, transport, security, cleaning, etc. occupations, which represents a mid-level of occupational attainment. Finally, about 5% of individuals work in professional or high-skilled occupations, including teachers and office workers, which require and reward additional formal training or specialized skills than the aforementioned categories.[29]

[Table 2]

Figures 2a and 2b illustrate the difference in occupation outcomes according to gender, migration status, and the location of migration. Almost all female non-migrants are homemakers. While the majority of female migrants to Mexican locations also work as homemakers, engagement in second, third, and fourth occupation categories is far more common than among non-migrants, with the bulk reporting an agricultural or cleaning occupation (category 2) followed by construction, manufacturing, and sales (category 3). By contrast, about 80% of female migrants to the US are employed outside the home, with more than half in the upper two categories and around 30% in the second, agricultural and domestic service, category. Male occupation patterns are distinct from those of females, which provide a justification for running separate statistical models, much like the gender differentiated patterns in migration and return migration. Non-migrant males predominantly work in agriculture, more than 90% in that category. Males migrating in Mexico work very little in agriculture; nearly 80% are in the middle occupational category, with the rest split about equally between agriculture and the top category. Males migrating to the US are about evenly split in between agricultural work and the upper two categories, with agricultural work being slightly more common. Overall, then, males are most likely to be agricultural workers as non-migrants or as migrants to the US, but are very unlikely to work in agriculture as migrants within Mexico.

[Figures 2a & 2b]

Figures 3a and 3b compare the occupational outcomes of non-migrants relative to return migrants. For both non-migrant and return migrant females, homemaker status is the main occupation category, but about 33% of female return migrants are split about evenly across the second through fourth occupation categories, versus about 10% of non-migrants. So, female return migrants exhibit occupational mobility. Meanwhile, for males, the main difference is that about a third of the return migrants are in the upper two occupation categories. Thus, upward occupational mobility appears similar across return migrant males and females. In sum, the four figures reveal a pattern of superior occupational achievement for migrants and return migrants, relative to non-migrants, except perhaps for males migrating to the US where most of them find work in agriculture. These positive relationships between migration and occupational attainment are investigated in more

[29] The primary occupation is missing for 49 observations, approximately 1% of the working age sample.

detail next, controlling for a host of factors including selection bias. The differences across gender shown here underscore the potential importance of separate estimations.

[Figures 3a & 3b]

6. Results

We begin this section with a brief summary of the variables used to estimate the endogenous switching regressions for migration (return migration) and occupation outcomes. Next, we present these regression results and relate them to the hypotheses on the direct effects of migration and return migration as well as the selection correction estimates associated with migration and return migration. This discussion also includes the marginal effect estimates of migration and return migration on occupation outcomes. We close with comments on two other aspects of the regression results: (i) The switching-stage estimates of the decision to migrate or return from migration from the first-moments of the MN-ESRs; and (ii) The sensitivity of the estimates to alternative specifications of the exclusion restrictions.

MN-ESR Specifications

The regressions are run separately for females and males, and in each case the endogenous switching regressions on occupation with the selection term are estimated with and the individual's migration status – the endogenous switching term – as an explanatory variable. Tables 3 and 4 present the analysis of how migration and return migration, respectively, influence occupation outcomes. The selection estimates and direct effects of migration (or return migration) are reported at the top of these tables. Table 5 provides the migration and return migration (first-moment) estimates.

As described above, three broad categories of explanatory variables are included in the specifications: (i) individual demographic characteristics, (ii) household demographic composition, as well as income generating activities, resources, and location, and (iii) household and community profile measures. Current migrant (or return migrant) status, the switching term, is the individual-level migration variable on the right-hand side of the occupation-stage (second-moment) regression and the left-hand side of the switching-stage (first-moment). Identification is achieved by the specification of the historical community migration exclusion restrictions in the first-moment, in addition to the structure of the MN-ESR. We discuss the robustness of alternative exclusion restrictions further below.

Occupation-Migration and Return Migration Results (Second-Moment)

The second-moment results on occupational outcomes are reported in Table 3 for females and males, with the two top rows featuring the coefficient estimates for the selection correction coefficient and the endogenous switching term – in this case migration. All four of these coefficient estimates are statistically significant at the 99% level for females and males. Both of the migration coefficients are positive and of a similar magnitude for women and men (2.7 and 2.9, respectively). Specifically, these coefficient estimates show that migration has a statistically significant and positive impact on occupational outcomes. On the other hand, the selection correction coefficient is similarly negative t for women and men (-0.64 and -0.68, respectively, on a -1 to +1 interval).

[Table 3]

We interpret these results as follows. Migration is endogenous, but controlling for that using the MN-ESR approach allows us to identify its direct and positive impact on occupational outcomes for both females and males. This result supports hypothesis 1. Meanwhile, the negative selection-correction coefficient suggests that unobserved factors that also explain migration have a negative impact on occupational outcomes. Because the first-moment estimation includes observed individual, household, and community control variables that have significant and standard effects on migration outcomes (more on those below), we argue that family reunification is most likely to be the remaining unobserved factor that could be negatively associated with occupation outcomes. For both females and males, once we control for the direct and positive effect of migration on occupation, as well as for the common economic factors that explain migration, then the unobserved component is likely non-pecuniary and the main contender in the context of migration is family reunification. The fact that the selection estimates are essentially identical for females and males does not support hypothesis 4 that females are more likely to migrate in pursuit of family reunification.

The marginal effects of migration on occupation are displayed for females and males in Figures 4a and 4b, respectively, while the supporting marginal effect estimates are reported in the Appendix Table 2. First, for both genders and consistent with the regression results, the average marginal effect of migration on occupation outcomes is positive and significant at a similar magnitude of about 0.7. Second, the positive marginal effect of migration is U-shaped for females while it is downward sloping for men. While the average marginal effect is driven by the concentration of women and men at the bottom of the occupation ladder, the next largest marginal effects are in the upper half of occupation categories for females and males. For males, this involves moving from category 2 (agriculture) to category 3 (construction, manufacturing or sales). In contrast, for females this involves moving from category 3 (construction, manufacturing, or sales) to category 4 (professional or high-skill).

In many ways, this represents greater upward mobility among females in two ways: (i) women are more likely to move to move out of their base occupation category (category 1 = homemaker); and (ii) they are more likely to move into the top occupation category (category 4 = professional or high-skill) than into category 2 or 3 (0.4 vs 0.2). They are also more likely than males to move into category 4 (0.4 vs 0.2). These results are consistent with hypothesis 1. They might also be explained based on commonly observed gender segmentation of labor markets, wherein males are more likely than females to work in construction or some types of manufacturing, while females are more likely than males to move into office or service work including teaching and health care.

[Figures 4a, 4b]

Just as the marginal effect estimates provide a nuanced view of the gendered impacts of migration on occupation, so do the control variable coefficient estimates reported in the rest of Table 3. Only education has a similar positive and significant predicted effect on occupation across females and males. Many of the other control variable estimates are distinct and logically so. For example, the presence of dependent children and the amount of support received from Oportunidades have a significant and negative effect on female occupational outcomes, probably coincident with them being more likely to remain as homemakers rather than to be working given the demands of caring for young children. By contrast, for males these same control variables have positive and significant signs, likely related to the increased demands on adult males to be provide income in support of those same children.[30] Overall then, the signs and statistical significance on coefficient estimates for the control variables increase our confidence in the reliability of the estimations as well as underscoring the distinctive factors shaping occupation experiences of females and males.

Return migration results are reported in Table 4 in the same fashion as in Table 3. Both of the return migration coefficient estimates are positive, significant, and of similar magnitude for women and men (1.8 and 1.5, respectively), meaning that, again, occupational outcomes are predicted to be higher for return migrants than they are for non-migrants. This is consistent with hypothesis 2. The findings here are similar to those of the migration estimation with one exception. Only the female selection correction coefficient estimate is negative and statistically significant (-0.42), while the male term is not significantly different from zero (-0.06). The interpretation here is that the direct effects of return migration on occupation are positive, but that only in the case of females is the occupation outcome endogenous to the choice. Here, the negative effect could again be associated with family reunification motives, but given that return migration – at least from the US – may also represent 'forced' journeys via deportations or illness, the interpretation is more ambiguous than in the case of migration. In either case, the fact that unobservable factors are negatively associated with occupational outcomes for females but not males is consistent with hypothesis 4, which posited a higher likelihood that unobserved factors associated with return migration negatively influence female occupation outcomes. This is a point we return to in the discussion.

[Table 4]

Marginal effect estimates for occupational outcomes associated with return migration are displayed for women and men in Figures 5a and 5b, respectively. First, the average effects, which continue to be driven by the concentration of observations in the base category, are higher for females (0.43) than they are for males (0.21). While this differs from the migration marginal effects presented above, the overall U-shaped pattern for females and downward sloping pattern for males remains.

