

Mexican Migration and Capital Investment: A Disaggregated Migration Network Approach

Matthew J. Clifford¹

Thesis Submitted for:
M.A., Quantitative Methods in the Social Sciences
Institute of Social and Economic Research and Policy
Columbia University

Abstract:

This paper asks what the relation of migration is to various capital measures at the household level, including the human capital accumulation of children. Since capital measures affect the migration decision along with possible spurious factors, a historical migration network instrument is created using the primary US migration locations within a community and the unemployment and poverty shocks experienced by Mexican migrants within those US locations. Instrumented migration is not found to have a significant effect on any capital measures save vehicle ownership, which falls under migration.

¹ Contact information: mclifford@qes-llc.com

I. Introduction

The effects of migration are myriad and misunderstood. The effects on source nations are especially confusing. Brain drain versus brain gain and educational return-on-investment are terms that are bandied about easily in the public sphere. Furthermore, while the economic impact of migration on the migrant may be assumed to be positive, the effect of that migration on the source household is less clear. Consumption, savings, access to credit, and capital accumulations are dually affected by the migration decision and the changing environment global migration creates. How does the household react to migration by one of its members?

Numerous previous studies have focused on the effect of migration and remittances on poverty shocks. McKenzie and Rappoport (2004) find evidence that migration reduces inequality within communities. Hildebrandt and McKenzie (2004) find evidence of an increase in child health measures due to migration. Yang (2004) finds that migration – and remittances in particular – can have positive impact on schooling rates, reduced child labor, and increased educational expenditures. López-Córdoba (2004) shows that an increase in remittance income can be responsible for improvement in health, poverty, and schooling measures.

Capital measures are another aspect of migration often studied. Woodruff and Zenteno (2001) show that remittance receipts are responsible for 20% of micro-enterprise capital in Mexico. McKenzie and Rapoport find instrumented migration to have positive effects on educational attainment. Their method is largely emulated in the latter half of this paper.

The analysis that follows attempts to determine the effects of migration by the heads of Mexican households on various measures of capital at the home level including business ownership, household structure, vehicle ownership, and home tenancy. Additionally, we look at the critical value of human capital, measured by educational attainment of children. Using a combination of the Mexican Migration Project and the US Current Population Survey we are able to look at the effects of migration using complex migration characteristics and household information.

Due to the error in migration being highly correlated with these capital measures an instrument is required to determine the exogenous effects of migration. This analysis follows several other studies in the use of historical migrant networks as an instrument for migration. We differ from those studies in the use of historical US unemployment and poverty shocks amongst Mexican migrants. Additionally, we disaggregate the migrant networks at the US regional level; that is, we define networks not just in terms of number of migrants to the US, but as number of migrants to specific regions. This allows for a greater diversity of network strength between communities and ties migration to regional US economic conditions.

The next section explains theoretical possibilities for the influence of migration on capital measures. Section three surveys the data sets used. Section four outlines the estimation method, followed by the method of creating the migration instruments in section five. This is followed by the results of the household capital analysis and then the human capital analysis in section seven. Section eight concludes.

II. Theory

A multitude of effects could alter the capital investment decisions of households after the migration decision. While it may appear that the inclusion of possible remittances to a migrating household can have nothing but a positive effect on capital measures, there are other, more nuanced affects at work. Firstly is the obvious loss of a worker from the migrant's households. The loss of this presumably productive household member can reduce overall resources available to the household.

The structure of the decision process also plays an important part. Using a neoclassical assumption, the capital investment decision would be made by those household members not having migrated. The choice made may not take into account the effect of this decision on the emigrating family member, just as the immigrant's remittance decision may not be made by the family unit as a whole. Furthermore, a neoclassical framework uses the assumption that individuals are consumption maximizing, and that the capital investment decision, in addition to the initial migration decision, will be made with this consumption in mind. A neoclassical framework could either reduce or increase capital investment depending on the remittance structure and expected future migration environment.

Under a 'new economics' assumption, the family can become the principle decision making unit, though the criteria under which a decision is made is less clear. While the maximizing of consumption may be the end goal, reducing risk is equally important. If capital accumulation is an effective way to reduce the risk to future consumption flows, a new economics framework should increase the capital investment

possibility of a household, just as the initial migration decision is itself a method of risk reduction.

Finally, the future environment which a household expects can be a large factor in the investment decision. If migration is an expected path of the youth in a given community, investment in business opportunities or in education may turn out to be a bad decision. This is further compounded by the migration network which an emigrating individual is helping to create. Strengthening this network can induce future migration, reducing current capital investment. This effect on education could be especially profound, given that the wage discrepancy between the US and Mexico is particularly large for those with higher education levels.

Overall, the effect of a household head's migration decision on his or her family's capital investment decision is unclear.

III. Data

The analysis presented uses data from the Mexican Migration Project (MMP), a collaboration between the University of Pennsylvania and the University of Guadalajara. The MMP is an annual survey of Mexican households which focuses on migration history and household characteristics. While not designed with economic correlation in mind, the sociological study offers a wealth of information. We use MMP107, from the five communities examined in 1982, the two to five surveyed from 1987 to 1997 and the approximately ten communities per year thereafter.

For each of the 117 communities surveyed, approximately 200 households are interviewed. Each household is asked a range of questions regarding basic household

composition and capital and wealth measures. The majority of the data, however, evaluates the migratory history of household members and extended family members. This includes an extensive supplement regarding the last migratory experience of the head of household.

The use of MMP over a more nationally representative household survey is plain, by sacrificing a clearer picture of the household situation we gain extensive data regarding the migratory experience and networks, including the ability to disaggregate migratory networks at the US regional level, outlined in the section regarding instrumentation. Unfortunately, each community is surveyed only once, making only a cross-sectional analysis possible.

