Haves and Have Nots, Relative Deprivation and Mexican Migration 1987-1997.

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Abstract

This paper tests the relationship between relative deprivation and the migration of Mexican workers using a household decision model. The paper's empirical analysis indicates that the repeat cycle of Mexico-U.S. migration is fostering inequality ("relative deprivation") in Mexican communities with respect to consumer durables ownership and housing size. The results do not show this to be true of intra-Mexico migration. It is also found that an individual's migration behavior differs based on his/her standard of living. Another contribution of this paper to the migration literature is the employing of a cluster approach to estimate wage differentials. This cluster approach allows for more precision than does the traditional average wage method without the problems inherent in estimating wage equations.

For policymakers, the paper's results suggest that Mexico-U.S. migration is increasing inequality and that policies intended to affect migration patterns may have different effects based on household standard of living and migration destination.

Keywords: Migration, Relative Deprivation, Inequality, Wage Differentials.

1 Introduction

During the last twenty years, the number of legal and illegal Mexican migrants to the U.S. has increased dramatically. Mexican migrants now account for over half of the illegal immigrants in the United States (INS 1998). Migration within Mexico has also increased. Much of the intra-Mexico migration is rural to urban with Mexico City being a major migration destination. According to recent estimates, the population of the Mexico City area has risen to over 20%

of the total population of Mexico (IMF 2000, UN 1999). The increasing domestic and international migration flows of Mexican workers has made explaining the motivation behind and effects of migration increasingly important for both Mexico and the U.S.

The paper employs a model of individual migration as a household decision. This is appropriate for situations of temporary, often expensive migration such as is the case with Mexico. Unlike previous relative deprivation research that uses only relative income, this paper will define relative deprivation across a number of variables. By utilizing different variables for relative deprivation, especially housing and consumer durables, it is possible to discern some important conclusions about the relationship between different aspects of a household's relative deprivation and migration.

Using data from the time period 1987-1997, evidence is found that Mexico-U.S. migration may be leading to a growing inequality in housing size and consumer durables ownership. The results suggest that the cycle of Mexico-U.S. migration is resulting in a group of repeat migrants that are accumulating consumer durables and housing and a deprived group of non-U.S. migrants. These results provide empirical support for the anecdotal observations that U.S. migration is increasing inequality in Mexican communities, especially with respect to consumer durables and housing.

The results also show that it is important to view domestic and international migration as two distinct processes. For the case of intra-Mexico migration more deprived individuals are more likely to migrate, unlike in the case of U.S.-Mexico migration,. This suggests that intra-Mexico migration may work to lower inequality. The results also show that community factors and wage differentials affect individuals different based on their standard of living. For example, wage differentials were found to have a much greater impact on those individuals with basic needs met than on those individuals who did not have basic needs met. Policies that may effect migration cannot be assumed to affect these groups of individuals in the same manner.

One of the econometric contributions of this paper to the migration literature is the use of a cluster approach to estimate wage differentials. This cluster approach offers a more precise measure of regional wage differences than does using average wage statistics, as is used by many Harris-Todaro type migration models. The cluster approach also avoids the problem of finding variables that influence wages but not migration as would be necessary if one wanted to estimate a wage equation.

The paper begins by discussing some the relevant research in relative deprivation and migration. In section three, I construct the theoretical model. Section four introduces the Mexican Migration Project data set and section five describes the variables. Section six describes the econometric model. In section seven, I discuss the results. The paper concludes by discussing the implications of the paper's results.

2 Review of Literature

2.1 Relative Deprivation

The term "relative deprivation" was coined by Stouffer (1949) and the term "reference groups" by Hyman (1942). Economists such as Veblen (1934) and Duesenberry (1949) used the term relative income, not relative deprivation, but it is a similar concept. Veblen first proposed a possible relative effect on consumption. He proposed that an individual's consumption could be affected by the consumption of others. Duesenberry furthered this idea with his relative income hypothesis. According to Duesenberry, individuals feel pressured to match community consumption standards. This leads to different savings behavior based on income rank. Lower income rank persons will consume a higher percentage of their incomes than individuals of higher rank because of the desire to reach community consumption standards. When Duesenberry's relative income hypothesis was empirically tested, the results were mixed.[1 2]

Runciman (1966) proposed a more general theory of relative deprivation. Runciman defines relative deprivation as an indicator of the extent to which an individual or group feels deprived with respect to another individual or group. The group to which an individual compares his/her situation is termed a reference group or reference point. Runciman defines some general conditions under which an individual feels relatively deprived of some X. Runciman defines his X using the term social inequality.

Runciman's elaboration of relative deprivation theory was similar to but wider in scope than Duesenberry's relative deprivation hypothesis. Runciman was more concerned with an individual's deprivation over his/her entire situation and how that might affect his/her well-being. Runciman describes three dimensions to social inequality: class, status and power. Class depends on income, living conditions and potential upward mobility. Status is defined as an individual's social position in society. Power can be defined in regards to both economic and political power. Other researchers have used definitions of X other than the one used by Runciman. For instance, relative income theorists such as Duesenberry defined X as income.

Runciman describes the four necessary conditions for person A to be relatively deprived of X as

i.) he does not have X

ii.) he sees some person or persons, which may include himself at some previous or expected

[1] The hypothesis was confirmed by the empirical work of economists such as Duesenberry (1949), Brady (1952), and Brady and Friedman (1947). Work by others, such as Tobin (1951) disputed these results.

[2] For a good summary of the relative income hypothesis literature see Kosicki (1987b) or Ng and Wang (1993).

time, as having X (whether or not this is or will be in fact the case)
iii.) he wants X
iv.) he sees having X as being feasible

Relative deprivation is defined as a sense of deprivation; an individual may be relatively but not objectively deprived. Individuals must only believe that they do not have a good (condition *i*) they want (condition *ii*) that is possessed by a reference group to which they compare themselves (condition *iii*). Individuals must also see it as possible for them to have X (condition *iv*). This last condition seeks to exclude unrealistic daydreaming.

In the 1970s, Baxter (1973) continued the relative deprivation literature. Baxter considers the overall relative deprivation of a group of workers, not the deprivation of any single individual in the group. For example let us consider a group of people in village A comparing their situation to people in village B. Baxter proposed that a group's overall degree of relative deprivation is a combination of the magnitude and frequency of deprivation experienced by the group. Baxter defines the magnitude of a group's relative deprivation as the difference between the group's actual situation and their desired situation. In this case, let us assume that the group in village A views indoor plumbing as the desired good/situation. The magnitude of relative deprivation would be not having indoor plumbing. Frequency is the proportion of a group that is experiencing relative deprivation. In this case, the frequency would be the percentage of villagers in village A that do not have indoor plumbing. The overall degree of relative deprivation of the group is a function of the magnitude and frequency of relative deprivation of all individuals within the group. The larger the difference between the situation of individuals in the group and the desired situation (magnitude) then the higher the group's relative deprivation. For example, if the issue were whether or not villagers lived in huts without plumbing versus wooden houses with plumbing then this would be a higher magnitude than if the issue were only plumbing or not. Also, the more individuals in the group that have less than the desired situation (frequency) then the higher the group's degree of relative deprivation. In our example, the more people in village A that lack plumbing, the higher the overall degree of relative deprivation of village A. Baxter defines relative deprivation over z variables. The overall degree of relative deprivation of a group is defined as

$$RD(M^k) = \sum_{i=1}^{n} D_i^k(M_i^k, G). \tag{1}$$

There are a total of N individuals in the group, with n being the number of these individuals that are deprived. In our example, there are N people in village A, n of which do not have plumbing. The M_i^k term is the perceived magnitude of relative deprivation of the ith individual with respect to the kth variable, with $k = 1..z$. Our example had only one variable (plumbing), instead of k variables. The reference group is G, the people in village B in the example. Some authors have suggested that this reference group need not necessarily be an actual group of individuals; rather it could be an "ideal" to which the individual compares his/her situation.[3] The degree of relative deprivation of the ith individual with respect to the kth inequality is termed as D_i^k. By summing the degree of relative deprivation of all n deprived individuals in the group Baxter calculates the total relative deprivation of the group.