For females, there is an approximately equal marginal effect (0.2) of moving from category 1 (homemaker) into category 2 (agriculture) as there is from moving from category 3 (construction, manufacturing or sales) to category 4 (professional or high-skill). In addition, there is a smaller positive increase in the probability of moving from category 2 to category 3. Whereas for males the only significant upward effect is into category 3. As mentioned above, these differences are consistent with the tendency for labor markets

[30] A second example is the positive and significant sign for females on 'HH organized' versus the negative sign for males. This measure indicates participation in a community coffee cooperative, which for females probably increases their potential to network into better employment directly or indirectly, while for males it probably means that their household is more likely to be dedicated to intensive coffee cultivation, which will increase their likelihood of working in agriculture.

to be segmented with males (in construction) and females (in professional services). These outcomes are also likely to be shaped by less developed local labor markets in rural areas, and the construction of improved homes for families benefitting from migration or return migration. The control variable coefficient estimates in Table 4 are similar in sign and (in many cases) magnitudes to the estimates in Table 3, but fewer are statistically significant. Those that are statistically significant underscore a similar pattern of gender-differentiation in the factors that shape occupation outcomes for non-migrants, relative to migrants.

[Figures 5a, 5b]

We wrap up discussion of Tables 3 and 4 with brief comments on the role of community migration network variables on female occupational outcomes. Consistent with Munshi (2003), it appears that female occupational outcomes are advanced by the presence of community migration networks within Mexico but are reduced by similar migration networks in the US. This result holds true for females in both the migrant and return migrant regressions, and it is consistent with other work that finds increased opportunities for Mexican women associated with rural to urban moves (Curran and Rivero-Fuentes, 2003; Lewis et al. 2017) and potentially returning home with more experience. It is also consistent with the potential that migration networks in the US might tend to involve women coming to work in agriculture or to do domestic work supporting existing family members who are already working. On the other hand, for males, networks of either type do the opposite. Additionally, almost none of these variables are significantly different from zero in the return migration estimations. These results are consistent with a situation where male occupational outcomes – dominated as they are in the US by agriculture – are neither buoyed by nor as sensitive to network effects to begin with given that males' access to migration networks was often established decades prior.

To summarize, the MS-ENR regression results and the marginal effect estimates illustrate that migration and return migration have a strong, direct positive impact on occupation mobility. The average positive marginal effect of migration on occupation outcomes ranges from 72% for females to 70% for males, while the average positive marginal effect on occupation outcomes of return migration ranges from 44% for females to 21% for males. While these impacts are strongest at the base of the occupation ladders, they do extend beyond, particularly for females. These results help to show with more specificity the unambiguously positive role that migration and return migration play in occupational mobility for females and males from rural Mexico. Including the switching and individual migration terms, while controlling for the selection process associated with migration or return migration, provides a more comprehensive portrayal of the links between these moves and occupation. These findings also demonstrate the endogenous, negative selection associated with occupation outcomes for female migration and return migration as well as male migration. In so doing, they highlight the important role that unobserved non-pecuniary factors, such as family reunification, forced returns, and illness, play in shaping migration decisions and occupation outcomes.

Migration and Return Migration Results (First-Moment)

The migration regression results (Table 5) are consistent with previous studies of Mexican migration in finding that individual and household-level demographic and socioeconomic characteristics shape female and male migration often in different ways. Coefficient estimates on the age variables are the same sign and similar magnitudes for females and male (columns 1 and 2, respectively). Education is positively and significantly related to migration for females and males, but is higher for females. This is an important distinction, because female migration for work may be more closely linked to pursuing a higher occupational status than it is for males. The presence of a dependent child has a negative and statistically significant effect on migration only for females.

[Table 5]

Very few other regressors are statistically significant in shaping female migration outcomes, including the historical community-migration coefficients, which are positive. This broad outcome is not surprising given the high degree of censoring in female migration (only 10% are currently migrants). One notable result is that household participation in Oportunidades, Mexico's conditional cash transfer program, is negatively and significantly related to female migration. This is consistent with Oportunidades positive impact on educational attainment outcomes for young women and with the transfer being paid directly to mothers of school-age children only if they are present to receive the transfer.

For males, several coefficient estimates are statistically significant in the migration regression. Both historical community-migration coefficients are positive and significantly influence male migration. These effects reflect the positive network effects of lower migration costs and the role of family structure in modifying those effects. Three household variables also significantly affect male migration outcomes – household size (negatively), number of household children (positively), and family member with a non-farm job (negatively). These are all consistent with the needs of the household shaping migration choices for males.

Return migration results can be summarized succinctly (columns 3 and 4). For both genders, the coefficient estimates on age and education are positive and statistically significant; individuals with higher human capital are more likely to return migrate. Of note, this is consistent with the findings of Gibson and McKenzie (2011) reported above in their study focused on non-pecuniary motives for a very distinct population. It is also consistent with the conceptualization of temporary migration advanced by Dustmann and Görlach (2016). The community ever return migration rate is positive and significantly related to individual return migration choices for both females and males, suggesting that cyclical migration for work varies systematically across communities, though the other historical community-level coefficients are not. While few other coefficient estimates are significant for either females or males, household participation in Oportunidades is positively related to females being in their home community, this time as a return migrant.

In summary, one of the exclusion restriction variables specified to aid in identification is a positive and statistically significant predictor of migration or return migration in three of the four cases (columns 2-4). Furthermore, the switching results are broadly in line with our understanding of the migration and return migration contexts. These findings also weakly support hypothesis 3 that female migration may be more directly influenced by education and other individual factors, consistent with the role that human capital considerations often play in occupational mobility.

Robustness

We assess the robustness of our results in three ways. First, we compare our findings to those from 'naïve' ordered probits that do not account for endogenous selection. Second, we compare our findings to those from a more traditional endogenous switching regression (selection) framework, which cannot include the migration/return migration switching term in the second-moment. Third, we assess the robustness of the findings to alternative exclusion restrictions of a more historical nature.

Relative to the MN-ESR migration and return migration findings presented in Tables 3 and 4, the results from the naïve ordinal probits presented in Appendix Table 3 illustrate that the direct effects of migration and return migration are downward biased when the negative influence of endogenous selection is unaccounted for. As expected, in the three cases where we observe negative, statistically significant selection on unobservables, the naïve coefficients are substantially downward biased. This non-trivial bias represents an underestimate of upward occupational mobility of 30-39%. The findings for a more traditional endogenous switching model presented in Appendix Table 4 demonstrate that standard selection procedures do account for the positive selection into migration and return migration, as reflected by the positive selection coefficients. This is the expected direction of selection strictly associated with migration/return migration, thereby providing us additional confidence about our findings. However, these results also show that a standard selection model does not account for the negative unobserved heterogeneity associated with the decision to migration/return migration and occupation outcomes, such as family reunification motives and forced returns.

Finally, in Appendix Tables 5 and 6 we present results of MN-ESR models for migration and return migration (respectively) based on alternative exclusion restrictions. The first is the community proportion of individuals who first migrated up until 1995. This measure differs from the one in our main analysis because it excludes journeys after 1995 and all repeat journeys. The historical nature of this measure and its emphasis on new journeys may provide a more plausibly exogenous exclusion restriction. Both the main variable we rely on and this alternative measure the size of the migration network (though at different points in time). On the other hand, the second alternative variable represents the length of time that a community's migration network reached a critical mass, which we define as 10% of the survey sample in each community reporting a first migration. On average, these criteria are satisfied for 17.7 years, implying that migration networks reached a critical mass in 1987. This varies from as late as 1995 to as early as 1982 across communities, indicating that this variable is at least as historical as the one described above.

The findings in Appendix Tables 5 and 6 broadly confirm our main results. Regardless of the variable in the first-moment that serves as our exclusion restriction, we observe large, positive, and statistically significant impacts of migration and return migration on occupation outcomes for females and males. Furthermore, we observe a similar pattern of negative self-selection on unobservables for women and men who migrate and return migrate. Taken as a whole, these three robustness checks indicate that (i) our findings differ from other models that ignore or only partially account for selection in the ways that we would expect and (ii) are not sensitive to the alternative specification of exclusion restrictions that may be more plausibly exogenous.

7. Discussion

This article deploys a novel econometric strategy, namely a Mixed Nonlinear Endogenous Switching Regression (MN-ESR), to explicitly examine endogenous selection issues and allow for a more comprehensive treatment of migration and return migration linkages to occupational outcomes than what has heretofore been provided. We find unambiguous positive and significant direct effects of migration and return migration on occupational mobility for rural Mexican females and males. These impacts differ in predictable ways in terms of upward occupational paths, for example with females being more likely to move out of their base activity of homemaking and into professional service jobs and males into construction. In addition, endogenous selection effects are negative and significant in three of the four cases (not for male return migrants). This indicates that the remaining unobserved heterogeneity linking migration or return migration to labor market outcomes has a negative impact on occupational mobility. In the case of migration, we link this outcome to the potential for family reunification motives that might involve adults migrating for non-pecuniary reasons, while with return migration the potential for forced returns (for legal or health reasons) makes the unobserved motives more ambiguous.

