Internal Migration, Selection Bias and Human Development: Evidence from Indonesia and Mexico

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Abstract

The aim of this paper is to measure the returns to migration using non-experimental data taking both observed and unobserved characteristics into account. A significant challenge related to migration research and the issues of unobserved heterogeneity is that the standard 2stage least squares estimator (2SLS) is strictly only applicable to situations with linear and continuous treatment and outcomes, both of which are not appropriate for models of migration and many outcomes of interest. Furthermore, migration is not always a binary process given that people migrate to city or non-city locations and some migrants do return. Introducing these multinomial treatment effects means that one cannot rely on standard 2SLS methods. Using panel data from Indonesia (Indonesia Family Life Survey—IFLS) and Mexico (Mexican Family Life Survey—MxFLS) and applying non-linear instrumental variable (Heckman's treatment effects model) and maximum simulated likelihood models, we measure the impacts of migration on a broad range of variables that include socio economic outcomes such as consumption, nutrition, health status and emotional well-being for adult household members and health and schooling outcomes for children. We find consistent results for both countries that point to significant trade-offs related to migration. We found that migration can greatly improve socio-economic status through increases in income or consumption but can also be detrimental to the health status and emotional well-being of migrants and/or their extended families.

Keywords: Migration, selection, non-linear instrumental variables, consumption, socio-economic mobility, health, education.

1. Introduction

Migration has always contributed to household livelihood and income diversification strategies. At the same time, both migration theory and the available evidence so far have emphasized the unique features of migration and migrants compared to other societal processes. This non-random selection of migrants makes measuring the gains from migration a tricky exercise. The econometric problem in measuring these gains is in fact the archetypical problem facing any analyst doing programme evaluation: one cannot observe migrants in two different states as migrants and non-migrants at the same time. Therefore one needs to resort to counterfactual analysis in order to infer the magnitude of those outcomes (Ravallion 2005).

For any counterfactual analysis, one has two choices: experimental and non-experimental methods. In experimental methods, migrants would be randomly selected amongst the wider population of would be migrants. As a result, non-random selection can be ruled out as a confounding factor and outcomes can be compared for the two groups. To date, to our knowledge, only one such study has been conducted, taking advantage of a migration lottery in Tonga (McKenzie, Gibson, and Stillman 2006). By far however, most studies measuring the gains and losses from migration use non-experimental methods which require some identifying assumptions.

As mentioned above however, migrants are typically self-selected from the wider population, generally on the basis of characteristics that are not observed by the analyst. For this reason, one has to worry about unobserved characteristics that are related to migration but can also influence the outcome in question. Some commonly mentioned unobserved characteristics are ability, drive and ambition. We take selection on unobserved characteristics to be of central importance in our statistical analysis described below.

Furthermore, to date, most studies looking at migration use a binary framework, with no indication of where people migrate to or even whether they have returned to their place of destination (return migrants). More often than not, people who migrate to further destinations (urban centres for example) and those who migrate to nearby rural areas are generally treated in

the same way while return migrants are either included in the control group or are labeled as migrants. It is reasonable to expect that migration to an urban centre is clearly different from migration to a nearby rural area and that current and return migrants do not have the same opportunities available to them. In fact, in the latter case, a good explanation of why people return could be because they have failed in their experiment, making them distinct from those who have not returned (Lucas 1997). In either case, not treating these groups as distinct categories can lead to serious biases.

Another issue that requires serious attention is also fairly basic but often ignored in the literature, namely: who is the appropriate control group? This question is not only important for computational purposes, it is also important from a policy perspective and as a result is the subject of a long-standing theoretical debate. We take the view that a clear corollary to migration is that other people—particularly the extended family— will benefit from its impacts and often share in its costs, at least financially through the receipt of remittances and the obvious emotional costs of separation. Should we consider them as part of the control group, a serious bias can arise due to spillover effects because they clearly benefit from the treatment. Furthermore, if migration is a household, as opposed to an individual strategy, selection can be expected to be first and foremost done at the household level. This result is consistent with the conclusion by Beegle, De Weerdt, and Dercon (2008).

Various econometric tools exist to deal with these issues. Standard regression methods with indicator variables for migration have been frequently used in the literature. These are appropriate only if migration status is exogenous. Propensity score matching (PSM) methods are a popular technique to reduce bias due to treatment selection. Rosenbaum and Rubin (1984) have shown that if outcomes are independent of participation given pre-treatment characteristics, they will also be independent conditional on the propensity score. Although PSM is much better than standard methods, it also requires that selection be based purely on observed characteristics, albeit not necessarily in simple parametric ways. Selection into migration status can be accounted for much more powerfully if households are observed in at least two points in time, one prior to the migration decision. If such panel data are available, one powerful method to

remove all sources of time-constant unobserved heterogeneity is to use fixed effects regressions. A difference-in-difference specification, also achieves the same objective, especially when the panel consists of only two points in time (pre- and post-migration). However, this is not the case when these unobserved characteristics vary in time and space (e.g. ambition). In such instances, instrumental variable (IV) methods are a powerful way to take time-varying unobserved heterogeneity into account.