Baxter proposed relative deprivation as a possible explanation for the persistence of inflation. Workers in one sector compare their wages to workers in other sectors. As workers see wages rising in other sectors these workers feel relatively deprived. These workers that did not initially get a wage increase will now demand increased wages because they see wages rising in other sectors. These increases in the nominal wage will push firms to raise prices. As prices rise, workers in at least one sector will see higher wage increases. Workers in other sectors will see these wage increases and demand higher wage increases. This cycle will help to perpetuate inflation. While perhaps theoretically appealing, this theory had mixed empirical results throughout the 1960s and 1970s[4].

Throughout the 1980s and 1990s, economists continued to study the impact of relative deprivation on wages and job satisfaction. Frank proposed relative deprivation as a factor determining the internal wage structure of firms and the existence of health and safety regulations in a competitive market.[5] Clark and Oswald (1966) found that an individual's job satisfaction is affected by how his/her wages compare to the wages of individuals in his/her reference group.

Economists such as Yitzhaki (1982) and Kakwani (1984) have used relative deprivation in the construction of welfare indexes. Their hypothesis is that an individual views his/her welfare as a function of his/her own income and the income of others. An individual may feel worse off if the incomes of everyone around him/her rises and his/her does not change.

In a Yitzhaki-Kakwani type model, the overall degree of relative deprivation is defined as an increasing function of the number of people who have the deprived good (income). Kakwani's index has the property that if the incomes of the high-income group increases and of the low-income group does not change, then poverty (as measured by his index) has increases. Kakwani imposes a functional form on relative deprivation. The degree of deprivation is defined as

$$\begin{aligned} u(x,y) &= (y-x) \quad if \;\; y > x \\ &= 0 \qquad\quad\;\; if \; y < x. \end{aligned} \tag{2}$$

They define y as the income of the reference group income and x as the individual's income.

[3] Burton (1977).

[4] For some empirical tests of the relative deprivation inflation hypothesis see Brown (1975), Hines (1969), McCarthy et al. (1975), and Sargan (1971).

[5] See Frank 1985a and 1985b.

Kakwani's index is based on the work of Hey and Lambert (1980) among others. Hey and Lambert stated the deprivation in two ways: one in terms of the factors that affect utility and one in terms of the utility levels themselves. Hey and Lambert's deprivation function for an individual is defined as

$$\begin{aligned} D(x,y) &= y - x \quad if \;\; y > x \\ &= 0 \qquad\; if \; y < x. \end{aligned} \tag{3}$$

In utility terms the deprivation of an individual is defined as

$$\begin{aligned} D(x,y) &= u(y) - u(x) \;\; if \;\; y \; > x \\ &= 0 \qquad\qquad\quad if \;\; y < x. \end{aligned} \tag{4}$$

In the 1980s, some authors began examining the impact of relative deprivation on migration. These relative deprivation models are an extension of traditional wage differential migration models, to which we now draw our attention.

2.2 Traditional Migration Models

Traditional labor migration models, such as the Harris-Todaro model, view the difference between wages in the migration origin and destination areas as the main determinant of migration. The Harris-Todaro model is one of rural to urban migration (Todaro 1969). Therefore in the discussion of their model, the migration origin area will be referred to as rural and the destination as urban. Harris-Todaro propose that rural-urban migration occurs as long as the expected urban wage is greater than the rural wage. As workers leave the rural area for the urban sector, the expected urban wage falls and the rural wage rises. The expected urban wage falls because the chances of attaining urban employment have fallen and/or the wage rate has decreased. Migration ceases when the expected urban wage equals the rural wage.

In the Harris-Todaro model, an individual migrates to the city hoping to get a modern sector job paying w_m^*. However the migrant only has a probability v of securing such a job. If the individual does not find a modern sector job, then he/she is employed in the lower-paying informal sector at a wage w_i. If the individual stays in the rural area (does not migrate) then he/she receives wage w_r. Todaro then adds a factor C to take account of the financial cost and emotional stress of moving. He also adds an urban amenities factor Z. This Z represents advantages available to the individual in the urban area such as better schooling, health care and amenities. The attraction of the "bright city lights" would also be a part of this Z. The aggregate net migration from rural to urban areas (NM_{r-u}) in a function of of expected wage differentials (C and Z)

$$(NM_{r-u}) = f(vw_m^* + (1-v)w_i - w_r, C, Z). \tag{5}$$

This model focuses on wage differentials between the rural and urban sector as the driving force behind migration. However, it is commonly observed that rural to urban migration exists even in cases when there is no differential between the expected urban wage and rural wage. This phenomena is termed "overmigration". Todaro type models tend to explain overmigration as individuals in the rural sector overestimating the probability of getting a job in the urban sector. These traditional theories do not adequately model and take into account the importance of non-wage factors in the migration decision.

Under these traditional type migration theories, individuals who expect the greatest increase in income from moving to urban areas should be the ones to migrate. This often leads to the implication that individuals from the poorest communities should be the ones to migrate because the disparity between their wages and the expected urban wages are often high. Of course, depending on the cost of migration sometimes the poorest are not able to afford migration.

These traditional migration theories can be viewed as "pull" theories. Individuals are drawn from the rural areas into urban ones by wage differentials. Absolute levels of income (and corresponding wage differentials) are the important factors determining migration. According to these theories, the level of inequality in a community is not a significant factor influencing migration.

2.3 Relative Deprivation Migration Models

Studies have found that the communities with the highest migration rates are those with high income inequality, regardless of the absolute level of community income[6]. Stark (1984) proposes that relative deprivation (income) may be a "push" factor in migration. Stark and Yitzhaki (1988) construct individual level migration models incorporating relative deprivation with income as the deprivation variable. More recently, Stark and Taylor (1989, 1991) have incorporated relative deprivation into household level migration models, but still use income as the only deprivation variable. While Stark and Taylor use the term relative deprivation, they could just as easily use the term relative income or income equality in its place because income is the only variable they consider in relative deprivation. Their work is an application of the more restricted case of relative deprivation where income is the only variable considered in deprivation, relative income theory. Relative deprivation is not meant as a replacement for wage differentials as an influence on migration. Relative deprivation adds

[6] For examples of such empirical studies see Fields (1982), Schultz (1982), and Stark (1991).

another factor to the migration decision. It proposes that both pull and push factors are at work in the migration decision.

Stark proposes that an individual considers his/her income as compared to the average income in the community. This average income is the reference point to which an individual compares his/her income. When an individual's income is below this reference point, he/she experiences relative deprivation. Relatively deprived individuals want to migrate in order to raise their incomes relative to the community average. Stark proposes that individuals will continue to use the community average as their reference point even after migration.

An individual's relative deprivation is defined as

$$\begin{aligned} RD(y) &= 1 \;\; if \;\; y < x - d \\ &= \;\; 0 \; if \; y > x - d. \end{aligned} \tag{6}$$

The individual's income is defined as y, with x being the average community income. The term d is the distance from the average community income at which an individual begins to feel relatively deprived. Stark proposes that this distance (d) be the cost of migration. Stark and Taylor define the relative deprivation of a household in the same way as they do the deprivation of an individual. The equations are the same except that individual income is replaced by household income.

Stark and Taylor then propose an alternative measure of relative deprivation for an individual using an income distribution for the entire community. The individual has income y. This relative deprivation function is restated in terms of the income distribution for the entire community. The relative deprivation of a person with income y is

$$D(y) = \int_{y}^{y_{\max}} h[1 - F(z)]dz. \tag{7}$$

Stark and Yitzhaki define $y_{\max}$ as the maximum income in the community and $F(y)$ as the cumulative distribution of income. Individuals are deprived in comparison to all individual's who have income $z > y$. Stark and Taylor define h as a linear function and later drop this function and use their deprivation measure without transforming it.

Stark and Taylor restated this individual relative deprivation in terms of the household. The functional form is identical, except that y is now the household's income and $F(y)$ is the cumulative distribution of household income in the community. They use this household level model to explain the migration of an individual(s) from a household without the entire household migrating. They view an individual migrating as a household decision. This household approach to individual migration is well-suited to situations in which an individual cannot pay the cost of migration without the help of other members of the household. It also makes sense in situations where decisions tend to be made by the household and the individual does not wish to break ties to the household by making a migration decision without consulting others in the household.

Stark and Taylor (1989) apply this model to Mexico-U.S. migration, a situation which lends itself to a household migration model because of the relatively high migration costs (relative to individual income) and the high probability of individuals eventually returning to the household. Stark and Taylor use a sample of 60 households (423 individuals) from two Mexican communities in 1982. Stark and Taylor use a three equation model. The first equation is the expected return to the household if individual j chooses to stay in Mexico. The second equation is the expected return to the household if individual j chooses to migrate to the U.S. The third equation is the probit equation with probability of person j migrating as the dependent variable.