These nuanced findings reveal a critical aspect of labor outcomes that is unavailable in standard selection regression frameworks, which additionally cannot measure the direct effects of migration or return migration. While these types of methods often find evidence of positive self-selection into migration, thus capturing the positive link between migration or return migration on occupational (or other) outcomes, they offer only indirect evidence based on correlated unobservable variables. Here we offer a more direct test that shows both the positive direct effects associated with migration or return migration and, in most instances, the negative selection effect.

Our contribution to the empirical literature is substantive. We provide evidence on the labor market effects of both migration and return migration, providing a fuller description of the migration-labor relationship than most studies that typically only characterize one or the other due to data limitations. With respect to the migration and occupational mobility literature, we provide confirmation of positive occupational outcomes associated with migration shown in other instances, including distinct effects by gender (Jasso and Rosenzweig, 1995; Powers and Shi, 1998; Powers et al. 1998). Our sample is somewhat distinct because it consists of rural, poor Mexicans who largely migrated without legal authorization. In welfare terms, finding unambiguous positive evidence of upward occupation mobility is noteworthy, because it highlights the fundamental role that access to better labor markets can play in reducing poverty.

We also find evidence that non-pecuniary motives for migration, such as family reunification, are significant and can cut against the positive direct effects on occupation; though this does not obviate the potential for welfare gains associated with family reunification. Our empirical findings are also consistent with previous research that demonstrate heterogeneity in migration selection processes (Chiquiar and Hanson, 2005; McKenzie and Rapoport, 2010), gendered patterns of community migration networks and labor market outcomes (Borjas, 1987; Munshi, 2003), and the salience of non-pecuniary factors (Gibson and McKenzie, 2011).

The return migration literature, at least for Mexico, has struggled to reconcile somewhat contradictory evidence on the impacts of return migration on skill acquisition, earnings, and presumably occupational mobility. Lacuesta (2010) argues that premigration differences in skill and ability were the basis for explaining higher wages for Mexican return migrants rather than experience or skill acquisition. Meanwhile, Reinhold and Thom (2013) and Campos-Vazquez and Lara (2012) counter that the 'unobservables' in Lacuesta's study, which are positively associated with higher earnings, are actually derived from labor market experience acquired in the US by return migrants. Our approach provides a direct hypothesis test for the positive effects of return migration on occupational mobility (and potentially wages), confirming the results of Reinhold, Thom and Campos-Vazquez and Lara, and broader findings reported in Dustmann and Gorlach (2016).

We close with three general implications of our article, one for future research and two relating to policy. First, the MN-ESR approach deployed here to study the impacts of migration and return migration on occupation illustrates the potential value of this method for studies of key welfare outcomes that can be measured categorically. Some salient migration/return migration and development examples include educational attainment, distinctive types and levels of physical and financial investments, and household splits (children or dependents setting up independent residences). The possibility of identifying direct effects and separately accounting for the role of endogenous selection holds potential for deepening our understanding of how these choices directly impact human welfare.

On the policy side, the significant and negative impact of the selection associated with return migration on occupational outcomes for females is relevant to the current context of Mexican migration to the US and to international migration in other parts of the globe. To the extent that forced returns rather than family reunification are a significant driver of 'returns', the potential gains from migration via skills acquisition and other paths may be substantively reduced. Historically, most Mexican migration to the US is 'temporary,' but when return journeys are not voluntary, the odds are considerably higher that re-entry will complicate and even erode welfare gains.

At a broader policy level, we highlight our findings for rural Mexicans, from the country's poorest regions, that both migration and return migration have direct, positive, and substantial impacts on occupational outcomes (especially for females). The opportunity to pursue gains through the labor market is the primary mechanism for most people to 'get ahead' in the world. As evident in our data, it often involves temporary migration, wherein people migrate for a period and then bring their acquired skills, knowledge, and assets home to their communities or countries of origin. Work by Clemens (2011) and Clemens and Pritchett (2016) argue that emigration is a critical means to reduce the extreme degree of global inequality. Our study provides unambiguous support for the role of increased labor mobility, at least from the perspective of rural Mexican households.

8. Compliance with Ethical Standards

The authors declare that they have no conflict of interest.

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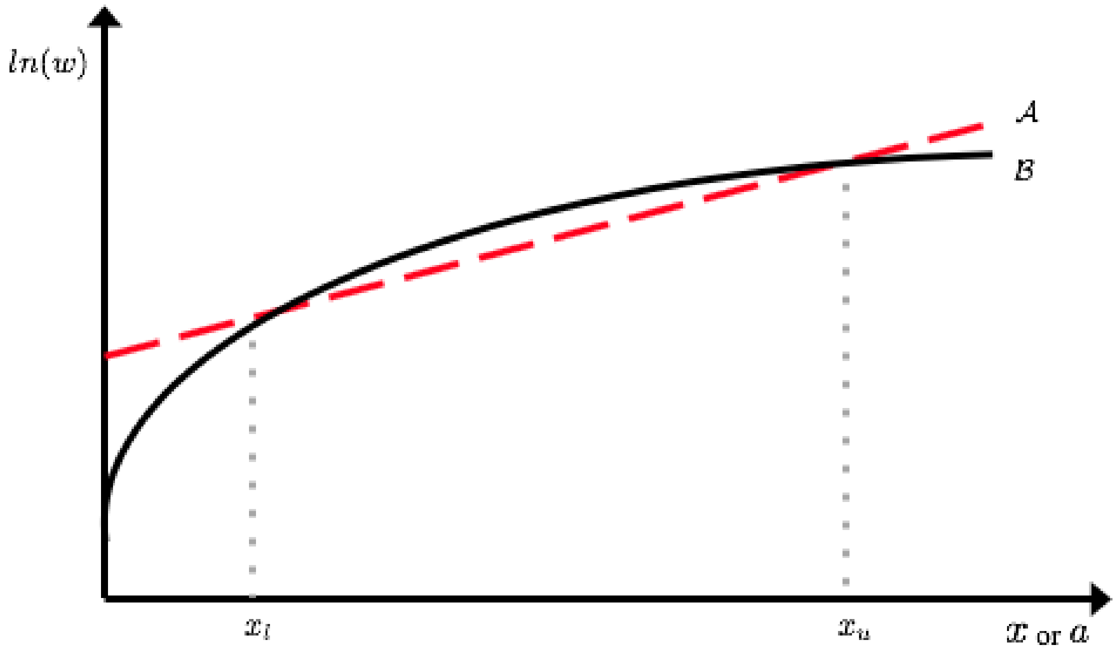
10. Figures & Tables

Figure 1: Net Wage (*q*) Profile Trajectories & Thresholds



$\mathcal{A}$ = *net wage profile for non-migrants.*

$\mathcal{B}$ = *net wage profile for migrants.*

Table 1: Individual and Household (HH) Characteristics

Level	*Indicator*	*Mean*	*SD*
Individual			
	Age (years)	27.14	17.76
	Youth & young adult, ages 16-25 (0/1)	0.24	0.43
	Adult, ages 26-40 (0/1)	0.26	0.44
	Middle, ages 41-60 (0/1)	0.15	0.36
	Female (0/1)	0.51	0.50
	Male (0/1)	0.49	0.50
	Education (years)	5.45	3.71
Household			
	HH size (#)	5.18	2.57
	HH children (#)	2.43	1.95
	HH adults (#)	2.74	1.34
	HH organized (0/1)	0.62	0.49
	HH non-farm work (0/1)	0.41	0.49
	HH owns enterprise (0/1)	0.12	0.32
	HH coffee hectares (#)	3.20	3.51
	HH maize hectares (#)	0.58	0.70
	HH livestock (#)	11.08	13.72
	HH Oportunidades transfer (MX$/year)	5,703	4,494
	HH PROCAMPO subsidy (MX$/year)	1,026	1,723
	HH agricultural income ratio (%)	0.24	0.24
	HH located in community (0/1)	0.67	0.47
	HH located in outskirts (0/1)	0.20	0.40
	HH located in the country (0/1)	0.13	0.34
State			
	Chiapas (0/1)	0.26	0.44
	Oaxaca (0/1)	0.74	0.44
Number of individual observations (#)		5,507	

Table 2: Primary Occupation Outcomes for Working Age Individuals (ages 15-60)

Sample	*All*			*Female*			*Male*		
	N	*%*	*Educ*	*N*	*%*	*Educ*	*N*	*%*	*Educ*
4 ordered occupation categories									
(1) Homemaker	1,464	44.26	4.77	1,464	82.43	4.76	-	-	-
(2) Agricultural, housekeeping/clean	1,254	37.91	5.27	161	9.08	5.21	1,095	71.38	5.28
(3) Construction, manufacturing, sales, food, service, etc.	437	13.21	6.67	84	4.73	6.71	353	23.01	6.66
(4) Professional or high-skilled, etc.	153	4.63	9.33	67	3.77	8.27	86	5.61	10.13
Total	3,308	100	5.40	1,776	100	5.01	1,534	100	5.85

Notes: 18 unemployed & 376 student observations
Educ is the average years of education for each occupation category.