Instrumental variable techniques require the existence of one or more instruments, which are variables that are correlated with the treatment, migration, but not related to the outcome except via its influence on treatment. Identification of the causal treatment effect is achieved through the exogenous variation due to participation that is isolated by regressing treatment status on the instrument(s). A major challenge with instrumental variable regression is that one has to make a clearly convincing argument in order to assert to the credibility of the actual estimates. Another challenge is that the standard 2stage least squares estimator (2SLS) is strictly only applicable to situations with linear and continuous treatment and outcomes, both of which are not appropriate for models of migration and many outcomes of interest. To be precise, the 2SLS estimator can be applied to binary treatment and to nonlinear and/or noncontinuous outcomes, including binary outcomes, but often at the cost of large efficiency losses. The 2SLS estimator cannot be adapted easily to models with multinomial treatments, which is the case for a number of the analyses considered in this paper. Gourieroux, Monfort and Trognon (1984) made a seminal contribution to the econometrics literature when they developed the theory of maximum simulated likelihood (MSL). MSL provides a way to estimate models which otherwise do not have closed form solutions. Nonlinear structural models often have that property; although they can be formulated in principle, they usually do not have representations amenable to estimation by standard methods. Deb and Trivedi (2006a, 2006b) adopt MSL methods to develop an estimator for a treatment effects model for situations in which the treatment is multinomial. In this paper, we use those methods for the models in which we distinguish between migration to urban and non-urban locations and for those in which we distinguish between migrants who have returned at the follow up date and those who are currently migrants.

The primary aim of this paper is to measure gains from migration using non-experimental data taking both observed and unobserved characteristics into account. In order to do this, the methods outlined above are applied to panel data from Indonesia (Indonesia Family Life Survey—IFLS) and Mexico (Mexican Family Life Survey—MxFLS). The outcomes that measured include a range of socio economic outcomes such as consumption, nutrition, health status and emotional well-being for adult household members and health and schooling outcomes for children.

The paper is divided into 6 sections. Section 2 reviews the literature on migration, selection and resulting outcomes, section 3 outlines the methodology, section 4 describes the data, section 5 presents the empirical estimates and discusses the results and section 6 concludes.

2. Literature Review

Research on migration has an extensive record in the economics literature, starting with important contributions by Sjaastad (1962) and most remarkably by the early works of Todaro (1969) and Harris and Todaro (1970) and the long list of authors who have subsequently expanded on their framework. According to the Harris-Todaro model, migration takes place from rural to urban areas as people compare expected earnings in the urban sector with the wages that they earn in the rural sector and decide to move if the former is greater. In this framework, migration is seen as a cost-benefit process and will take place until the expected net gain for the marginal migrant equals zero. This conceptualisation of the migration process as an individual strategy, taking place in a social vacuum (Massey 1990), has been challenged since then by numerous authors who state instead that migration can better be explained as a collective household decision that can serve to minimize risks in the face of uncertainty and the myriad of market failures that are prevalent in developing countries (Stark and Bloom 1985, Lucas and Stark 1985, Rosenzweig and Stark 1989, Lauby and Stark 2000, Stark 1991). Arguments to support both camps abound in the literature; see discussion in the survey by Massey (1990) whose analysis leans heavily towards the view that migration can better be explained as a collective household strategy.

As much attention—both theoretical and empirical—as the issues surrounding the causes of internal migration have received in the literature, there has been a conspicuous dearth of studies looking at its consequences, and where they have existed, they tend to focus mostly on wage and income differentials so as to test the propositions behind the major competing theories such as the ones outlined above (see surveys in Greenwood (1997a) for developed countries and Lucas (1997) for developing countries). There are many reasons for this lacuna as on the one hand there is the need to observe migrants before and after they migrate, requiring at the very least adequate panel data; and on the other hand the analyst has to account for the fact that migrants may differ from non-migrants in ways that are not always observable. Using recently available panel data from Indonesia and Mexico, this paper will contribute to this long-established but relatively thin literature.

In measuring these impacts one of the key practical problems that we need to address is: who is the appropriate comparison group for migrants? Incidentally in order to answer this question, we need to take an a priori stand between the two competing models described above. As a starting point of our analysis we argue that although alternative theories of migration—which are not always antagonistic—may shed a lot of light on the process, ultimately, one needs to factor in the fact that migration is a source of important externalities: even though migrants may be the primary beneficiaries, their immediate and extended families also do benefit from the process and so do sometimes the communities from which they come. Consequently, using actual migrants alone in the treatment group obviously mispecifies the true impact, while using the family left behind as the reference group, although interesting in its own right, obviously misses the point.

The same line of reasoning applies to communities and countries in general as these externalities are better captured at each higher level of aggregation, but understandably, the data requirements become more onerous and a non-negligible tradeoff is that we lose important idiosyncratic impacts and potentially interesting dynamics. Therefore, in what follows, our analysis takes the household as the treatment unit. In terms of terminology, a household is referred to as a migrant household if at least one of its members has migrated between the surveys, and as a result all

outcomes are defined at the "origin" household level.[1] This methodological framework of choosing a broader treatment group is standard and is mentioned by Ravallion (2005) as an important source of internal validity for the evaluation of social programmes. It was applied by Miguel and Kremer (2004) to identify the impacts of school deworming interventions in Kenya and is also consistent with the conclusions reached by Beegle, De Weerdt, and Dercon (2008).