The first equation models the expected return to the household if individual j does not migrate

$$lnR_0^j = \alpha_0 + \alpha_1 X_0^j + \nu_0^j. \tag{8}$$

R_0^j is individual j's the contribution to the household if he/she works (remains) in Mexico, $X_0^j$is a vector of characteristics explaining earnings. The error term is ν_0^j. They estimate this function for all individuals who did not migrate. This allows them to obtain coefficients and construct a predicted R_0^j for all individuals in the sample.

The second equation for net remittances is constructed

$$lnR_1^j = \beta_0 + \beta_1 X_1^j + \beta_2 Z^j + \nu_1^j. \tag{9}$$

In this equation net remittances (lnR_1^j) are a function of characteristics (X_1^j) that affect a migrant's earnings and his/her propensity to share these earnings with the household and a vector of characteristics (Z^j) that affect the probability of finding employment in the migration destination. Similar to the first equation, Stark and Taylor estimate this equation for all individuals who migrated in order to obtain coefficients and calculate predicted net remittances for all individuals in the sample.

Stark and Taylor then construct predicted deprivation for a household with income y if individual j does not migrate. They use a relative deprivation function

$$RD(y) = \int_y^{y_{\max}} h[1 - F(z)]dz = [1 - F(y)]E(z - y|z > y) = AD(y)P(y). \tag{10}$$

$AD(y)$ is the mean excess income of households richer than the household with income y (the second term in the previous expression). $P(y)$ is the proportion of households richer than the household with income y (the first term in the previous expression).

Stark and Taylor predict household income excluding individual j using variables such as the number of post-primary school educated adults (but not individual j) and assets regressed on actual income to obtain coefficients. They combine this with the predicted household contribution of individual j from equation 1 to calculate predicted household income.

This relative deprivation term and the predicted values from equations 1 and 2 are used in equation 3, the migration equation

$$M^j = \delta_0 + \delta_1(lnR_1^j - lnR_0^j) + \delta_2 Z^j + \delta_3 RD^j + \varepsilon^j. \tag{11}$$

Stark and Taylor found relative deprivation to be a significant factor affecting the probability of migration.

3 Theory

This paper's model continues the recent migration work that views migration as a household (not an individual) decision. There are many cases in which migration cannot be viewed as a strictly individual decision. If migration costs are high enough such that household resources must be pooled in order to finance an individual's migration then this becomes a household decision. It is also very common for migration to be only a temporary separation from the household. The individual may leave the household to work in another region/country and send remittances back to the household and eventually rejoin the household. In these cases, the individual is not taking a migration action and breaking ties with the household; in fact, migration is often motivated by a desire to help the household.

Mexico-U.S. and intra-Mexico migration are often temporary and the migration costs are also relatively high compared to an individual's income. Therefore, it is logical to view migration as a household, not a strictly individual, decision in this model's application to Mexico. The conditions leading to a household based model would certainly also hold in many other situations besides the case of Mexico.

The choice faced by households in this model are whether or not to finance the migration of its household members. The household must make this decision for each member of the household. The household may choose to send no one, one person, or multiple individuals. The household seeks to maximize household utility which is based on the utility of its individual members.

Each individual's utility function depends on both individual and household factors. An individual's utility is affected by his/her own consumption (c_i), consumption of others in the household ($c_2..c_k$), consumption of a household good (x), relative deprivation (R) and community level amenities (v). The household good is a public good to all members within the household (e.g. housing). Relative deprivation lowers an individual's utility from their current situation. Individuals in communities with fewer amenities will also have lower utility. The consumption of other members of the household is included in the utility function because individuals place some value on the welfare of the other people in the household. It has been stated that relative deprivation affects the utility of an individual staying in a community. I am also assuming that the level of relative deprivation is the same for all members of the household. The utility function for individual 1 can be written as

$$u_1(c_1, c_2, ..., c_k, x, v, R). \tag{12}$$

The treatments of relative deprivation in the literature have focused on the use of income distributions. Authors such as Stark and Taylor (1989) measure relative deprivation as determined exclusively by income inequality. This paper uses a broader definition of relative deprivation. In an attempt to capture the different social dimensions, relative deprivation is defined across land ownership, housing quality, housing size, consumer durables, social standing and social networks. Examining factors such as income and living conditions are more common to economics than are factors such as social status. However, social status can be a potentially important factor in the migration decision.

Social networks could also potentially be an important variable. Individuals who perceive that they have far fewer friends and other social connections than is average in their community may feel relatively deprived by this outcome. These individuals may be more likely to migrate. Unfortunately, because of a lack of data on social status and social networks, neither of these two variables will be empirically tested in this paper. All of the other relative deprivation variables discussed above will be empirically tested.

Relative deprivation relies on there being a reference point. The reference point used will be the community average. All of the relative deprivation variables will be defined in terms of how these values compare to community average values. The relative deprivation variables were also redefined in terms of seven other reference points. These alternative reference points are discussed in Appendix B. The statistical results were robust to the choice of reference point. We can state a household's relative deprivation as function of different variables

$$\begin{aligned} R &= f(\text{land, consumer durables, housing quality, housing} \\ &\quad \text{size, social standing}^*, \text{social networks}^*). \end{aligned} \tag{13}$$

*=not empirically tested because of lack of data. All variables are defined as ratios of the individual or household values to community average values.

Without Migration

In the case where no one from the household migrates, household utility is

$$U(u_1, ..., u_k). \tag{14}$$

A household maximizes its utility subject to the household budget constraint

$$P_c c_1 + P_c c_2 + ... + P_c c_k + P_x x = y_1 + y_2 + ... + y_k.. \tag{15}$$

The variable y_i is the income of household member i. The prices of the consumption good and the public good are P_c and P_x, respectively. The budget constraint states that the sum of all individual consumption and of spending on the household good (x) must equal total household income.

With Migration

Suppose now that the household decides to finance the migration of individual 1. The household makes the consumption choice for all individuals residing in the household. This consumption decision is made given the income of all individuals in the household and expected remittances from the migrant. The household has some expectation of individual 1's income and remittances should he/she migrate. Let y_1^* denote expected income at the migration destination. Given the expected income and remittances, the household's expectation of the migrant's consumption in the migration destination is c_1^*.

As stated, individual 1's financial contribution to the household should he/she migrate comes through remittances. Migration costs the household money. Therefore the net contribution of individual 1 to the household after migration must take account of these migration costs. The cost of migration is d. Gross remittances of individual 1 to the household will be defined as r_1. Net remittances can be defined as $r_1 - d$. It is reasonable for the household to believe that the migrant will send the agreed on remittances after migration because of the temporary nature of the migration. If the migrant "cheats" and chooses not to send the remittances, then the migrant will suffer consequences when he/she returns to the community. The returning migrant may be ostracized economically and/or socially from the household (and possibly others in the community).

We should also note that the migrant's contribution to household utility comes not only from remittances but also from his own consumption, since household utility includes the consumption of all members. If individual 1 migrates then he/she is no longer affected directly by the non-consumption factors (R, v) experienced when living in the community or by the household good (x). These factors are of course still in the household utility function because they are still experienced by other members of the household. The non-consumption appeal of the destination for individual 1 will be denoted as m_1. This non-consumption appeal is also a part of the household utility function since the household values the utility of the migrant.

Household utility can now be restated for the case where the household chooses for individual 1 to migrate

$$U_{1m}(c_1^*, m_1, c_2...c_k, R, x, v). \tag{16}$$

This is maximized subject to

$$P_c c_1^* + P_c c_2 + P_c c_3 + ... + P_c c_k + P_x x - d = y_1^* + y_2 + y_3 + ... + y_k. \tag{17}$$

The household's choice variables in this case are $c_2..c_k, x$. The price of the consumption good is P_c and the price of the household good is P_x. The cost of individual 1's migration is d.

The household must decide under which situation, migration or no migration, it can maximize utility. Let us define the maximum possible household utility without migration as u^* and the maximum possible utility with migration of individual 1 as u^*_{1m}. A necessary condition for the migration of only individual 1 is

$$u^*_{1m} > u^*. \tag{18}$$

It should also be noted that another necessary, but not sufficient, condition for the migration of individual 1 is the ability of the household to afford such migration. The fulfillment of these two necessary conditions are sufficient for migration to occur.