Figure 2a

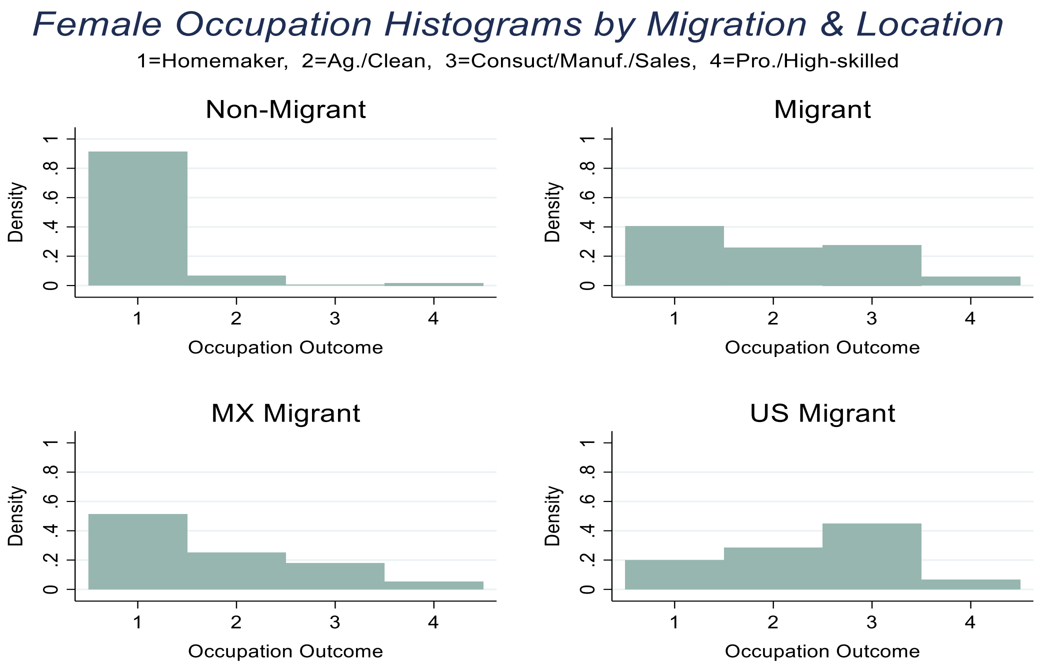


Figure 2b

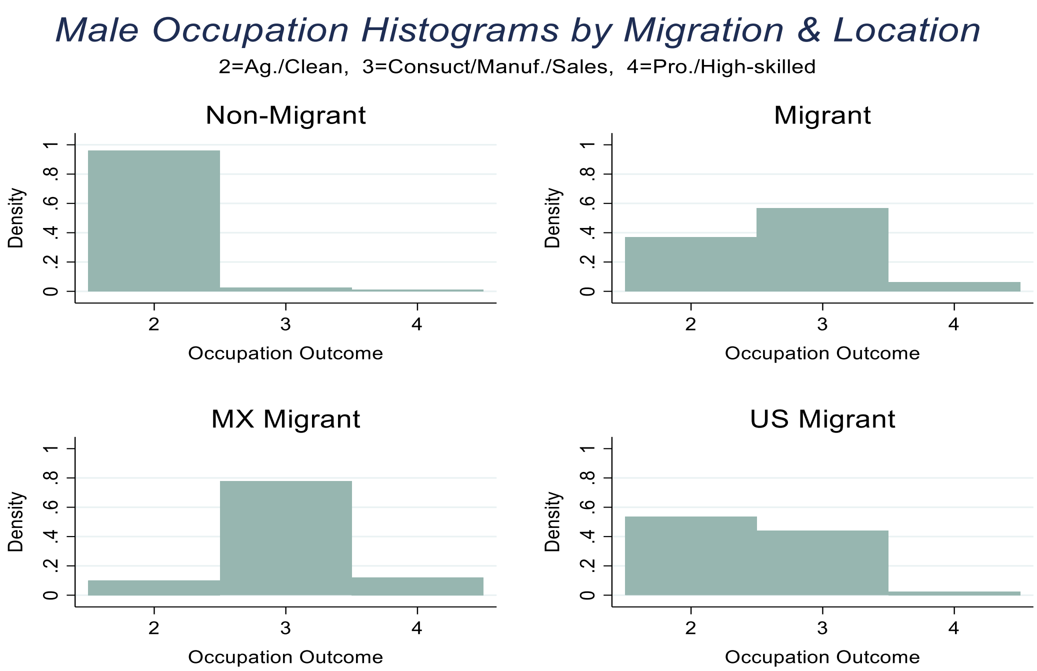


Figure 3a

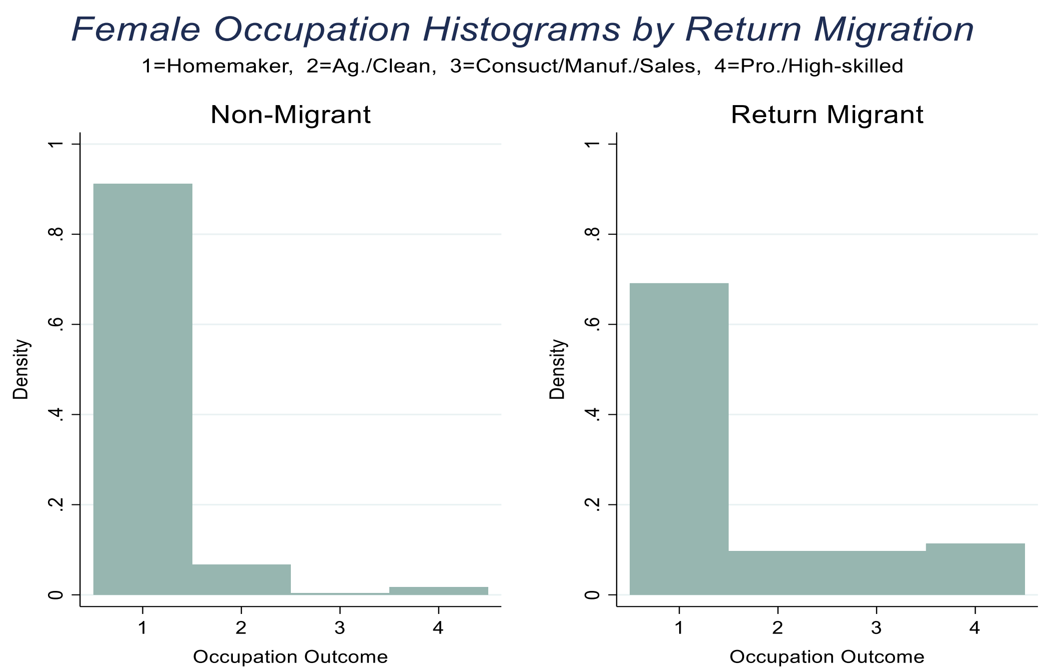


Figure 3b

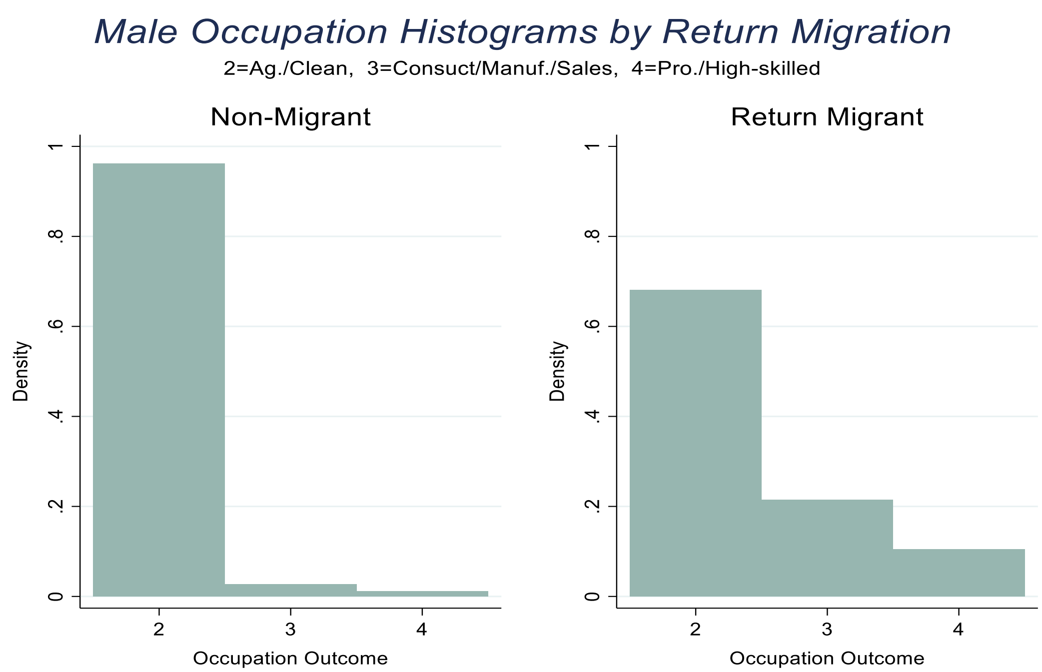


Table 3 (MN-ESR, Ordered Probit): *Migration* and Occupation

	(1)		(2)	
Sample	*Female*		*Male*	
Outcome	*4 Ordered Occupations*		*3 Ordered Occupations*	
	Coef.	**S.E.**	**Coef.**	**S.E.**
Selection (ρ)	-0.639***	(0.10)	-0.677***	(0.04)
Migrant	2.711***	(0.20)	2.884***	(0.14)
Comm. Rate of HHs w/ MX migration history	2.375***	(0.68)	-1.026	(0.76)
Comm. Rate of HHs w/ US migration history	-0.938***	(0.23)	-0.883***	(0.27)
Age	0.045	(0.04)	-0.006	(0.05)
Age^^{2}	-0.000	(0.00)	0.000	(0.00)
Education	0.053***	(0.02)	0.092***	(0.02)
Child dependent	-0.698***	(0.14)	0.215	(0.13)
Youth & young adult	-0.254	(0.37)	0.079	(0.40)
Adult	-0.136	(0.25)	0.109	(0.29)
HH size	-0.067	(0.04)	0.057	(0.05)
HH children	0.145**	(0.06)	-0.094	(0.06)
HH non-farm work	0.341***	(0.10)	0.155	(0.11)
HH coffee hectares (IHS)	-0.079	(0.08)	0.010	(0.08)
HH organized	0.258**	(0.12)	-0.328***	(0.11)
HH Oportunidades (LN)	-0.154*	(0.08)	0.208**	(0.09)
HH located in outskirts	0.003	(0.14)	-0.305**	(0.15)
HH located in the country	-0.614***	(0.22)	-0.136	(0.18)
Chiapas	0.782***	(0.12)	-0.036	(0.14)
Number of observations	1,264		849	
Log-likelihood	-870.41		-780.11	

Notes: *** p<0.01, ** p<0.05, * p<0.10.
Standard errors are robust clustered at the community level.
Jointly estimated switching-level migration results are presented in Table 6.
IHS = inverse hyperbolic sine transformation, and LN = natural log transformation.
Column 2: The full switching specification for males does not converge when the household level migration history variables are included.