In addition to the MMP we use the Bureau of Labor Statistics' Current Population Survey (CPS). Looking only at the population of Mexican born immigrants, either legal or illegal, living in the US we construct measures of unemployment and poverty to be used in the construction of our instrumental variables. The CPS contains data on these values dating back to 1976, obtainable through their March labor supplement. We can easily obtain the rates of employment and poverty, by US census region and year, for Mexican migrants living in the US.

The nature of the analysis restricts the data being used in several ways. Due to the changing nature of the survey, the initial waves do not include the detailed family history questions necessary to construct our instruments, specifically the migration destination. Therefore waves one through 52 are dropped. Additionally the limits of the CPS data prevent us from examining employment and poverty shocks in the US prior to 1976. We are left with 2081 households in 55 communities to study.

There are several interesting aspects to the data. Overall, men and women have the same level of educational attainment, men an average of 5.43 years and women an average of 5.47. These numbers rise to 7.71 years for boys and 7.79 for girls in the 12 to 18 years old category that will be examined in section VII. The average age of a survey participant is 20.3 years, with the average age of a household head is 44.7 years.

Perhaps the most surprising statistic of all is the rate of migration itself. The overall migration rate among all of those surveyed is 42.8%, though the rate of migration among heads of the household is 29.3%. While this is enough variation to observe differences, the rate is surprisingly low. The necessarily higher rate of migration for non-heads of household could be a result of the increasing attractiveness of migration among younger Mexicans, though other spurious factors are equally plausible.

A second type of analysis we employ involves regressions on the educational attainment of children within the household. This requires person-level observations as opposed to the previously used household-level observations. Since we will be regressing individual educational attainment on the migration status of the household head, all of the previous data retains its relevance. We simply merge MMP person level data with its household equivalent.

IV. Methods

In order to obtain a complete picture of the migration effects on several capital measures we employ a variety of single-stage and two-stage regressions. Since all of our outcome variables are either binary or ordered, our most important analyses will use probit and ordered probit methods. As outlined in the section regarding instrumentation, the

two-stage estimations will use either instruments of shocks to the US unemployment rate, shocks to the US poverty rate, or both of these shocks simultaneously.

As a starting point all of our estimations will utilize an OLS regression, followed by a fixed effects regression on the survey year. A probit (or ordered probit, depending on the type of regressand) is examined as well. In addition to a migration dummy variable indicating the migration history of the household head a variety of household composition variables are used. Income being a major component of all household decisions, we include the log of annual income and its square as regressors. Additional household employment and income variables include dummies indicating both the father's and mother's employment status and the number of workers in the household. The father's and mother's education, the household head's sex, and the total number of household members round out the family composition. Additionally, we include a series of dummies indicating home tenancy as another measure of household wealth.

The two-stage calculations employ the same explanatory variables while incorporating their respective instruments. The method used to create the various instruments is defined in the next section. With two instrumental variables in hand, we employ an OLS first stage on the migration dummy, and add the predicted values of migration to our second stage.

A second analysis is interested in the effect of household head migration on the educational attainment of children within that household. In addition to the OLS regressions on years of education, we follow the method employed in McKenzie and Rapoport (2006) by classifying educational attainment into ordered categories. They

consist of 0 years of schooling, 1 to 5 years, complete primary, 7 to 8 years, complete junior high, 10 to 11 years, complete high school, and more than high school.

Ordered probit calculations, both single and two-stage, are drawn on for this analysis. Further following McKenzie and Rapoport we separate analyses by boys and girls and by age, looking at ages 14 to 16 in one set of regressions and ages 17 to 18 in another.

V. Instrumentation

Since the possibility of migration by a household head and the capital investment patterns of any specific household are related in a manner more nuanced than direct causality, an instrument is in order. We are looking for a variable, or series of variables, that are correlated to migration but can be safely uncorrelated to the capital measures which are the principle aim of study. In this instance the employment and poverty shocks experienced by a community's specific migration network within the United States are used.

There are many examples of migration networks being used as an instrument for the likelihood of migration by a household member. The typical method is to instrument using the historical migration rate of a state or district as a proxy for the strength of the migration network. Woodruff and Zenteno (2001), Hanson and Woodruff (2003), McKenzie and Rapoport (2004), Hildebrandt and McKenzie (2004) and López-Córdoba (2004) all use historic state-level migration as an instrument.

There are some additional studies pointing to the power of migrant networks. Munshi (2001) points out that the size of migrant networks is related to employment

shock experienced by the immigrants within that network. Bauer, Epstein, and Gang (2002) show that both network effects and herd effects are principle to a migrant's decision. Davis, Stecklov and Winters (2001) show that both Mexican and US migrant networks play an important role in the migration location decision, with disaggregation at the state level heightening this effect, especially within Mexico-based networks.

The MMP allows for a unique approach to the migration network. Household members are asked about the locations of their first migration experience. Every migrating member of a sampled community is asked about the specific US standard metropolitan statistical area and US state to which they have migrated. An index for the disaggregated migrant network for each community is made, representing the top five migration locations within that community along with the percentage of it's migrants that journey to that location.

Initially this study was concerned with disaggregating the migrant network at the SMSA level, which would allow for detailed differences between communities to be ascertained. There is, however, limited data with SMSA tags within the CPS. Instead, we have been forced to examine the migrant networks at the US Census sub-regional level. This still allows for a significant difference in network composition between communities. Figure 1 shows the composition of location destinations as Census sub-regions.

The instruments are not complete, as simple location division does not tell us any information regarding an exogenous effect on migration. For this we turn to both employment and poverty data from the CPS at the regional level. Since we are interested in the shocks observed by potential Mexican emigrants, only the shocks experiences by

Mexican families living in the US are considered. Using this data, an unemployment rate is calculated for every year for each of the US regions. This rate is converted to a percentage difference from the Mexican immigrant population as a whole for any given year. This process is repeated for the poverty rate of Mexicans in the US.