This model leads to the following hypotheses:

1.) The gain to migration will rise with an increase in the expected income (y^*_1) in the migration destination. $\frac{\partial(U^m-U)}{\partial y^*_1} > 0$.

2.) The gain to migration will fall with an increase in the wage paid to individuals in the home community. $\frac{\partial(U^m-U)}{\partial y_1} < 0$.

3.) The gain to migration will rise with an increase in relative deprivation experienced while living in the home community. I am assuming that the migrant does not experience the household relative deprivation if he is living in the migration destination. Therefore when the migrant's relative deprivation falls this reduces the overall level of household deprivation and increases household utility. $\frac{\partial(U^m-U)}{\partial R_1} > 0$

4.) The gain to migration will fall with an increase in the amenities of the home community. Should an individual choose to migrate he/she will no longer be in the community to experience the amenities. $\frac{\partial(U^m-U)}{\partial v} < 0$.

5.) The gain to migration will rise with an increase in the expected amenities of the migration destination. $\frac{\partial(U^m-U)}{\partial m} > 0$

6.) The gain to migration will fall with an increase in the cost of migration. $\frac{\partial(U^m-U)}{\partial d} < 0$

4 Data

The data used are taken from the Mexican Migration Project (MMP). The MMP is run jointly by the Population Studies Center at the University of Pennsylvania and the University of Guadalajara. The MMP has sampled 2-5 Mexican communities per year since 1982, excluding 1983-86. The MMP samples different communities every year. Each community sample is usually at least 200 households (for all communities with 500 or more residents). The sampling is cross-sectional in nature, with histories taken for some variables. The years available for use at this time are 1987-1997 and 1982. These are the twelve years of data used in the paper.

The sample data are collected from November through February. This time frame is chosen for survey taking because it is the agricultural off-season in many areas. Many workers also return home during the Christmas holidays. During this time, it is more likely that Mexican migrants will be back in Mexico.

Each individual in the household was asked questions about him/herself and about members of the household who were currently living outside the community. Individual and household level variables were collected. In addition, migration histories were taken for those individuals with migration experience. Life histories were also collected for heads of households.

The data are separated into numerous parts. The three main parts of the data used in this paper are the persfile, housefile, and comcross sections. The persfile section contains data on each individual in the sample. Included in this file are mostly demographic and migration information. The housefile section contains information on each household. Some examples of the household information collected includes household assets, number of members in household, geographic location of the household, and migration information. The comcross section contains information on each community sampled such as population, amenities, employment and infrastructure.

5 Variables

Individual and Household Level Variables

The dependent variable in the analysis is a trichotomous migration variable called *migrate*. Migrate takes on the value of zero if the individual reported that he/she did not migrate during the last year, a value of 1 if he/she reported working in the U.S., and a value of 2 if the individual migrated to another community in Mexico. The number of years of education the individual completed is denoted as the variable *edyrs*. The variable *sex* takes on the value 1 if the individual is male and 0 if the individual is female. The individual's age is represented by the variable *age*. Age squared is the variable age^2. The individual's marital status is represented by the variable *married* and takes on the value zero if the individual is not married and a value of one if the individual is currently married. Summary statistics for some of the individual and household level variables are in table 1.

Table 1 – Descriptive Statistics of Individual and Household Variables

	Mean	*Std Dev*	*Min*	*Max*
Age	32.8	13.55	14	70
Sex	.49	.5	0	1
Education (yrs)	6.67	4.18	0	28
Married	.656	.474	0	1
Durables	5.44	2.28	0	9
Land (hectares)	5.37	45.4	0	1960
Number of Rooms	4.81	3.15	0	36
Housing Quality	3.32	.85	0	4

Note: There are 46,613 observations.

In the migration equation, there are numerous household level variables. The first household variable is the average number of years of schooling of household members. The second variable is the *dependent ratio*. The dependent ratio is defined as the number of non-workers in the household divided by the number of workers in the household. There are four relative deprivation variables representing deprivation in regards to land ownership, consumer durables, housing quality and housing size. These four variables were chosen in an attempt to capture the different aspects of a household's standard of living. The first deprivation variable is the ratio of the number of hectares of land that the household owns as compared to the average number of hectares that a household owns in the community. The variable *land deprivation* is defined as

$$1 - \frac{\#\ of\ hectares\ hh\ owns}{community\ avg\ \#\ hectares}. \tag{19}$$

An alternative definition of land deprivation was also constructed based on land value. This alternative definition of land deprivation is the ratio of the peso value of the land the household owns as compared to the average peso value of household land holdings in the community. The first step in construction of this variable involves taking household reported data on the number of hectares of different types of land owned by the household. These hectares were then converted to peso value by using community level data on the value of different type of land in the community (per hectare). The average peso value of land holdings for the community were then calculated and the final household/community ratio calculated. The results were not significantly different using the two different land measures so results were only reported using the first measure of land deprivation.

The second deprivation variable, *durables deprivation*, is the ratio of the household's holdings of consumer durables as compared to the average number of durables owned by a household in the community. The ownership of eight items are considered. The eight items are a stove, refrigerator, washing machine, sowing machine, radio, television, stereo, and telephone. The household's ownership of each of these eight items was coded as a zero/one variable. The variable *durables* was then constructed by adding the eight ownership variables.

The household's value for durables along with the community average value for durables was used to construct durables deprivation

$$1 - \frac{durables_{hh}}{community\ avg\ durables}. \tag{20}$$

The third variable is *housing quality deprivation.* In constructing this variable, the variable *housing quality* was first constructed for each household. *Housing quality* is a combination of type of flooring, water and sewer facilities. The variable *housing quality* deprivation is the ratio of the household's *housing quality* variable as compared to the average value in the community for the *housing quality* variable. *Housing quality* deprivation is defined as

$$1 - \frac{housing\ quality}{community\ avg\ housing\ quality}. \tag{21}$$

The fourth deprivation variable is *housing size* deprivation. The variable *housing size* is defined as the number of rooms in the household's home. The *housing size* deprivation variable is calculated as

$$1 - \frac{housing\ size}{community\ avg\ housing\ size}. \tag{22}$$

Community level variables

There are ten community level variables. The variable, *plaza*, takes on a value of one if the community has a central plaza and zero if it does not. The variable, *market*, takes on a value of one if the community has a daily market and zero if it does not. The variable, *bank*, takes on a value of one if the community has a bank and zero if it does not. The variable, *hospital*, takes on a value of one if the community has a hospital and zero if it does not. The variable, *parish*, takes on a value of one if the community has a parish and zero if it does not. The variable, *bbleague*, takes on a value of one if the community has a baseball league and zero if it does not. The variable, *scleague*, takes on a value of one if the community has a soccer league and zero if it does not. The variable, *bkleague*, takes on a value of one if the community has a basketball league and zero if it does not. The variable *clinic* takes on a value of one if the community has a government clinic and zero if it does not. The variable, *irrigation*, takes on a value of one if the community has irrigation and zero if it does not.

Wages

Wages are an important factor in migration analyses. Migration researchers have dealt with wages by either estimating wage equations or by using average wages in an area. The average wage in an area is exogenous to the individual but is also imprecise. Estimating a wage equation for individuals is problematic because the same variables that influence wages also influence migration. This paper uses a cluster fixed-effects approach in order to estimate the wage effects of different geographic regions.[7] This allows me to take into account the impact of living in a particular region on an individual's wages in a more precise way than does using average wages while avoiding endogeneity problems.

In the estimation, reported wages are on the left side of the equation with individual characteristics and region dummies on the right side. The regions are the "clusters" in the analysis. The regressions were run without a constant. The wage equation is

$$w_j = \beta X_j + \delta c_j + \epsilon_j. \tag{23}$$

The individual's reported wage is w_j. The vector X_j contains the independent variables age, age^2, sex, marital status and education. The cluster dummies are the vector c_j. The error term is ϵ_j.