Figure 4a

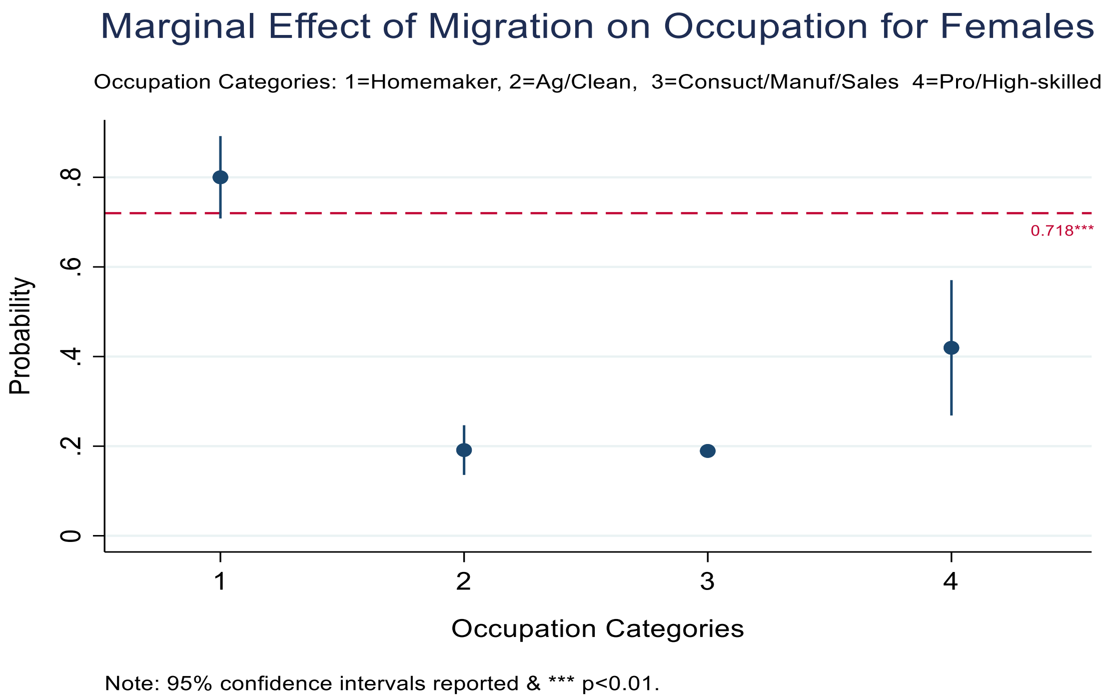


Figure 4b

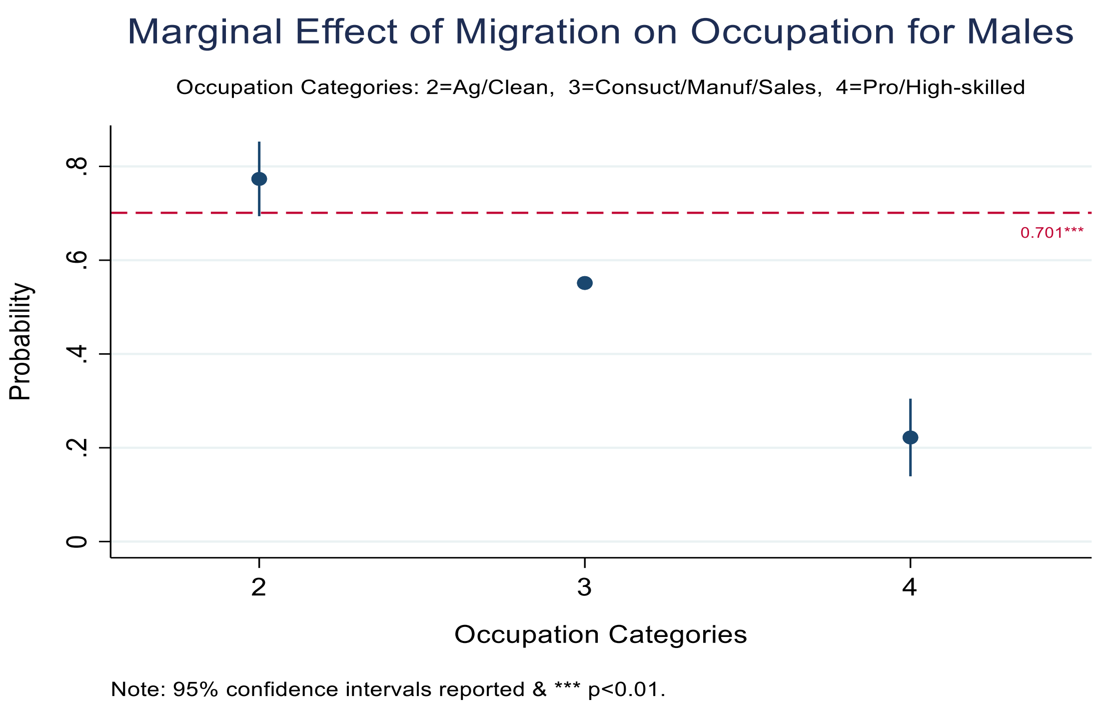


Table 4 (MN-ESR, Ordered Probit): *Return Migration* and Occupation

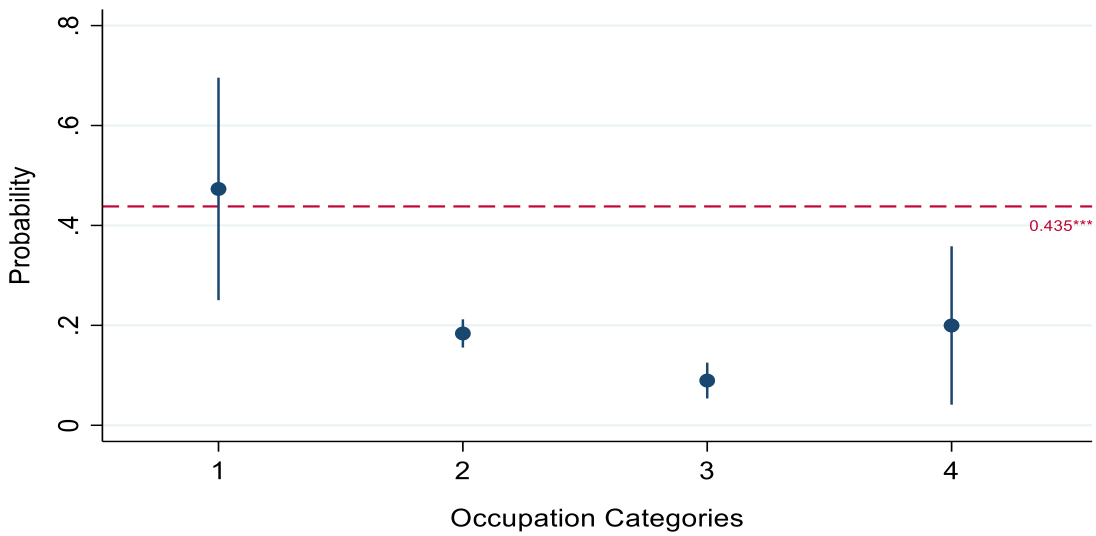
	(1)		*(2)*	
Sample	*Female*		*Male*	
Outcome	*4 Ordered Occupations*		*3 Ordered Occupations*	
	Coef.	**S.E.**	**Coef.**	**S.E.**
Selection (ρ)	-0.405**	(0.16)	-0.061	(0.25)
Return migrant	1.758***	(0.28)	1.533***	(0.39)
Comm. Rate of HHs w/ MX migration history	2.849***	(0.73)	-	-
Comm. Rate of HHs w/ US migration history	-1.466***	(0.26)	-	-
Age	0.098**	(0.04)	0.014	(0.06)
Age^2	-0.001*	(0.00)	-0.000	(0.00)
Education	0.097***	(0.02)	0.161***	(0.02)
Child dependent	-0.695***	(0.13)	0.309*	(0.17)
Youth & young adult	-0.089	(0.35)	0.290	(0.43)
Adult	-0.074	(0.23)	0.127	(0.29)
HH size	-0.025	(0.04)	-0.063	(0.05)
HH children	0.003	(0.05)	-0.042	(0.07)
HH non-farm work	0.272***	(0.10)	0.205*	(0.12)
HH coffee hectares (IHS)	-0.069	(0.07)	-0.046	(0.08)
HH organized	0.128	(0.11)	-0.154	(0.12)
HH Oportunidades (LN)	-0.121	(0.08)	0.061	(0.10)
HH located in outskirts	-0.116	(0.14)	0.134	(0.15)
HH located in the country	0.012	(0.17)	-0.521**	(0.21)
Chiapas	0.692***	(0.11)	-1.715***	(0.23)
Number of observations	1,377		959	
Log-likelihood	-1,133.07		-914.36	

Notes: *** p<0.01, ** p<0.05, * p<0.10.
Standard errors are robust clustered at the community level.
Jointly estimated switching-level return migration results are presented in Appendix Table 1.
IHS = inverse hyperbolic sine transformation, and LN = natural log transformation.
Column 2: The full switching specification for males does not converge when the household or community level migration history variables are included.

Figure 5a

Marginal Effect of Return Migration on Occupation for Females

Occupation Categories: 1=Homemaker, 2=Ag/Clean, 3=Consuct/Manuf/Sales, 4=Pro/High-skilled

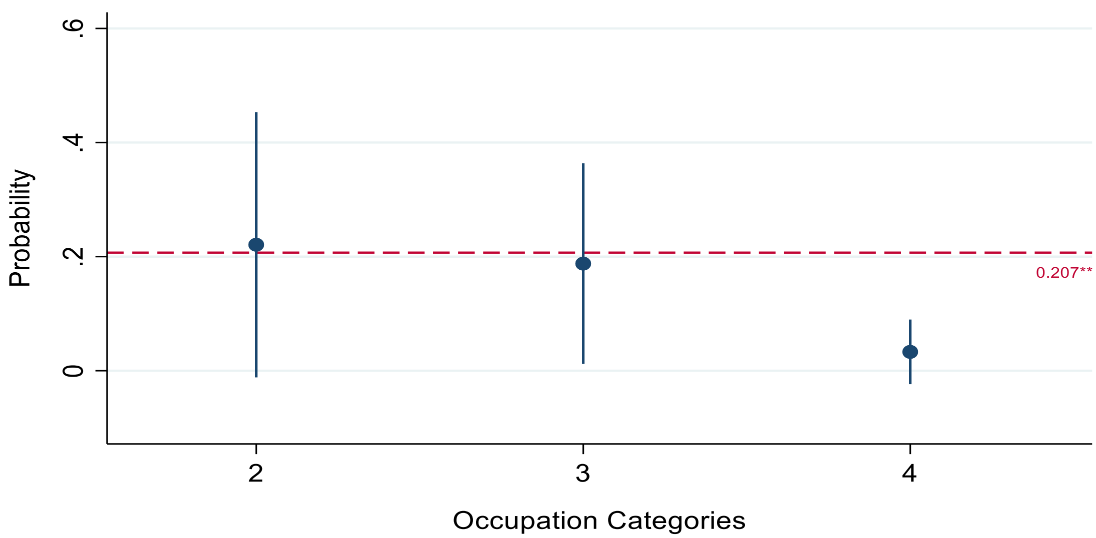


Note: 95% confidence intervals reported & *** p<0.01.

Figure 5b

Marginal Effect of Return Migration on Occupation for Males

Occupation Categories: 2=Ag/Clean, 3=Consuct/Manuf/Sales, 4=Pro/High-skilled



Note: 95% confidence intervals reported & ** p<0.05.

***Table 5 (Probit): Migration &* Return Migration *Switching Stage* (First Moment)**

	(1)		*(2)*		*(3)*		*(4)*	