Merging the CPS shock data with the MMP network data is no easy task. Firstly, we are given one value of network composition for each community and a different value for each year per associated shock. It does not suffice to simply merge the shock with its survey year network; most migration occurs well before the actual survey and we are looking for an instrument which influences migration, not lags it. Since the theory behind migrant networks is that historical migration patterns effects current migration trends we have settled on the use of the migrant network as it existed on a migrant's 18th birthday. While it is certainly plausible that an earlier instance, later instance, or a trend of network shocks is a better indicator of migration, this method allow us to maximize use of the data given the imitations of the CPS².

The final step is the multiplication of the percentage of a location's strength within a given community with the employment shock of that location at the household head's 18th year. This is expressed as:

$$I_{nh}^{employment} = \frac{(U_{nh} - U_{th})}{U_{th}} N_{nh}$$

where I_{nh} is the employment instrument of location n for household h, U_{nh} is the unemployment rate at location n at the 18th year of household h's head, U_{th} is the US

²The CPS has employment and poverty data dating to 1976, allowing for the study of households with household heads born after 1958.

national unemployment rate for Mexican migrants at that same year, and N_{nh} is the network percentage of location N for household h .

Another choice might be to merge the data based on the year of first US migration. Households without migration, though, lack such a measure. A matching technique was ruled out given the lack of criteria on which to match household in the MMP.

Households within a community have the same network composition, though the ages of the household heads vary their associated shocks. An attempt was made to create household specific network compositions. This was to use the migration locations of the head of household's immediate family which was asked about in later waves of the survey. There was very little variance in these measures, however, since many families choose to migrate to one location. This, along with the fewer number of households for which it was possible to create these indices, made such an instrument unsuitable.

Both the unemployment shock and poverty shock are actually a sum of five variables, representing the top five migration destinations for each of the communities in the survey. For each of these five we calculate the regional-year shock multiplied by the percentage strength of that region within the Mexican community of question.

Table 1 shows the first stage regressions for the first of our analyses, the effect of migration on business ownership. The results are interesting; both of the instruments are significant at the 10% level, with significance and power increasing for both instruments when used jointly. The effects of other factors on the migration decision are noteworthy independent of any second stage. The log of income exercises a U-shaped influence on the migration decision, with both terms highly significant. Parental education has a

negative effect, with the father's education significant at the 1% level. This is significant given the theoretical proposition that migration in the household will reduce educational attainment. It stands to reason that a previous generation's educational attainment also influences migration. Additionally, the number of workers in a household has a negative and significant coefficient on migration, leading to an obvious conclusion that families without working prospects are more likely to emigrate.

VI. Results – Household Capital Measures

Household were asked what type of business they own, if any. We are easily able to represent this as a binary variable of business ownership. Capital at some level is required to begin any business venture and the business ownership binary variable is therefore a good proxy for access to capital. The business ownership rate among those surveyed is 27.6%³, table 2 shows the OLS, probit, and iv-probit estimation of the effect of migration on this variable. The initial estimations are inconclusive, and while the use of the poverty instrument shows a positive effect on business ownership significant at the 10% level, the negative effect produced by the unemployment instrument is puzzling and eliminates the efficacy of the joint instrument.

A similar situation exists with the estimation of migration effects on a dirt floor dummy, a better indication of poverty than of capital investment. Table 3 shows that, using unemployment instrumented migration, a mild positive relation in the probit is turned negative and significant at the 10% level. The poverty shock, however, remains positive, making the joint method inconclusive. One reason for this may be the high rate

³ Microenterprises are considered businesses and the large amount of self-employed Mexicans makes the overall business ownership rate seem large.

of non-dirt floors, 96.9%. Such a high volume of households leaves little variance for us to observe.

Vehicle ownership by a household is perhaps the best direct measure of non-human capital available to us. 47.5% of households surveyed own a vehicle. The relation between vehicle ownership and migration is shown in table 4. This is the most interesting result in the household capital measures. Our initial probit regression expresses a small positive relation between migration and vehicle ownership significant at the 5% level. Both single-variable two-stage regressions show a negative effect, one of them significant. The joint effect remains significant and negative, showing that the independent migration effect is responsible for a large reduction in vehicle ownership, not a small increase as may initially be believed.

Finally, an ordered probit is run on types of home tenancy experienced, ranked in order from without papers (squatting) to borrowing to rental to ownership. The MMP, being primarily rural, shows a high rate of home ownership with 78.8%. Borrowing accounts for 7.5% of the sample and renters 12.8%. Squatters are few, accounting for less than 1% of those surveyed⁴. Land and home ownership are important factors in reducing credit constraints and should be considered an aspect of capital. The instrumented coefficients of migration retain their positive sign on land tenancy and increase slightly in strength; however, they lose their significance. This is shown in table 5.

⁴ It is a possibility that squatters have self-reported as renters or borrowers.

VII. Results – Human Capital Measures

The results for human capital measures are less noteworthy than the household capital measures. This is due to the comparatively low number of observations for each subgroup⁵. Still, there are several interesting features of the education analysis. The analysis of boys ages 12 to 18 shows that migration influences educational attainment negatively. This is in contradiction to both the OLS and ordered probit result of a positive and non-significant value. Additionally, the educational level of the child's mother becomes negative and significant, though the possibility of the increased education of a mother negatively affecting the education of her children should not be viewed in absence of other factors, such as the probable correlation with the father's educational level. Girls ages 12 to 15 have no significant effects of migration on educational attainment, though the use of instrumentation turns the migration coefficient strongly negative.

In the 16 to 18 category, there is again an inconclusive effect of migration on girls's educational attainment. In contrast to their younger counterparts, however, girls in this age category have a strong and significant effect from the educational level of their mothers. One assumes a strong intergenerational relation in educational level, especially among women. It is curious, then, why younger girls do not have a strong statistical influence from this factor.