The sample was divided into U.S. and Mexican clusters. The estimated coefficients on the cluster dummies are used to construct wage variables for the analysis. The cluster wage effect of the individual's home cluster corresponds to the coefficient on the dummy of the cluster in which he/she resides and is the variable $home\ Mexican\ wage$. The cluster wage effect experienced if the individual were to migrate to the U.S. ($U.S.\ wage$) is a weighted average of the coefficients on the U.S. clusters. The weights are calculated using the percentage of migrants from the community that reside in the different U.S. clusters. Also included are wage dummies for other Mexican regions in which the individual does not live. These wage variables for other Mexican regions are denoted $Mexican\ wage$ 2 and $Mexican\ wage$ 3. More information on the geographic composition of the clusters and the results from the wage regressions are included in Appendix A.

6 Econometric Model

The relative deprivation migration model predicts the following results:

1.) A positive correlation should exist between the relative deprivation of a household and the probability of migration

2.) Higher wages in the U.S. relative to wages in the home community should be positively correlated with the likelihood of migration to the U.S.

3.) Higher wages elsewhere in Mexico relative to wages in the home community should be positively correlated with the likelihood of migration within Mexico.

4.) A negative relationship should exist between the level of amenities (v) in a community and the probability of migration.

The dependent variable *migrate* has three possible outcomes. The individual will either not migrate ($M = 0$), migrate to U.S. ($M = 1$) or migrate

[7] This cluster approach has been used in other fields of economic research. One of the most famous applications of this approach is Angus Deaton's application to unit values and quality effects (1994). For a good text on cluster effects and household data see Deaton (1997).

within Mexico ($M = 2$). Since it is not a simple binary choice, the choice will be estimated using a multinomial logit model. The probability of either of the $M = 1$ or $M = 2$ outcomes can be stated in relation to the probability of the base outcome ($M = 0$). It should be noted that any outcome could have been chosen as the base category. I am normalizing the coefficients estimated for the base category, $\beta^{(0)}$,to be equal to zero. The coefficients for the other two outcomes $\beta^{(1)}$ and $\beta^{(2)}$ are relative to this normalized value. The probability equations for the three outcomes are:

$$\Pr(M = 0) = \frac{1}{1 + e^{X\beta(2)} + e^{X\beta(3)}} \tag{24}$$

$$\Pr(M = 1) = \frac{e^{X\beta(2)}}{1 + e^{X\beta(2)} + e^{X\beta(3)}} \tag{25}$$

$$\Pr(M = 2) = \frac{e^{X\beta(3)}}{1 + e^{X\beta(2) + e^{X\beta(3)}}} \tag{26}$$

The relative probability of outcome $M = 1$ to $M = 0$ is:

$$\frac{\Pr(M = 1)}{\Pr(M = 0} = e^{X\beta^{(1)}} \tag{27}$$

Similarly the relative probability of outcome $M = 2$ to $M = 1$ is:

$$\frac{\Pr(M = 2)}{\Pr(M = 0} = e^{X\beta^{(2)}} \tag{28}$$

We can write the migration decision (M) as

$$M_j = \alpha + \beta_1 X_j + \beta_2 V_j + \varepsilon_j. \tag{29}$$

The migration choice is represented as M_j. The constant term is α. The vector of personal and household characteristics affecting the migration choice is X_j. The variables in X_j are age, age^2, sex, education, marital status, dependent ratio, average education of household members, land deprivation, household quality deprivation, household size deprivation, and durables deprivation. The vector of community level variables is V_j. The community level variables are plaza, market, bank, hospital, parish, baseball league, soccer league, basketball league, irrigation and clinic. The wage variables are U.S. wage, home Mexican wage, and Mexican wages 2 and 3. Dummy variables for the year are also included. The Huber/White variance estimator is used to correct the standard errors for heteroscedasticity. The corrected errors are ε_j.

The computer program Stata was used to generate the results. The mlogit command was used for the multinomial logits with the robust and cluster options specified. The robust option means that Huber-White corrected standard errors are used in the estimation. The cluster option with community as the cluster variable was used to allow for a lack of independence of observations within communities.

7 Results

Individual and Household Variables

First, a multinomial logit was run with the entire sample. The results of this logit are in Table 2. The results from the regressions with different reference points for the deprivation variables are in appendix B. These additional results were relegated to the appendices since their results do not significantly differ from those in table 2. As expected, the coefficient on the variable age was positive and significant effect for both U.S. and Mexico. Also as expected, age squared had significant negative coefficients for both the U.S. and Mexican migration outcomes. The analysis found males to be more likely than females to migrate both to the U.S. and within Mexico. This is consistent with previous results on Mexican migration. A regression was run with a married-sex interaction variable. The results of this regression are in appendix C. The coefficients on the interaction variable were positive for the intra-Mexico migration and negative for the Mexico-U.S. migration. These significant signs can be interpreted as evidence that for married individuals being a woman made an individual less likely to migrate within Mexico but more likely to migrate to the U.S.

The individual's level of education had positive and significant coefficients with respect to both U.S. and intra-Mexico migration. However, the average level of education in the household had significant negative coefficients for both migration outcomes. These statistical results imply that the overall level of education in a household makes migration of its members less likely, but that the education of any individual member makes his/her migration more likely. The coefficients on the dependent ratio was negative for both U.S. and Mexican migration. This suggests that an individual is less likely to migrate if there is a high ratio of nonworkers to workers in the household. However, since women tend to do most of the caring for children and the elderly the dependent ratio coefficient may vary by sex. In order to ascertain whether sex had an interaction effect with dependent ratio I constructed an interaction variable for sex and dependent ratio. The interaction variable had significant positive coefficients. This result suggests that a high dependent ratio makes women less likely to migrate and men more likely. The results including this interaction variable are included in appendix C.

Wages

As predicted, the coefficient on the wage in the individual's home region was negative and significant with respect to U.S. migration. This wage coefficient was negative but insignificant with respect to intra-Mexico migration. If a significant amount of the intra-Mexico migration is within the same geographic cluster then this would explain why the coefficient on the home cluster wage is failing to be significant with respect to Mexican migration. The coefficient for the wage for Mexican cluster 2 was significant and positive with respect to U.S. migration.

Community Variables

The community amenities variables had different results for Mexico-U.S.

and intra-Mexico migration. The model predicted negative results for the community amenities variables. For U.S. migration there were two significant community variables. The coefficient on market was significant negative as predicted. However, the coefficient on plaza was significantly positive which was not predicted. More community variables had significant coefficients in the case of intra-Mexico migration. The variables bank, parish, and baseball league all had significant negative coefficients for intra-Mexico migration. The coefficients on irrigation was positive and significant for both U.S. and intra-Mexico migration.

Deprivation Variables

The model predicted that the relative deprivation variables would have a positive sign with respect to Mexico-U.S. and intra-Mexico migration. Once again, variables had different results for U.S. and Mexican migration. For intra-Mexico migration, the coefficients on land and durables deprivation were both significant and positive as the model predicted. Housing quality and housing size deprivation both had insignificant coefficients for intra-Mexico migration. For U.S. migration the deprivation variables did not impact as expected. The coefficients were insignificant for land and housing quality deprivation with respect to U.S. migration. Housing size and durables deprivation yielded significant negative coefficients for U.S. migration. The relative deprivation variables exhibited the response predicted for Mexican migration but not for U.S. migration. The unexpected results of these deprivation variables for Mexico-U.S. migration led to more analyses being done in order to more fully explain these signs. The first step in these additional analyses was to separate the sample based on standard of living to determine whether that would have an impact.

Table 2 — Migration Multinomial Logit Results: Full Sample

	Migrate to U.S.	Migrate within Mexico
Age	.17*	.18*
	(.0144)	(.017)
Age^2	−.0027*	−.0022*
	(.0002)	(.0002)
Education	.0138**	.166*
	(.00777)	(.017)
Sex	.914*	.39*
	(.087)	(.09)
Married	.123*	.118
	(.058)	(.111)
Dependent Ratio	−.122*	−.14*
	(.0268)	(.033)
Average Education	−.129*	−.11*
	(.021)	(.03)
Home Mexican Wage	−.57*	−.116
	(.13)	(.222)
Mexican Wage 2	.47*	.11
	(.15)	(.27)
Mexican Wage 3	−.14	.06
	(.13)	(.2)
U.S. wage	2.8	3.4
	(2.3)	(2.4)
Durables Deprivation	−1.32*	.31*
	(.1455)	(.16)
Housing Size Deprivation	−.3*	−.1
	(.083)	(.08)
Housing Quality Deprivation	.17	−.04
	(.16)	(.16)
Land Deprivation	.009	.015*
	(.007)	(.007)
Plaza	1.1*	.3
	(.52)	(.6)
Market	−.92**	.77
	(.48)	(.54)
Bank	−.92	−2.2*
	(.718)	(.5)
Hospital	.5	−.16
	(.327)	(.34)
Parish	.13	−.93**
	(.52)	(.52)
Baseball League	−.31	−.6**
	(.33)	(.32)
Soccer League	.422	.25
	(.6)	(.4)
Basketball League	−.11	.355
	(.47)	(.3)
Government Clinic	−.5	1.2
	(1)	(1.48)
Irrigation	1.9*	1.56*
	(.6)	(.458)
Log Likelihood	−15822	
Wald Chi^2	13398	

Notes: The coefficients are listed with the standard errors in parenthesis.
* = significant at 5% level. ** = significant at 10% level.