Outcome	*Migration*				*Return Migration*			
Sample	*Female*		*Male*		*Female*		*Male*	
	Coef.	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Age	0.118**	(0.05)	0.131***	0.048	0.079*	(0.04)	0.131***	(0.04)
Age^2	-0.002**	(0.00)	-0.002***	0.001	-0.001**	(0.00)	-0.002***	(0.00)
Education	0.099***	(0.02)	0.050***	0.019	0.079***	(0.01)	0.075***	(0.02)
Child dependent	-0.390***	(0.14)	-0.141	0.137	-0.339***	(0.11)	0.273*	(0.14)
Community proportion of individuals who ever migrated	0.334	(1.72)	3.820**	1.715	1.250	(1.44)	1.585	(1.58)
Community proportion of individuals who ever migrated X HH adults	0.618	(0.60)	1.535***	0.541	0.041	(0.43)	-0.199	(0.48)
Community proportion of individuals who ever return migrated	-	-	-	-	1.979**	(0.89)	4.273***	(0.91)
Community proportion of individuals who ever return migrated X HH children	-	-	-	-	-0.147	(0.27)	0.042	(0.29)
Youth & young adult	0.811*	(0.41)	0.582	0.369	0.384	(0.32)	0.536*	(0.32)
Adult	0.333	(0.32)	0.113	0.255	0.172	(0.22)	0.190	(0.19)
HH size	-0.411	(0.29)	-1.014***	0.263	-0.029	(0.21)	0.049	(0.22)
HH children	0.337	(0.29)	0.945***	0.262	0.003	(0.24)	-0.086	(0.25)
HH non-farm work	-0.063	(0.11)	-0.392***	0.110	0.120	(0.09)	-0.077	(0.10)
HH coffee hectares (IHS)	0.082	(0.08)	0.126	0.084	0.133**	(0.07)	0.055	(0.07)
HH organized	0.179	(0.11)	0.119	0.106	0.053	(0.09)	0.128	(0.09)
HH Oportunidades (LN)	-0.175*	(0.09)	-0.010	0.091	0.145**	(0.07)	0.019	(0.08)
HH located in outskirts	-0.059	(0.15)	0.100	0.133	0.489***	(0.11)	-0.077	(0.12)
HH located in the country	-0.289*	(0.17)	0.284*	0.165	0.107	(0.14)	0.409***	(0.15)
Chiapas	-0.729***	(0.16)	0.667***	0.146	-0.327***	(0.13)	0.562***	(0.12)
Constant	-1.927	(1.37)	-3.140**	1.370	-5.094***	(1.12)	-5.253***	(1.22)
Number of observations	1,264		849		1,377		959	
Log-likelihood	-870.41		-780.11		-1,133.07		-914.36	

Notes: *** p<0.01, ** p<0.05, * p<0.10.

Standard errors are robust clustered at the community level.

Column 1 corresponds to column 1 in Table 4; column 2 corresponds to column 2 in Table 4; column 3 corresponds to column 1 in Table 5; and column 4 corresponds to column 2 in Table 5.

IHS = inverse hyperbolic sine transformation, and LN = natural log transformation.