Boys ages 16 to 18 have a strong ordered probit coefficient from migration, an effect that is considerably heightened by the inclusion of instrumentation. Again, these

⁵ An attempt should be made to use a different data set for US employment and poverty shocks. If regional-level values are obtained for years before 1976 households with heads born before 1958 can be included in the data. This would greatly improve the results for all analyses, and especially those with an initially low number of observations.

results are not significant. This age group of boys has the lowest number of observation of any of the sub-groups analyzed; no conclusions are merited.

Despite the lack of statistical significance, the difference between the two age groups are marked. In all cases, the effect of migration is stronger for those in the 16 to 18 year category than for their younger equivalents. This would seem to suggest that, given a certain level of educational attainment, migration is a boon to it's completion. It is not, however, a significant factor in the commencement of secondary education.

VIII. Conclusion

Unfortunately, the study yields little additional light on the effects of migration. The reaction of a household from the migration of one of its members remains obscure. While the effect on vehicle ownership is surprising and noteworthy – showing a negative effect of migration while positive without instrumentation – little else is. Our analysis does, however, reveal an interesting method of devising instrumentation for community-level surveys, one that incorporates clearly exogenous and timely shocks from an outside data source.

Ideas for further study include a revision of the instruments. A more detailed history of migrant status in the U.S. would allow for greater disaggregation of the instruments in question and possibly lead to a greater understanding of some of the historical antecedents of emigration. Additionally, further removing Mexican household characteristics from any first stage regression would help ameliorate the Manski reflection effect.

It is unfortunate that there has been little research that does not attempt to bundle the effects of migration with its cohorts. Generally, migration effects are treated as separate from remittance and labor movements. In reality, migration cannot be separated from its components. Looking at the totality of a labor movement pattern can have important social and political gains. The potential gains necessitate further study.

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Table 1: Sample First-Stage Regressions, Business Ownership			
	OLS	OLS	OLS
Employment Shocks	0.9821 (0.4445)*		1.0967 (0.4471)*
Poverty Shocks		0.4393 (0.2277)	0.5046 (0.2289)*
Log(income)	-0.1242 (0.0248)***	-0.1232 (0.0248)***	-0.1213 (0.0248)***
Log(income)^2	0.0056 (0.0016)***	0.0057 (0.0016)***	0.0055 (0.0016)***
Household Members	0.0103 (0.0086)	0.0096 (0.0086)	0.0101 (0.0085)
Household Workers	-0.0365 (0.0168)*	-0.0366 (0.0168)*	-0.0365 (0.0168)*
Head's sex	-0.2220 (0.1089)*	-0.2155 (0.1091)*	-0.2109 (0.1090)
Father's education	-0.0155 (0.0032)***	-0.0152 (0.0032)***	-0.0152 (0.0032)***
Mother's Education	-0.0033 (0.0034)	-0.0029 (0.0034)	-0.0027 (0.0034)
Fathers employment status	-0.0471 (0.0495)	-0.0431 (0.0495)	-0.0427 (0.0494)
Mothers employment status	0.0056 (0.0148)	0.0044 (0.0148)	0.0047 (0.0148)
N	2081	2081	2081
R-squared	0.068822	0.0683	0.071013

Significance: *** 1%, ** 5%, * 10%

	OLS	probit	2S probit empl	2S probit pov	2S probit joint
Migration	0.0290 (0.0198)	0.1033 (0.0686)	-0.1198 (1.3843)	4.1415 (1.6096)*	1.7145 (0.9910)
Log(income)	-0.0279 (0.0225)	-0.0779 (0.0839)	-0.1069 (0.1915)	0.4299 (0.2196)	0.1218 (0.1489)
Log(income)^2	0.0036 (0.0015)*	0.0112 (0.0052)*	0.0126 (0.0094)	-0.0120 (0.0106)	0.0021 (0.0076)
Household Members	-0.0069 (0.0077)	-0.0273 (0.0273)	-0.0254 (0.0304)	-0.0677 (0.0317)*	-0.0431 (0.0289)
Household Workers	0.0193 (0.0152)	0.0730 (0.0515)	0.0645 (0.0718)	0.2207 (0.0783)**	0.1308 (0.0627)*
Head's sex	-0.0941 (0.0983)	-0.2787 (0.3581)	-0.3376 (0.4734)	0.6183 (0.5084)	0.0700 (0.4209)
Father's education	0.0035 (0.0029)	0.0122 (0.0098)	0.0086 (0.0234)	0.0745 (0.0268)**	0.0368 (0.0181)*
Mother's Education	0.0048 (0.0031)	0.0166 (0.0105)	0.0157 (0.0115)	0.0299 (0.0118)*	0.0218 (0.0110)*
Fathers employment status	0.0358 (0.0446)	0.1386 (0.1701)	0.1230 (0.1818)	0.3170 (0.1837)	0.2072 (0.1751)
Mothers employment status	0.0681 (0.0134)***	0.2041 (0.0441)***	0.2050 (0.0446)***	0.1837 (0.0449)***	0.1967 (0.0444)***
N	2081	2081	2081	2081	2081
R-squared	0.068142	0.061848	0.06085	0.063761	0.062175