Separating the Sample

There are two potential problems with using this full sample to examine relative deprivation. First, individuals at the lowest levels of income may not be able to migrate. Therefore the most deprived individuals in a community may actually be the least likely to migrate because they cannot afford the cost of migration. Second, migration may be motivated by different variables because of differences in the household's standards of living. In attempting to take account of this second point, the sample was split into two parts based on whether or not the household's basic needs were met or not. A household's basic needs were defined as access to safe water, sewage facilities, electricity, a non-dirt floor, and owning a stove. The logits were then run for these two subsamples separately to see if migration behavior differed based on whether the household's basic needs were met. Some descriptive statistics from the two subsamples are in tables 3 and 4 below followed by the logit results in table 5. A likelihood ratio test found that the results from the separated samples were significantly different from the full sample.[8]

Table 3 – Descriptive Statistics for Sample Without Needs Met

	Mean	*Std Dev*	*Min*	*Max*
Age	32.8	13.8	14	70
Sex	.49	.5	0	1
Education (yrs)	5.36	3.64	0	22
Married	.672	.47	0	1
Durables	3.76	2.1	0	9
*Land (hectares)**	5.03	53.5	0	1960
Number of Rooms	3.38	1.84	0	19
Housing Quality	2.38	.82	0	4

Note: There are 14,284 observations in the needs not met sample
*If I exclude the one outlier household of 1960 hectares then the land variable for the needs not met sample has a mean of 3.6, standard deviation of 13.9 and a maximum of 400.

Table 4 – Descriptive Statistics for Sample With Basic Needs Met

	Mean	*Std Dev*	*Min*	*Max*
Age	32.85	13.44	14	70
Sex	.49	.5	0	1
Education (yrs)	7.25	4.27	0	28
Married	.653	.47	0	1
Durables	6.18	1.94	1	9
Land (hectares)	5.52	41.24	0	1620
Number of Rooms	5.45	3.39	1	36
Housing Quality	3.74	.436	3	4

Note: There are 32,121 observations in the sample.

[8] The $\chi^2 = 2(15822 - (4855.2 + 10584.9)) = 763.8$. This is higher than the critical value. Thus, we can reject the null hypothesis that the full and separated samples are not significantly different.

Individual and Household Variables

As with the full sample logit, age had positive significant coefficients for both outcomes and samples. Age squared had negative significant coefficients for both outcomes and samples. Also, males were more likely to migrate in both samples. For the sample with needs met, being married had a positive impact on an individual's likelihood of migrating to the U.S. As with the full sample, a regression was also run with a married-sex interaction variable. The results for this interaction variable were the same as in the full sample. Education had a positive significant coefficient for intra-Mexico migration in both samples. Education had a positive effect on U.S. migration for those individuals who had not met basic needs but was insignificant) for the sample with needs met. It is not surprising that the education variable was positive for both migrations for the sample with the lower standard of living. Individuals with the least income in this group are also likely to have the lowest income and be unable to migrate. Therefore when examining this subsample of individuals at the lowest standard of living we should observe that some individuals at the bottom of this group are unable to migrate. As education rises for individuals in this group, they are less likely to be at the bottom of the group and more likely to be able to migrate.

The coefficient on the average level of household education was significantly negative for both migrations. The dependent ratio also had significant negative coefficients for both outcomes. A regression including a sex-dependent ratio interaction variable was run in order to see if the dependent ratio had a different effect based on sex. The regression results are in appendix C. The effect of the dependent ratio did not vary based on sex for the group without needs met. For the group of individuals with needs met, males with a high dependent ratio are more likely to migrate than females with the same ratio.

Wages

The coefficient on the home Mexican wage variable was negative across all outcomes and was significant for U.S. migration for those individuals with needs met. The wage in Mexican cluster 2 had a positive significant coefficient for U.S. migration for those individuals with needs met. The U.S. wage variable had positive coefficients for all migrations but was significant only in the case of intra-Mexico migration for the sample with needs met.

Overall, the coefficients on the different wage variables were significant only for the group with needs met. None of the coefficients on the wage variables were significant for the group without needs met. There is no clear explanation for this result. This may be resulting from the group with needs met having better information about wages in different areas.

Community Variables

The community variables were more important for the sample with needs met than for the other sample. For the sample without needs met, the only significant community variables were market and parish for intra-Mexico migration. Market had a positive coefficient and parish had a negative coefficient.

For the sample with needs met, the variable bank had a negative impact on both migration types and market had a negative impact on Mexico-U.S. migration. This result may reflect less need to migrate if sources of investment funds and economic opportunity are already in the community. This would also explain why the bank variable was insignificant for the sample without needs met. The individuals at the lowest standards of living in the community tend not to be served by commercial banks so they become banks become less important for this group. The hospital and clinic variables both had positive significant coefficients for the needs met sample. The plaza variable's coefficient was significant for both U.S. and intra-Mexico migration. The irrigation variable was also significant for both types of migration. This contrasts with irrigation being insignificant for the sample without needs met. Irrigation is useless without land to farm. On average, individuals in the needs not met sample have less land (compared to individuals in the needs met sample) and often own no land at all. The individuals without land to farm or who own marginal land without access to community irrigation do not yield the benefits from this irrigation.

Deprivation Variables

For intra-Mexico migration, the coefficients on the relative deprivation variables were either as predicted or insignificant. Land deprivation was found to have a positive effect on Mexican migration for those individuals without needs met. Durables deprivation had a positive significant effect on Mexican migration for the sample with needs met. The coefficients on both housing size and durables deprivation were negative and significant with respect to U.S. migration in both samples. The housing size deprivation coefficient was also negative (and significant) for intra-Mexico migration for the sample without needs met. These results suggest that land has a greater impact on those individuals at the lowest standards of living. For many individuals in this sample without needs met, they do not own any land. The negative significant coefficients on housing size and durables deprivation persists across both samples.

Additional Analyses

Separating the sample was not enough to fully explain the unexpected behavior of the deprivation variables. One of the results further explored is why the durables and housing size deprivation variables had significant negative coefficients. The explanation for this result is based on two propositions: prior U.S. migration experience is a strong predictor of future U.S. migration, and many Mexican migrants in the U.S. purchase a disproportionately high amount of consumer durables while in the U.S. These purchases are because of the relative price differences in these goods between the U.S. and Mexico. These propositions are tested with the data. The likelihood of U.S. migration was tested as a function of prior U.S. experience (and other variables). Prior U.S. experience was found to have positive significant coefficients with respect to the likelihood of current U.S. migration. The amount of durables owned was tested as a function of prior U.S. experience (and other variables). The variable for prior U.S. experience had a significant positive coefficient. The results of these regressions are in Appendix D. These propositions and supporting regression results provide an explanation for the negative significant signs on the durables and housing size deprivation variables. Individuals that have U.S. experience are more likely to migrate to the U.S. This same group of individuals are also more likely to own consumer durables because of their previous U.S. migration. Individuals with past U.S. migrant experience are also more likely to have increased housing size. This leads to the conclusion that there is a group of repeat U.S. migrant that are acquiring durables and housing and a group of individuals that are not partaking in the migration or its benefits. The cycle of Mexico-U.S. migration is fostering an increase in durables and housing size inequality.

Table 5.—Multinomial Logit Results: Separated by Basic Needs Met or Not.