11. Appendix

Appendix Table 1: Individual and Household (HH) Characteristics

Level	*Indicator*	*Mean*	*SD*
Individual			
	Age (years)	27.14	17.76
	Youth & young adult, ages 16-25 (0/1)	0.24	0.43
	Adult, ages 26-40 (0/1)	0.26	0.44
	Middle, ages 41-60 (0/1)	0.15	0.36
	Female (0/1)	0.51	0.50
	Male (0/1)	0.49	0.50
	Education (years)	5.45	3.71
Household			
	HH size (#)	5.18	2.57
	HH children (#)	2.43	1.95
	HH adults (#)	2.74	1.34
	HH organized (0/1)	0.62	0.49
	HH non-farm work (0/1)	0.41	0.49
	HH owns enterprise (0/1)	0.12	0.32
	HH coffee hectares (#)	3.20	3.51
	HH maize hectares (#)	0.58	0.70
	HH livestock (#)	11.08	13.72
	HH Oportunidades transfer (MX$/year)	5,703	4,494
	HH PROCAMPO subsidy (MX$/year)	1,026	1,723
	HH agricultural income ratio (%)	0.24	0.24
	HH located in community (0/1)	0.67	0.47
	HH located in outskirts (0/1)	0.20	0.40
	HH located in the country (0/1)	0.13	0.34
State			
	Chiapas (0/1)	0.26	0.44
	Oaxaca (0/1)	0.74	0.44
Number of individual observations (#)		5,507	

Appendix Table 2: Marginal Effect of *Migration* & *Return Migration* on Occupation Outcomes by Gender

	(1)		*(2)*	
Sample	*Female*			
Marginal Effect	*Migration*		*Return Migration*	
	Coef.	**S.E.**	**Coef.**	**S.E.**
Average	0.718***	(0.03)	0.435***	(0.09)
(1) Homemaker	0.800***	(0.05)	0.473***	(0.11)
(2) Agricultural, housekeeping/clean	0.191***	(0.03)	0.184***	(0.01)
(3) Construction, manufacturing, sales, food, service, etc.	0.189***	(0.00)	0.089***	(0.02)
(4) Professional or high-skilled, etc.	0.419***	(0.08)	0.200**	(0.08)
Number of observations	1,264		1,377	

	(3)		*(4)*	
Sample	*Male*			
Marginal Effect	*Migration*		*Return Migration*	
	Coef.	**S.E.**	**Coef.**	**S.E.**
Average	0.701***	(0.02)	0.207**	(0.10)
(2) Agricultural, housekeeping/clean	0.773***	(0.00)	0.221*	(0.12)
(3) Construction, manufacturing, sales, food, service, etc.	0.551***	(0.04)	0.188**	(0.09)
(4) Professional or high-skilled, etc.	0.222***	(0.04)	0.033	(0.03)
Number of observations	849		959	

Notes: *** p<0.01, ** p<0.05, * p<0.10.
Standard errors are robust clustered at the community level.
Column 1 corresponds to column 3 in Table 5; column 2 corresponds to column 3 in Table 6; column 3 corresponds to column 6 in Table 5; and column 4 corresponds to column 5 in Table 6.
Marginal efffects calculated at the mean of the relevant data sample.

Appendix Table 3 (Ordered Probit): Naïve Regressions for *Migrants* & *Return Migrants* & Occupation

	(1)		*(2)*		*(3)*		*(4)*	
Analysis	*Migration*				*Return Migration*			
Sample	*Female*		*Male*		*Female*		*Male*	
Outcome	*4 Ordered Occupations*		*3 Ordered Occupations*		*4 Ordered Occupations*		*3 Ordered Occupations*	
	Coef.	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Migrant	1.675***	(0.19)	2.029***	(0.29)	-	-	-	-
Return migrant	-	-	-	-	1.070***	(0.20)	1.358***	(0.24)
Age	0.074***	(0.02)	0.019	(0.05)	0.108***	(0.03)	0.031	(0.05)
Age^^{2}	-0.001*	(0.00)	-0.000	(0.00)	-0.001***	(0.00)	-0.000	(0.00)
Education	0.077***	(0.02)	0.127***	(0.02)	0.116***	(0.03)	0.159***	(0.03)
Child dependent	2.841***	(0.94)	0.162	(1.05)	-0.788***	(0.17)	0.306	(0.25)
Comm. Rate of HHs w/ MX migration history	-0.994**	(0.45)	-0.744**	(0.32)	3.320***	(0.62)	-1.081	(1.20)
Comm. Rate of HHs w/ US migration history	-0.838***	(0.14)	0.151	(0.13)	-1.456***	(0.38)	-0.284	(0.52)
Youth & young adult	0.025	(0.27)	0.344	(0.22)	0.004	(0.20)	0.360	(0.36)
Adult	-0.045	(0.22)	0.209	(0.29)	-0.025	(0.17)	0.164	(0.36)
HH size	-0.102	(0.07)	-0.054	(0.03)	-0.033	(0.05)	-0.054	(0.06)
HH children	0.161**	(0.08)	-0.010	(0.05)	-0.007	(0.04)	-0.029	(0.08)
HH non-farm work	0.438***	(0.07)	0.111*	(0.07)	0.309***	(0.08)	0.204	(0.21)
HH coffee hectares (IHS)	-0.089	(0.11)	0.028	(0.11)	-0.041	(0.07)	-0.048	(0.09)
HH organized	0.335**	(0.15)	-0.334***	(0.09)	0.148	(0.10)	-0.172	(0.13)
HH Oportunidades (LN)	-0.186	(0.14)	0.238***	(0.09)	-0.098	(0.13)	0.066	(0.08)
HH located in outskirts	0.016	(0.17)	-0.344***	(0.10)	-0.004	(0.17)	0.166	(0.15)
HH located in the country	-0.720***	(0.21)	-0.173	(0.20)	0.009	(0.19)	-0.439**	(0.19)
Chiapas	0.699***	(0.17)	-0.023	(0.13)	0.663***	(0.16)	-1.733***	(0.23)
Number of observations	1,264		849		1,377		959	
Log-likelihood	-510.81		-374.44		-556.65		-350.55	

Notes: *** p<0.01, ** p<0.05, * p<0.10.
Standard errors are robust clustered at the community level.
Column 1 corresponds to column 1 in Table 3; column 2 corresponds to column 2 in Table 2; column 3 corresponds to column 1 in Table 4; and column 4 corresponds to c
IHS = inverse hyperbolic sine transformation, and LN = natural log transformation.

Appendix Table 4 (Ordered Probit): Standard Selection Endogenous Switching Regression for *Migrants* & *Return Migrants* & Occupation

	(1)		*(2)*		*(3)*		*(4)*	
Analysis	*Migration*				*Return Migration*			
Sample	*Female*		*Male˚*		*Female*		*Male˚*	
Outcome	*4 Ordered Occupations*		*3 Ordered Occupations*		*4 Ordered Occupations*		*3 Ordered Occupations*	
	Coef.	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Selection (ρ)	0.500***	(0.05)	0.477***	(0.04)	0.528***	(0.05)	0.136***	(0.05)
Age	0.127***	(0.04)	0.072*	(0.04)	0.115***	(0.04)	0.074**	(0.04)
Age^^{2}	-0.001***	(0.00)	-0.001**	(0.00)	-0.001***	(0.00)	-0.001**	(0.00)
Education	0.120***	(0.01)	0.127***	(0.01)	0.119***	(0.01)	0.126***	(0.01)
Child dependent	-0.919***	(0.10)	0.013	(0.10)	-0.914***	(0.10)	0.004	(0.10)
Comm. Rate of HHs w/ MX migration history	2.418***	(0.53)	0.795	(0.55)	2.428***	(0.54)	1.030*	(0.56)
Comm. Rate of HHs w/ US migration history	-0.792***	(0.20)	-0.044	(0.21)	-1.007***	(0.20)	-0.130	(0.22)
Youth & young adult	0.261	(0.30)	0.420	(0.28)	0.260	(0.30)	0.413	(0.28)
Adult	0.063	(0.20)	0.126	(0.21)	0.087	(0.21)	0.129	(0.21)
HH size	-0.069**	(0.03)	-0.170***	(0.03)	-0.069**	(0.03)	-0.175***	(0.03)
HH children	0.037	(0.05)	0.072*	(0.04)	0.045	(0.05)	0.078*	(0.04)
HH non-farm work	0.244***	(0.08)	-0.029	(0.08)	0.283***	(0.08)	-0.026	(0.08)
HH coffee hectares (IHS)	-0.008	(0.06)	0.083	(0.06)	0.006	(0.06)	0.094	(0.06)
HH organized	0.202**	(0.09)	-0.168**	(0.08)	0.182**	(0.09)	-0.175**	(0.08)
HH Oportunidades (LN)	-0.117*	(0.07)	0.087	(0.06)	-0.123*	(0.07)	0.089	(0.06)
HH located in outskirts	0.009	(0.11)	0.021	(0.10)	0.004	(0.11)	-0.002	(0.10)
HH located in the country	-0.136	(0.14)	-0.249*	(0.13)	-0.206	(0.15)	-0.257*	(0.13)
Chiapas	0.242**	(0.10)	-0.487***	(0.10)	0.219**	(0.10)	-0.410***	(0.10)
Number of observations	1,264		1,302		1,377		1,302	
Log-likelihood	-1,234.72		-1,384.42		-1,393.28		-1,586.25	

Notes: *** p<0.01, ** p<0.05, * p<0.10.