Significance: *** 1%, ** 5%, * 10%

	OLS	probit	2S probit empl	2S probit pov	2S probit joint
Migration	0.0185 (0.0083)*	0.1934 (0.1431)	-6.5220 (3.2090)*	4.7126 (3.6459)	-1.6785 (1.9471)
Log(income)	-0.0282 (0.0094)**	-3.1352 (1.0527)**	-4.0400 (1.1391)***	-2.5219 (1.1380)*	-3.3697 (1.0893)**
Log(income)^2	0.0027 (0.0006)***	0.1991 (0.0565)***	0.2417 (0.0602)***	0.1704 (0.0598)**	0.2100 (0.0581)***
Household Members	-0.0039 (0.0032)	-0.0206 (0.0456)	0.0548 (0.0567)	-0.0586 (0.0573)	0.0034 (0.0493)
Household Workers	-0.0127 (0.0064)*	-0.1662 (0.0865)	-0.4198 (0.1473)**	-0.0082 (0.1564)	-0.2388 (0.1118)*
Head's sex	0.0348 (0.0411)				
Father's education	0.0035 (0.0012)**	0.0722 (0.0238)**	-0.0257 (0.0539)	0.1459 (0.0612)*	0.0478 (0.0379)
Mother's Education	0.0023 (0.0013)	0.0437 (0.0251)	0.0229 (0.0275)	0.0619 (0.0288)*	0.0383 (0.0262)
Fathers employment status	-0.0112 (0.0187)				
Mothers employment status	0.0032 (0.0056)	0.0948 (0.0992)	0.1224 (0.1008)	0.0762 (0.1005)	0.1036 (0.0994)
N	2081	2021	2021	2021	2021
R-squared	0.063316	0.271759	0.276668	0.271542	0.269864

Significance: *** 1%, ** 5%, * 10%

	OLS	probit	2S probit empl	2S probit pov	2S probit joint
Migration	0.0735 (0.0217)***	0.2217 (0.0647)***	0.4578 (1.3336)	-4.5475 (1.5584)**	-1.6892 (0.9469)
Log(income)	-0.1764 (0.0246)***	-0.5292 (0.0784)***	-0.4957 (0.1846)**	-1.1322 (0.2141)***	-0.7682 (0.1439)**
Log(income)^2	0.0143 (0.0016)***	0.0431 (0.0051)***	0.0414 (0.0092)***	0.0707 (0.0105)***	0.0540 (0.0076)***
Household Members	-0.0165 (0.0084)	-0.0479 (0.0258)	-0.0500 (0.0288)	-0.0008 (0.0300)	-0.0295 (0.0273)
Household Workers	0.0051 (0.0166)	0.0152 (0.0499)	0.0238 (0.0695)	-0.1595 (0.0758)*	-0.0543 (0.0605)*
Head's sex	-0.0142 (0.1077)	-0.0550 (0.3085)	0.0021 (0.4282)	-1.1186 (0.4658)*	-0.4749 (0.3728)
Father's education	0.0222 (0.0031)***	0.0659 (0.0096)***	0.0692 (0.0228)**	-0.0082 (0.0259)	0.0359 (0.0175)
Mother's Education	0.0157 (0.0034)***	0.0473 (0.0102)***	0.0477 (0.0111)***	0.0311 (0.0114)**	0.0407 (0.0106)
Fathers employment status	0.0856 (0.0489)				
Mothers employment status	0.0329 (0.0146)	0.1013 (0.0440) *	0.1006 (0.0443) *	0.1260 (0.0447)**	0.1106 (0.0441)
N	2081	2081	2081	2081	2081
R-squared	0.196767	0.15771	0.153653	0.156599	0.154722

Significance: *** 1%, ** 5%, * 10%

	OLS	ordered probit	2S ordered probit empl	2S ordered probit pov	2S ordered probit joint
Migration	0.1059 (0.0349)	0.1092 (0.0349)***	0.1113 (0.0351)	0.1024 (0.0350)	0.0963 (0.0351)
Log(income)	-0.0754 (0.0396)	-0.0676 (0.0400)	-0.0650 (0.0404)	-0.0641 (0.0402)	-0.0711 (0.0402)
Log(income)^2	0.0039 (0.0026)	0.0030 (0.0027)	0.0029 (0.0027)	0.0028 (0.0027)	0.0033 (0.0027)
Household Members	0.0292 (0.0136)	0.0340 (0.0137)*	0.0342 (0.0137)	0.0353 (0.0137)*	0.0356 (0.0137)
Household Workers	-0.0310 (0.0269)	-0.0364 (0.0269)	-0.0381 (0.0270)	-0.0358 (0.0269)	-0.0363 (0.0269)
Head's sex	-0.2962 (0.1733)	-0.3314 (0.1729)	-0.3322 (0.1730)	-0.2826 (0.1735)	-0.2754 (0.1733)
Father's education	0.0005 (0.0051)	0.0006 (0.0051)	0.0005 (0.0051)	0.0013 (0.0051)	0.0018 (0.0051)
Mother's Education	0.0107 (0.0054)	0.0098 (0.0055)*	0.0098 (0.0055)*	0.0109 (0.0055)	0.0118 (0.0055)*
Fathers employment status	0.0227 (0.0787)	0.0176 (0.0783)	0.0172 (0.0785)	0.0390 (0.0786)	0.0421 (0.0785)
Mothers employment status	0.0140 (0.0236)	0.0210 (0.0235)	0.0232 (0.0236)	0.0170 (0.0236)	0.0165 (0.0235)
N	2076	2076	2076	2076	2076
R-squared	0.053155	0.050413	0.052333	0.055108	0.060981