	Needs not Met		Needs Met	
	U.S.	Mexico	U.S.	Mexico
Age	.2*	.17*	.17*	.2*
	(.017)	(.032)	(.017)	(.021)
Age^2	−.003*	−.002*	−.002*	−.002*
	(.0002)	(.0004)	(.0002)	(.00029)
Education	.097*	.18*	−.0035	.16*
	(.018)	(.03)	(.009)	(.02)
Sex	1.02*	.4*	.9*	.4*
	(.16)	(.138)	(.092)	(.116)
Married	.05	.21	.14*	.048
	(.096)	(.17)	(.07)	(.15)
Dependent Ratio	−.114*	−.14*	−.12*	−.15*
	(.028)	(.066)	(.033)	(.03)
Average Education	−.155*	−.15*	−.135*	−.08*
	(.033)	(.044)	(.025)	(.03)
Home Mexican Wage	−.8	−57	−.61*	−.16
	(.6)	(.44)	(.145)	(.19)
Mexican Wage 2	.68	.535	.54*	.17
	(.8)	(.55)	(.16)	(.22)
Mexican Wage 3	−.17	−.1	−.25**	−.002
	(.62)	(.42)	(.145)	(.17)
U.S.wage	4.2	2.84	4.2	7*
	(2.8)	(2.8)	(2.8)	(2.68)
Durables Deprivation	−.87*	.2	−1.5*	.38*
	(.15)	(.21)	(.22)	(.18)
Housing Size Depr	−.3*	−.27*	−.3*	−.038
	(.09)	(.094)	(.086)	(.1)
Housing Quality Depr	−.27	−.26	.94	.22
	(.21)	(.258)	(.62)	(.48)
Land Deprivation	.002	.034*	.008	.009
	(.012)	(.011)	(.0084)	(.0095)
Plaza	.55	−.43	1.26*	1.08**
	(.83)	(.68)	(.626)	(.61)
Market	−.3	1.5*	−1.12*	−.08
	(.63)	(.55)	(.556)	(.51)
Bank	.8	−.81	−2.5*	−3.4*
	(.72)	(.63)	(1)	(.57)
Hospital	.22	−.75	.945*	.51
	(.46)	(.5)	(.38)	(.35)
Parish	.05	−1.2**	.2	−.17
	(.7)	(.64)	(.6)	(.44)
Baseball League	−.2	−.554	−.05	−.43
	(.46)	(.39)	(.366)	(.3)
Soccer League	.3	.91	−.056	−.009
	(.82)	(.56)	(.67)	(.48)
Basketball League	−.09	−.35	.1	.44
	(.67)	(.354)	(.468)	(.32)
Government Clinic	1	1.46	−.74	15.3*
	(1.73)	(1.3)	(1.25)	(3.84)
Irrigation	1.78	1.1	2.07*	2.34*
	(1.5)	(1.18)	(.64)	(.4)
Log Likelihood	−4855.2		−10584.9	
Wald Chi^2	6737442		159893	

Note: The coefficients are listed with the standard errors in parenthesis.
* = significant at 5% level. ** = significant at 10% level.

8 Conclusions

The paper shows a complex relationship between relative deprivation and migration. In the case of Mexico-U.S. migration, I find the least deprived individuals engaging in the migration. On further investigation, a relationship is found where individuals repeatedly migrate to the U.S. and accumulate consumer durables and increased housing. Those individuals that do not become part of this cycle become more relatively deprived. These results provide empirical evidence to support the observation that Mexico-U.S. migrants tend to purchase large amounts of consumer durables in the U.S. and invest in housing in Mexico.

The results also show differences between Mexico-U.S. and intra-Mexico migration. For intra-Mexico migration, the statistical results suggest that relatively deprived individuals are the more likely to migrate. It appears that deprivation with respect to land and consumer durables are especially important. This suggests that intra-Mexico may have the effect of lowering inequality.

For government officials, these results imply that land reform aimed at greater equality in land ownership may be an effective tool to reduce rural-urban migration within Mexico but may not affect Mexico-U.S. migration. The cycle of Mexico-U.S. is more aimed at purchasing consumer durables and housing. Even policies that raised wages in the Mexican community would not have as powerful an impact as the traditional wage differential model would suggest because of the lower relative prices of consumer durables in the United States as compared to Mexico. The results from the separated sample also indicate that wage differentials may have a greater effect on individuals with a higher standard of living.

Appendix A

There are three clusters for Mexico. The clusters were constructed geographically. The first cluster comprises the central Mexican states. The second cluster comprises the northern Mexican states and the third cluster comprises the southeastern Mexican states. The number of Mexican observations located in each cluster by year is listed table 6 below.

Table 6 – Number of observations in each Mexican cluster

Year	Cluster 1	Cluster 2	Cluster 3
1982	47	766	226
1987	1741	90	19
1988	692	477	42
1989	103	127	348
1990	272	359	344
1991	376	642	261
1992	518	344	282
1993	104	232	130
1994	292	817	18
1995	29	275	295
1996	12	443	173
1997	6	83	130

The United States was also divided into three clusters. The state of California is the first cluster. The second cluster contains the states of Texas, Arizona and New Mexico. The third cluster includes the rest of the states in the U.S. Forty percent of the third cluster is comprised of migrants to Illinois. Another 17% are from Idaho and 14% from Florida. Each remaining U.S. state comprises less than five percent of the third cluster. A table with the number of U.S. observations by cluster and year is below. An alternative set of U.S. clusters was also tested with Florida in the second cluster instead of the third. The moving of Florida from the third to the second cluster did not change the results. The logit results reported in the paper use the original U.S. clusters that contain Florida in the second cluster.

Table 7 – Number of Observations in each U.S. cluster

Year	Cluster 1	Cluster 2	Cluster 3
1982	259	26	26
1987	200	48	39
1988	479	63	118
1989	505	31	100
1990	399	39	113
1991	485	88	102
1992	370	21	72
1993	169	23	75
1994	272	138	202
1995	249	60	53
1996	111	36	40
1997	220	65	15

A total of 24 regressions were run. A regression was run for each year for the U.S. and Mexican samples (separately). The resulting R-squared and F-statistics from the regressions are in tables 8 and 9 below.

Table 8 – U.S. Wage Regressions

Year	R^2	F-Statistic
1982	.15	44.93
1987	.49	302
1988	.86	1287
1989	.90	3718
1990	.85	983
1991	.64	642
1992	.62	354
1993	.56	91
1994	.43	209
1995	.74	479
1996	.59	285
1997	.73	142

Table 9 – Mexican Wage Regressions

Year	R^2	F-Statistic
1982	.71	179
1987	.70	263
1988	.77	557
1989	.70	617
1990	.84	471
1991	.86	840
1992	.90	575
1993	.86	213
1994	.91	915
1995	.91	634
1996	.90	261
1997	.52	184

Appendix B

The model was tested using eight different reference points for the relative deprivation variables. The results reported in the paper use the community mean as the reference point. The other reference points tested were community median, 25th percentile in community, 75th percentile in community, mean in state, median in state, 25th percentile in state and 75th percentile in state. The results using the relative deprivation variables with different reference points are in the two tables below. The table lists the signs and significance of variables.

Table 10 Regressions with other Reference Points for Outcome M=1 U.S.

U.S.	Mean Comm	Median Comm	75% Comm	25% Comm	Mean State	Median State	75% State	25% State
Age	+	+	+	+	+	+	+	+
Age^2	−	−	−	−	−	−	−	−
Education	+*	+*	+*	+*	+	+*	+*	+*
Sex	+	+	+	+	+	+	+	+
Married	+	+*	+*	+*	+	+*	+*	+*
Dependent Ratio	−	−	−	−	−	−	−	−
Average HH Education	−	−	−	−	−	−	−	−
Home Mexican Wage	−	−	−	−	−	−	−	−
Mexican Wage 2	+	+	+	+	+	+	+	+
Mexican Wage 3								
U.S. wage								
Durable Deprivation	−	−	−	−		−	−	−
Housing Size Depr	−	−	−	−	−	−	−	−
Housing Quality Depr		+				+*		
Land Deprivation			+*					
Plaza	+	+	+	+	+	+	+	+
Market	−*	−*	−*	−	−	−*	+*	−*
Bank								
Hospital								
Parish								
Baseball League								
Soccer League								
Basketball League								
Govt Clinic								
Irrigation	+	+*	+	+*	+	+	+	+

Note: * denotes significant at 10%. All other signs are significant at 5% level. Omitted signs are insignificant.

Table 11 Regressions with other Reference Points for Outcome M=2 Mexico.