Standard errors are robust clustered at the community level.

Column 1 corresponds to column 1 in Table 3; column 2 corresponds to column 2 in Table 2; column 3 corresponds to column 1 in Table 4; and column 4 corresponds to c

˚ Columns 2 and 4 for males do not converge with our preferred comparison group. In order to achieve convergence, we include observations with migration experience into the augmented comparison group for the purposes of this excrise. This likely results in an underestimate of positive selection.

First moment (switching stage) results are analagous to those presented in Table 5.

IHS = inverse hyperbolic sine transformation, and LN = natural log transformation.

Apptendix Table 5 (MN-ESR, Ordered Probit): *Migration* & Occupation with Alternative Exclusion Restrictions

	(1)		*(2)*		*(3)*		*(4)*	
Sample	*Female*				*Male*			
Outcome	*4 Ordered Occupations*				*3 Ordered Occupations*			
Exclusion Variable	*1995*		*Critical Mass*		*1995*		*Critical Mass*	
	Coef.	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Selection (ρ)	-0.567***	(0.14)	-0.542***	(0.15)	-0.470**	(0.19)	-0.330	(0.20)
Migrant	2.593***	(0.25)	2.549***	(0.25)	2.677***	(0.25)	2.507***	(0.29)
Comm. Rate of HHs w/ MX migration history	0.048	(0.04)	0.050	(0.05)	0.010	(0.05)	0.015	(0.05)
Comm. Rate of HHs w/ US migration history	-0.000	(0.00)	-0.000	(0.00)	0.000	(0.00)	0.000	(0.00)
Age	0.055***	(0.02)	0.057***	(0.02)	0.097***	(0.02)	0.106***	(0.02)
Age^^{2}	-0.722***	(0.14)	-0.730***	(0.14)	0.162	(0.14)	0.156	(0.14)
Education	2.285***	(0.71)	2.385***	(0.71)	-0.809	(0.90)	-0.253	(0.87)
Child dependent	-0.900***	(0.24)	-0.898***	(0.24)	-0.658**	(0.29)	-0.666**	(0.30)
Youth & young adult	-0.224	(0.37)	-0.213	(0.38)	0.183	(0.40)	0.233	(0.40)
Adult	-0.127	(0.25)	-0.125	(0.25)	0.141	(0.28)	0.164	(0.29)
HH size	-0.071*	(0.04)	-0.072*	(0.04)	0.043	(0.05)	0.020	(0.06)
HH children	0.149***	(0.06)	0.150***	(0.06)	-0.097	(0.06)	-0.081	(0.06)
HH non-farm work	0.360***	(0.11)	0.365***	(0.11)	0.140	(0.11)	0.126	(0.11)
HH coffee hectares (IHS)	-0.084	(0.08)	-0.085	(0.08)	-0.018	(0.08)	-0.014	(0.09)
HH organized	0.273**	(0.12)	0.274**	(0.12)	-0.302***	(0.11)	-0.308***	(0.11)
HH Oportunidades (LN)	-0.160*	(0.09)	-0.161*	(0.09)	0.220**	(0.09)	0.228**	(0.09)
HH located in outskirts	0.012	(0.14)	0.016	(0.14)	-0.287**	(0.15)	-0.299**	(0.15)
HH located in the country	-0.629***	(0.22)	-0.640***	(0.22)	-0.089	(0.18)	-0.118	(0.18)
Chiapas	0.777***	(0.12)	0.776***	(0.12)	-0.009	(0.14)	0.003	(0.14)
Migration Exclusions								
1995 Community proportion of first migration	4.512	(3.11)	-	-	4.564	(3.06)	-	-
1995 Community proportion of first migration X HH	-0.085	(1.12)	-	-	2.876***	(1.08)	-	-
Historical years of critical mass (10%)	-	-	0.107***	(0.04)	-	-	0.068**	(0.03)
Historical years of critical mass (10%) X HH adults	-	-	-0.022*	(0.01)	-	-	0.012	(0.01)
Number of observations	1,264		1,264		849		849	
Log-likelihood	-868.76		-866.37		-803.44		-817.73	

Notes: *** p<0.01, ** p<0.05, * p<0.10.
Standard errors are robust clustered at the community level.
Full first moment (switching stage) results are available upon request.
IHS = inverse hyperbolic sine transformation, and LN = natural log transformation.
Columns 1 and 2 correspond with Column 1 of Table 3; Columns 3 and 4 correspond with Column 2 of Table 3.

Apptendix Table 6 (MN-ESR, Ordered Probit): *Return Migration* & Occupation with Alternative Exclusion Restrictions

	(1)		(2)		(3)		(4)	
Sample	Female				Male			
Outcome	4 Ordered Occupations				3 Ordered Occupations			
Exclusion Variable	1995		Critical Mass		1995		Critical Mass	
	Coef.	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**	**Coef.**	**S.E.**
Selection (ρ)	-0.341*	(0.18)	-0.354**	(0.18)	-0.632***	(0.15)	-0.646***	(0.14)
Return Migrant	1.653***	(0.33)	1.672***	(0.31)	2.356***	(0.21)	2.361***	(0.20)
Comm. Rate of HHs w/ MX migration history	0.100**	(0.04)	0.100**	(0.04)	-0.021	(0.05)	-0.023	(0.05)
Comm. Rate of HHs w/ US migration history	-0.001*	(0.00)	-0.001*	(0.00)	0.000	(0.00)	0.000	(0.00)
Age	0.100***	(0.02)	0.100***	(0.02)	0.104***	(0.02)	0.103***	(0.02)
Age^2	-0.714***	(0.14)	-0.711***	(0.13)	0.087	(0.16)	0.088	(0.16)
Education	2.991***	(0.73)	3.042***	(0.72)	-1.379*	(0.76)	-1.156	(0.75)
Child dependent	-1.435***	(0.26)	-1.413***	(0.26)	-0.312	(0.32)	-0.278	(0.32)
Youth & young adult	-0.069	(0.35)	-0.071	(0.35)	0.083	(0.38)	0.079	(0.38)
Adult	-0.064	(0.23)	-0.066	(0.23)	0.070	(0.24)	0.068	(0.24)
HH size	-0.028	(0.04)	-0.028	(0.04)	-0.003	(0.04)	-0.005	(0.04)
HH children	0.002	(0.05)	0.002	(0.05)	-0.098*	(0.06)	-0.097*	(0.06)
HH non-farm work	0.277***	(0.10)	0.275***	(0.10)	0.170	(0.11)	0.161	(0.11)
HH coffee hectares (IHS)	-0.069	(0.07)	-0.072	(0.07)	-0.075	(0.07)	-0.079	(0.07)
HH organized	0.134	(0.11)	0.133	(0.11)	-0.137	(0.11)	-0.129	(0.11)
HH Oportunidades (LN)	-0.120	(0.08)	-0.121	(0.08)	0.072	(0.09)	0.072	(0.08)
HH located in outskirts	-0.099	(0.14)	-0.104	(0.14)	0.102	(0.14)	0.096	(0.14)
HH located in the country	0.003	(0.17)	0.001	(0.17)	-0.458**	(0.18)	-0.480***	(0.18)
Chiapas	0.697***	(0.12)	0.698***	(0.12)	-1.403***	(0.18)	-1.396***	(0.18)
Migration Exclusions								
1995 Community proportion of first return migration	5.347**	(2.64)	-	-	5.085**	(2.57)	-	-
1995 Community proportion of first return migration X HH	-0.398	(0.87)	-	-	-0.011	(0.86)	-	-
Historical years of critical mass (10%)	-	-	0.074***	(0.03)	-	-	0.040	(0.03)
Historical years of critical mass (10%) X HH children	-	-	-0.012	(0.01)	-	-	-0.001	(0.01)
Number of observations	1,377		1,377		959		959	
Log-likelihood	-1,136.51		-1,137.01		-959.37		-963.30	

Notes: *** p<0.01, ** p<0.05, * p<0.10.
Standard errors are robust clustered at the community level.
Full first moment (switching stage) results are available upon request.
IHS = inverse hyperbolic sine transformation, and LN = natural log transformation.
Columns 1 and 2 correspond with Column 1 of Table 4; Columns 3 and 4 correspond with Column 2 of Table 4.