Significance: *** 1%, ** 5%, * 10%

Table 6: First-Stage Regressions, Migration on Educational Level Girls ages 12 to 15			
	OLS	OLS	OLS
Employment Shocks	0.1057 (0.8209)		0.1508 (0.8478)
Poverty Shocks		0.0800 (0.4495)	0.1003 (0.4642)
Log(income)	-0.1547 (0.0556)**	-0.1530 (0.0563)**	-0.1527 (0.0564)**
Log(income)^2	0.0085 (0.0036)*	0.0084 (0.0036)*	0.0084 (0.0036)*
Household Members	0.0174 (0.0131)	0.0175 (0.0131)	0.0174 (0.0131)
Household Workers	-0.0348 (0.0248)	-0.0352 (0.0248)	-0.0351 (0.0248)
Head's sex	-0.1660 (0.2480)	-0.1620 (0.2482)	-0.1633 (0.2486)
Father's education	-0.0228 (0.0065)***	-0.0227 (0.0065)***	-0.0227 (0.0065)***
Mother's Education	0.0040 (0.0073)	0.0040 (0.0073)	0.0040 (0.0073)
Fathers employment status	-0.0308 (0.1186)	-0.0297 (0.1185)	-0.0306 (0.1187)
Mothers employment status	0.0216 (0.0287)	0.0214 (0.0287)	0.0216 (0.0287)
N	493	493	493
R-squared	0.093961	0.09399	0.09405

Significance: *** 1%, ** 5%, * 10%

Table 7: Second-Stage Regressions, Migration on Educational Level Girls ages 12 to 15					
	OLS	ordered probit	2S ordered probit empl	2S ordered probit pov	2S ordered probit joint
Migration	0.0308 (0.1696)	-0.0304 (0.1059)	-9.4409 (18.0792)	-12.0564 (13.0129)	-11.2097 (9.2728)
Log(income)	-0.3030 (0.2075)	-0.2492 (0.1330)	-1.7043 (2.7985)	-2.1105 (2.0183)	-1.9796 (1.4414)
Log(income)^2	0.0203 (0.0133)	0.0170 (0.0084)*	0.0967 (0.1533)	0.1189 (0.1106)	0.1117 (0.0791)
Household Members	-0.0502 (0.0485)	-0.0360 (0.0306)	0.1279 (0.3162)	0.1733 (0.2285)	0.1585 (0.1641)
Household Workers	-0.1652 (0.0919)	-0.1184 (0.0593)*	-0.4464 (0.6325)	-0.5373 (0.4569)	-0.5077 (0.3282)
Head's sex	2.5835 (0.9183)	1.8368 (0.5761)**	0.2860 (3.0334)	-0.1415 (2.2160)	-0.0023 (1.6300)
Father's education	0.0424 (0.0243)**	0.0281 (0.0152)	-0.1866 (0.4126)	-0.2462 (0.2971)	-0.2268 (0.2120)
Mother's Education	0.0688 (0.0269)*	0.0361 (0.0168)*	0.0735 (0.0739)	0.0839 (0.0544)	0.0805 (0.0405)*
Fathers employment status	-0.1662 (0.4389)	-0.0529 (0.2731)	-0.3363 (0.6091)	-0.4157 (0.4783)	-0.3903 (0.3911)
Mothers employment status	-0.1662 (0.4389)	-0.0529 (0.2731)	-0.3363 (0.6091)	-0.4157 (0.4783)	-0.3903 (0.3911)
N	493	493	493	493	493
R-squared	0.15332	0.060293	0.060426	0.060837	0.061261

Significance: *** 1%, ** 5%, * 10%

Table 8: First-Stage Regressions, Migration on Educational Level Boys ages 12 to 15			
	OLS	OLS	OLS
Employment Shocks	0.4824 (0.8676)		0.5516 (0.9004)
Poverty Shocks		0.0683 (0.5096)	0.1538 (0.5288)
Log(income)	-0.1158 (0.0670)	-0.1155 (0.0671)	-0.1150 (0.0672)
Log(income)^2	0.0056 (0.0040)	0.0057 (0.0040)	0.0056 (0.0040)
Household Members	0.0416 (0.0158)**	0.0417 (0.0158)**	0.0413 (0.0158)**
Household Workers	-0.0815 (0.0269)**	-0.0810 (0.0269)**	-0.0811 (0.0269)**
Head's sex	-0.1631 (0.2616)	-0.1660 (0.2617)	-0.1639 (0.2619)
Father's education	-0.0157 (0.0069)*	-0.0158 (0.0069)*	-0.0157 (0.0069)*
Mother's Education	-0.0108 (0.0072)	-0.0105 (0.0072)	-0.0106 (0.0072)
Fathers employment status	0.1062 (0.1696)	0.1070 (0.1697)	0.1044 (0.1698)
Mothers employment status	0.0483 (0.0316)	0.0467 (0.0316)	0.0476 (0.0317)
N	452	452	452
R-squared	0.128185	0.127603	0.128355

Significance: *** 1%, ** 5%, * 10%

Table 9: Second -Stage Regressions, Migration on Educational Level Boys ages 12 to 15					
	OLS	ordered probit	2S ordered probit empl	2S ordered probit pov	2S ordered probit joint
Migration	0.0387 (0.1899)	0.0351 (0.1119)	-12.0585 (4.2511)**	9.9906 (17.3748)	-9.7933 (3.7672)**
Log(income)	0.1557 (0.2669)	0.0906 (0.1535)	-1.3088 (0.5152)*	1.2441 (2.0188)	-1.0467 (0.4620)*
Log(income)^2	-0.0070 (0.0159)	-0.0026 (0.0092)	0.0658 (0.0258)*	-0.0590 (0.0988)	0.0530 (0.0232)*
Household Members	-0.0938 (0.0630)	-0.0551 (0.0374)	0.4498 (0.1813)*	-0.4713 (0.7274)	0.3552 (0.1615)*
Household Workers	-0.0417 (0.1076)	-0.0324 (0.0641)	-1.0143 (0.3510)**	0.7761 (1.4125)	-0.8308 (0.3125)**
Head's sex	0.7518 (1.0384)	0.5938 (0.6245)	-1.4031 (0.9395)	2.2421 (2.9421)	-1.0278 (0.8811)
Father's education	0.0688 (0.0276)*	0.0402 (0.0163)*	-0.1507 (0.0690)*	0.1975 (0.2752)	-0.1150 (0.0616)
Mother's Education	0.0509 (0.0285)	0.0297 (0.0167)	-0.0982 (0.0480)*	0.1352 (0.1848)	-0.0742 (0.0432)*
Fathers employment status	0.3432 (0.6729)	0.2664 (0.4024)	1.5773 (0.6119)**	-0.8051 (1.9145)	1.3325 (0.5735)
Mothers employment status	0.3432 (0.6729)	0.2664 (0.4024)	1.5773 (0.6119)**	-0.8051 (1.9145)	1.3325 (0.5735)*
N	452	452	452	452	452
R-squared	0.08706	0.033003	0.039153	0.033182	0.038151