Mexico	Mean Comm	Median Comm	75% Comm	25% Comm	Mean State	Median State	75% State	25% State
Age	+	+	+	+	+	+	+	+
Age^2	−	−	−	−	−	−	−	−
Education	+	+	+	+	+	+	+	+
Sex								
Married								
Dependent Ratio	−	−	−	−	−	−	−	−
Average HH Education	−	−	−	−	−	−	−	−
Home Mexican Wage								
Mexican Wage 2								
Mexican Wage 3								
U.S. wage								
Durable Deprivation	+	+*	+			+	+	+*
Housing Size Depr								
Housing Quality Depr								
Land Deprivation	+		+					+*
Plaza								
Market		+	+	+	+	+	+	+
Bank	−	−	−	−	−	−	−	−
Hospital								
Parish	−*	−	−	−	−	−	−	−
Baseball League	−*	−*	−*	−*	−*		−*	
Soccer League								
Basketball League								
Govt Clinic								
Irrigation	+							

Note: * denotes significant at 10%. All other signs are significant at 5% level. Omitted signs are insignificant.

Appendix C

The coefficient on the interaction variable for sex and dependent ratio was significant and positive for both U.S. and Mexican migration. The variable sex is defined as equal to 1 if the individual is male and zero if the individual is female. The variable married is equal to one if the individual is married and zero if he/she is not. An interaction term was also constructed for sex and married.

Table 12 — Multinomial Logit with Interaction Variables

	Migrate to U.S.	Migrate within Mexico
Age	12*	10.2*
Age^2	−12.7*	−9.2*
Education	1.8**	9.4*
Sex	8.9*	−2.3*
Married	4.2*	−1.5
Dependent Ratio	−6.5*	−4.7*
Sex*Dependent Ratio	4.6*	3.1*
Average Education	−6*	−3.5*
Sex*Married	−3.8*	4.3*
Home Mexican Wage	−4.3*	−.55
Mexican Wage 2	3.1*	.43
Mexican Wage 3	−1.1	.3
U.S. wage	1.2	1.4
Durables Deprivation	−9*	2*
Housing Size Deprivation	−3.7*	−1.2
Housing Quality Deprivation	1	−.2
Land Deprivation	1.3	1.96*
Plaza	2.1*	.5
Market	−1.9*	1.4
Bank	−1.2	−4.4*
Hospital	1.5	−.45
Parish	.2	−1.75**
Baseball League	−.9	−1.9**
Soccer League	.7	.6
Basketball League	−.2	1.1
Government Clinic	−.4	.8
Irrigation	3.2*	3.5*
Log Likelihood	−15782	
Wald Chi^2	16250000	

Notes: The t-statistics are listed. * = significant at 5% level. ** = significant at 10% level.

A regression was also run with interaction variables for the separated sample. These results are below.

Table 13 — Multinomial Logit with Interaction Variables for Separated Samples

	Needs Not Met		Needs Met	
	U.S.	Mexico	U.S.	Mexico
Age	11.8*	5.3*	9.8*	8.7*
Age^2	−11.6*	−5*	−10*	−7.6*
Education	5.1*	5.7*	−.3	7.2*
Sex	5.6*	−1.7**	7.3*	−2*
Married	3*	−1	3.4*	−1.3
Dependent Ratio	−3.8*	−2.3*	−4.6*	−5.2*
Sex*Dependent Ratio	1.8**	1.3	3.8*	3.2*
Sex*Married	−3*	3.2*	−2.7*	3.2*
Average Education	−4.6*	−3.3*	−5.3*	−2.2*
Home Mexican Wage	−1.2	−1.3	−4.2*	−.8
Mexican Wage 2	.8	1	3.3*	.77
Mexican Wage 3	−.2	−.3	−1.72**	−.01
U.S. wage	1.4	1	1.4	2.6*
Durables Deprivation	−5.5*	.9	−6.7*	2.1*
Housing Size Deprivation	−3.3*	−2.7*	−3.4*	−.33
Housing Quality Deprivation	−1.2	−1	1.5	.44
Land Deprivation	.2	3*	1	.9
Plaza	.6	−.6	2*	1.78**
Market	−.4	2.6*	−2*	−.17
Bank	1.1	−1.2	−2.5*	−6*
Hospital	.4	−1.5	2.4*	1.4
Parish	.06	−1.8**	.3	−.3
Baseball League	−.4	−1.3	−.13	−1.4
Soccer League	.3	1.6	−.08	.01
Basketball League	−.1	−1	.22	1.3
Government Clinic	.5	1	−.5	4*
Irrigation	1.1	.9	3.2*	6*
Log Likelihood	−4839		−10560	
Wald Chi^2	28415		153188	

Notes: The t-statistics are listed. * = significant at 5% level.
** = significant at 10% level.

Appendix D

A regression was performed with the amount of consumer durables owned as the dependent variable. The main variable of interest is prior U.S. migration experience. The regressions were run with Huber-White corrected errors and clustering by community. The regressions were also run without the cluster option and then without either the cluster option or corrected errors. Since U.S. experience was significant in all regressions, only the results from the robust cluster regressions are listed in table 14 below. As the results show, prior U.S. experience is a significant indicator of consumer durables ownership.

Table 14 Consumer Durables Regression Results

	Consumer Durables
Age	.02*
	(.0055)
Age^2	−.00016*
	(.000069)
Education	.015*
	(.0028)
Sex	.002
	(.016)
Married	−.15*
	(.035)
Dependent ratio	−.04*
	(.014)
Average HH Education	.36*
	(.014)
Home Mexican Wage	−.16*
	(.066)
Mexican Wage 2	.0046
	(.08)
Mexican Wage 3	.14**
	(.08)
U.S. wage	−.033
	(1.3)
Plaza	.062
	(.33)
Market	−.087
	(.21)
Bank	1.33*
	(.36)
Hospital	−.3
	(.21)
Parish	.24
	(.36)
Baseball League	−.1
	(.23)
Soccer League	.3
	(.4)
Basketball League	−.2
	(.26)
Government Clinic	.82
	(.72)
Irrigation	−.36
	(.24)
U.S. experience(months)	.00009*
	(.00002)
F-Statistic	52.5
R^2	.33

Note: Coefficients are listed with standard errors in parenthesis. * denotes significant at 5% level. ** denotes significant at the 10% level.

Two multinomial logits were run with migrate as the dependent variable. The variable migrate is from the original multinomial logits and takes on a value of zero if the individual did not migrate in the last year, a value of one if he/she migrated to the U.S. and a value of two if he/she migrated within Mexico. The difference between the two logits is the measure of U.S. experience used. The first measure of U.S. experience is the number of prior U.S. trips and the second measure is the number of months of experience in the U.S. Both measures of U.S. experience had the same result. These logits were also run with and without Huber-White corrected errors and clustering. As the U.S. experience variables were significant in all logits, only the robust cluster logit results are listed in table 15 below. The results clearly show the importance of past U.S. migration as an indicator of future U.S. migration.

Table 15 U.S. Migration and U.S. Experience Logit Results

	U.S. Migration	U.S. Migration
U.S. Trips	5.7*	–
U.S. Experience	–	6.8*
Age	11.6*	11.6*
Age^2	−12*	−12.4*
Education	.22	.29
Sex	10.2*	10.5*
Married	2.1*	2*
Dependent Ratio	−4.3*	−4.4*
Average HH Education	−6*	−6*
Home Mexican Wage	−4.6*	−4.6*
Mexican Wage 2	3.4*	3.4*
Mexican Wage 3	−1.2	−1.2
U.S.wage	1.23	1.26
Durables Deprivation	−9.5*	−9.4*
Housing Size Deprivation	−3.7*	−3.8*
Housing Quality Deprivation	1.15	1.12
Land Deprivation	1.3	1.23
Plaza	2.1*	2.1*
Market	−2*	−2*
Bank	−1.1	−1.1
Hospital	1.5	1.5
Parish	.28	.24
Baseball League	−.86	−.84
Soccer League	.72	.72
Basketball League	−.3	−.31
Government League	−.39	−.346
Irrigation	3.1*	3.1*
Wald Chi^2	3742.6	3778.4
Log Likelihood	−10758	−10722.5

Note: Coefficients are listed with standard errors in parenthesis. * denotes significant at 5% level. ** denotes significant at the 10% level.

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