Significance: *** 1%, ** 5%, * 10%

Table 10: First-Stage Regressions, Migration on Educational Level Girls ages 16 to 18			
	OLS	OLS	OLS
Employment Shocks	0.3906 (1.0157)		0.5976 (1.0377)
Poverty Shocks		0.6123 (0.6965)	0.6961 (0.7124)
Log(income)	-0.2570 (0.2316)	-0.2384 (0.2325)	-0.2328 (0.2330)
Log(income)^2	0.0147 (0.0121)	0.0138 (0.0121)	0.0136 (0.0121)
Household Members	0.0262 (0.0145)	0.0239 (0.0146)	0.0246 (0.0146)
Household Workers	-0.0043 (0.0270)	-0.0045 (0.0269)	-0.0046 (0.0270)
Head's sex	-0.1066 (0.2677)	-0.1019 (0.2675)	-0.1030 (0.2678)
Father's education	-0.0168 (0.0087)	-0.0166 (0.0087)	-0.0165 (0.0087)
Mother's Education	-0.0028 (0.0106)	-0.0025 (0.0106)	-0.0022 (0.0106)
Fathers employment status	-0.1120 (0.1157)	-0.1031 (0.1156)	-0.1063 (0.1159)
Mothers employment status	-0.0487 (0.0356)	-0.0498 (0.0356)	-0.0501 (0.0356)
N	290	290	290
R-squared	0.108074	0.110102	0.111182

Significance: *** 1%, ** 5%, * 10%

	OLS	ordered probit	2S ordered probit empl	2S ordered probit pov	2S ordered probit joint
Migration	0.3946 (0.2902)	0.2139 (0.1411)	-9.1263 (6.0973)	2.6127 (2.6765)	0.1826 (2.2281)
Log(income)	-0.3888 (1.1151)	0.0464 (0.5396)	-2.3706 (1.6674)	0.6700 (0.8789)	0.0392 (0.7901)
Log(income)^2	0.0426 (0.0582)	0.0089 (0.0281)	0.1471 (0.0946)	-0.0268 (0.0486)	0.0092 (0.0434)
Household Members	0.0695 (0.0698)	0.0357 (0.0339)	0.2752 (0.1602)	-0.0262 (0.0765)	0.0362 (0.0664)
Household Workers	-0.1804 (0.1296)	-0.1275 (0.0632)*	-0.1673 (0.0686)*	-0.1172 (0.0641)	-0.1268 (0.0638)*
Head's sex	0.4300 (1.2866)	0.4179 (0.6347)	-0.5628 (0.9012)	0.6759 (0.6948)	0.4160 (0.6761)
Father's education	0.1817 (0.0421)***	0.0931 (0.0208)***	-0.0647 (0.1047)	0.1331 (0.0497)**	0.0921 (0.0428)*
Mother's Education	0.1884 (0.0509)***	0.0846 (0.0250)***	0.0567 (0.0308)	0.0918 (0.0263)***	0.0843 (0.0259)**
Fathers employment status	0.6852 (0.5558)	0.4499 (0.2713)	-0.5698 (0.7178)	0.7136 (0.4004)	0.4456 (0.3649)
Mothers employment status	0.6852 (0.5558)	0.4499 (0.2713)	-0.5698 (0.7178)	0.7136 (0.4004)	0.4456 (0.3649)
N	290	290	290	290	290
R-squared	0.325635	0.112594	0.112546	0.11124	0.110288

Significance: *** 1%, ** 5%, * 10%

Table 12: First-Stage Regressions, Migration on Educational Level Boys ages 16 to 18			
	OLS	OLS	OLS
Employment Shocks	-0.6302 (1.4431)		-0.6070 (1.5739)
Poverty Shocks		0.1203 (0.5821)	0.0237 (0.6346)
Log(income)	0.6934 (0.4489)	0.7055 (0.4479)	0.6933 (0.4498)
Log(income)^2	-0.0311 (0.0219)	-0.0317 (0.0219)	-0.0311 (0.0219)
Household Members	0.0231 (0.0201)	0.0228 (0.0202)	0.0231 (0.0202)
Household Workers	-0.0168 (0.0304)	-0.0170 (0.0304)	-0.0167 (0.0305)
Head's sex	-0.0976 (0.2567)	-0.0846 (0.2554)	-0.0969 (0.2578)
Father's education	-0.0176 (0.0099)	-0.0176 (0.0101)	-0.0175 (0.0101)
Mother's Education	0.0015 (0.0105)	0.0014 (0.0105)	0.0015 (0.0105)
Fathers employment status	-0.0956 (0.1346)	-0.1036 (0.1333)	-0.0958 (0.1350)
Mothers employment status	-0.0323 (0.0395)	-0.0313 (0.0395)	-0.0324 (0.0397)
N	253	253	253
R-squared	0.105383	0.104829	0.105388

Significance: *** 1%, ** 5%, * 10%

Table 13: Second-Stage Regressions, Migration on Educational Level Boys ages 16 to 18					
	OLS	ordered probit	2S ordered probit empl	2S ordered probit pov	2S ordered probit joint
Migration	0.4088 (0.3182)	0.1418 (0.1485)	1.8478 (5.1772)	18.1643 (11.0565)	2.5491 (5.1593)
Log(income)	-0.7543 (2.2140)	-1.0139 (1.0222)	-2.2257 (3.8095)	-13.7993 (7.9086)	-2.7232 (3.7979)
Log(income)^2	0.0392 (0.1080)	0.0503 (0.0498)	0.1047 (0.1722)	0.6245 (0.3557)	0.1271 (0.1717)
Household Members	0.0969 (0.0994)	0.0581 (0.0467)	0.0189 (0.1280)	-0.3557 (0.2581)	0.0028 (0.1276)
Household Workers	-0.7290 (0.1496)	-0.3510 (0.0720)	-0.3200 (0.1150)	-0.0397 (0.2032)	-0.3079 (0.1147)
Head's sex	1.8228 (1.2565)	1.0002 (0.5862)	1.1463 (0.7356)	2.5512 (1.1178)	1.2067 (0.7349)
Father's education	0.1853 (0.0488)	0.0975 (0.0232)	0.1281 (0.0963)	0.4233 (0.2013)	0.1408 (0.0960)
Mother's Education	0.0294 (0.0516)	0.0221 (0.0239)	0.0198 (0.0250)	-0.0037 (0.0287)	0.0188 (0.0250)
Fathers employment status	0.7270 (0.6564)	0.4670 (0.3084)	0.6470 (0.6222)	2.3474 (1.1931)	0.7202 (0.6207)
Mothers employment status	0.7270 (0.6564)	0.4670 (0.3084)	0.6470 (0.6222)	2.3474 (1.1931)	0.7202 (0.6207)
N	253	253	253	253	253
R-squared	0.291948	0.113312	0.112422	0.115341	0.112554

Significance: *** 10%, ** 5%, * 1%

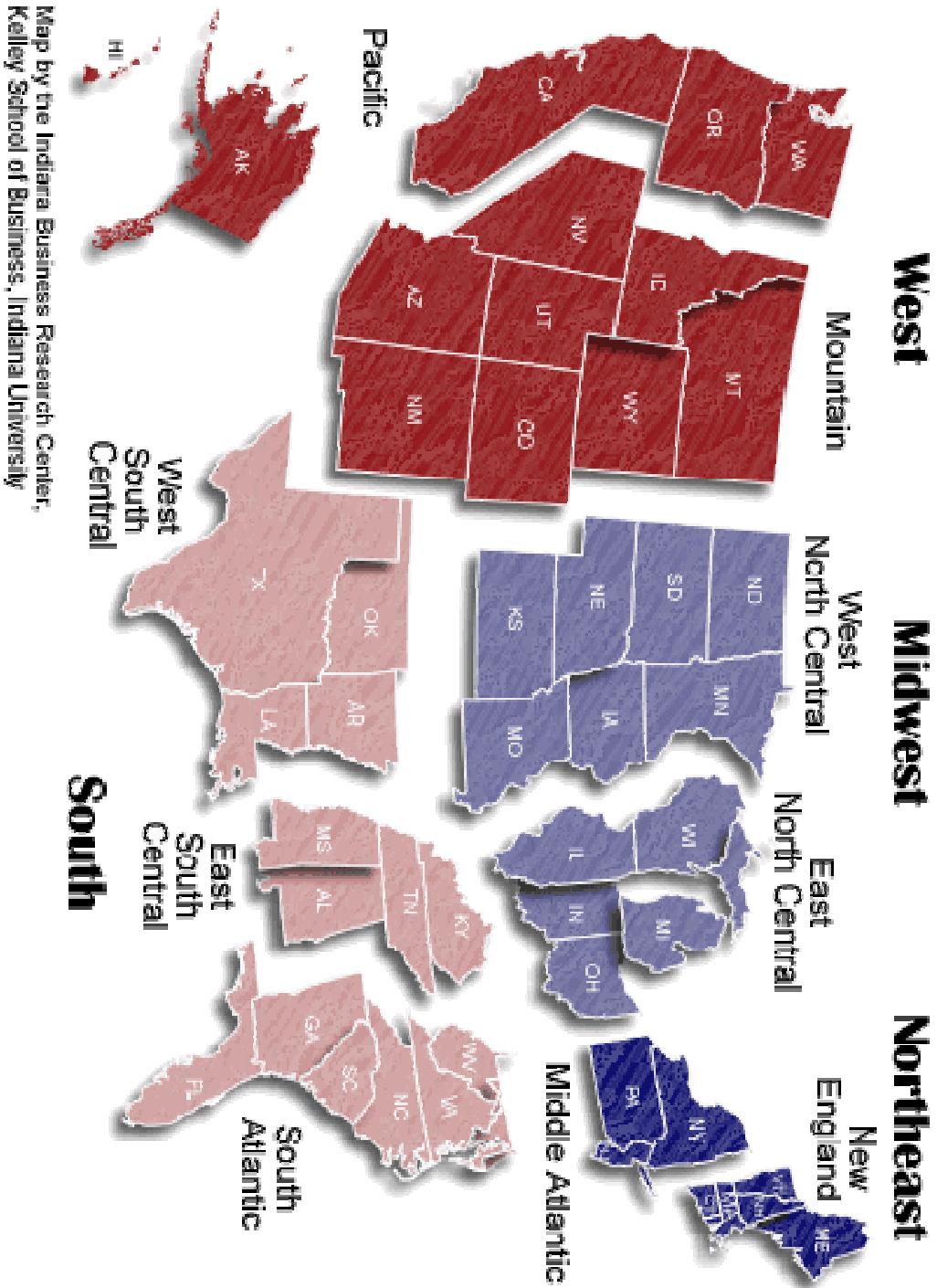


Figure 1: Census Regions

Map by the Indiana Business Research Center,
Kelley School of Business, Indiana University