Measuring the gains from migration presents a distinct challenge. It is now a stylized fact in the literature that migrants are typically self-selected from the wider population. Although Borjas's early conjecture about migration and self-selection was in the context of international migration, it also largely applies to internal migration (Borjas 1988, Lucas 1997). In the context of international migration, McKenzie, Gibson, and Stillman (2006) (henceforth referred to as MGS), using data from a natural experiment in Tonga, augmented by an observational survey, show that migrants are positively selected in terms of both observed and unobserved skills. They found that Non-experimental methods overstate the gains from migration by 9 to 82 percent. They also find that an instrumental variables estimator performs best among the non-experimental estimators, overstating gains by 9 percent, a difference that is not statistically significant.

Having access to experimental data is not always a feasible option for most studies, especially when one is interested in measuring the impacts of internal migration. As a result, the limited research in this topic has generally leaned heavily on general purpose surveys. Furthermore, even using general purpose surveys presents an additional set of challenges that need to be addressed. First, at a minimum, one has to have access to panel data in which particular attention is paid to the issue of sample attrition. Such surveys are routinely conducted in developed countries but research on internal migration has had a tendency to look at the drivers with a relative neglect of the actual consequences (see early the early study by Bowles (1970) and the surveys in Greenwood (1975, 1997b and 2004). Comparatively, in most developing countries, data issues are a remarkable challenge, and where panel data is available, the levels of attrition therein are

[1] For non-migrant households, aggregating the outcomes is a straightforward process as the original household is still the same. For households that split due to a member migrating, to define outcomes, we reconstitute the "original" household by creating a common identification variable.

unacceptably high, casting doubt on empirical estimates in general and migration in particular (Alderman, Behrman, Kohler, Maluccio, and Watkins 2001; Thomas, Frankenberg, and Smith 2001).

The data challenges thus highlighted have ensured that a great deal of research on migration takes a rather limited view of the process by focusing on remittances. Examples of this burgeoning literature are the impacts of remittances on poverty and inequality (Stark, Taylor, and Yitzhaki 1986; Gustafsson and Makonnen 1993; Hoddinott 2000; Bracking 2003; Adams 2004), on other proximate human development indicators such as education (muedo-Dorantes, Georges, and Pozo 2007; Mueller and Sharif 2009) and health (Kanaiaupuni and Donato 1999; Amuedo-Dorantes, Sainz, and Pozo 2007) or broader household economic strategies such as risk management (Lucas and Stark 1985, Roberts and Morris 2003, Halliday 2006) and investment (Adams, Cuecuecha, and Page 2008; Yang 2005). Although remittances are an integral part of migration, they cannot account for the diverse and pervasive impacts of migration (McKenzie and Sasin 2007). For instance, as we show in this paper and from other studies, migration involves a great deal of stress and anxiety for those who migrate and their immediate family (McKay, Macintyre, and Ellaway 2003; Carballo 2007). In this case, looking at income effects alone obviously overstates the overall net gains of migration.

The preceding example also strengthens our initial conjecture that the impacts of migration should really be examined for broader groups such as the household. A generic example will clarify this point: take a migrant who leaves behind his/her family including spouse and children. It is reasonable to assume that the entire family (at least in most cases) would be emotionally affected by the separation, even if it is temporary. However, if one were to take the view that migration is really an individual process by comparing the emotional well being of migrants and others in the control group, then equally affected household members would offset the true impact that one would find by comparing migrants and other true non-migrants. In this case, dropping the sample of the migrant's household members is a possibility, but one would have to worry about sample selection issues which are no less serious.

3. Empirical Strategy

As outlined above, our empirical strategy is based on nonlinear instrumental variable methods which we describe below in more detail. In our baseline models, we model migration as a binary variable at the individual or household level (depending on the type of outcome being considered). The basic structure of the model is as follows. The outcome and treatment equations are specified as

$$E(y_i \mid y_{i0}, \mathbf{x}_{i0}, m_i) = \mathrm{f}(\gamma y_{i0} + \mathbf{x}_{i0}\beta + \gamma m_i)$$

$$\Pr(m_i = 1 \mid y_{i0}, \mathbf{x}_{i0}, \mathbf{z}_{i0}) = \mathrm{g}(\tau y_{i0} + \mathbf{x}_{i0}\zeta + \mathbf{z}_{i0}^{'}\alpha)$$

respectively, where the subscript 0 denotes information at baseline, and specifically, y_{i0} denotes the value of the outcome at baseline. Thus the post-migration outcome is modeled conditionally on pre-migration outcomes in addition to pre-migration household characteristics.

The inclusion of the baseline outcome as a regressor can be interpreted in two ways. First, it can be seen as analogous to a household fixed effect. More precisely, if we modeled changes in outcomes, with two points in time in the panel dataset, the first differenced outcome would serve to eliminate time-invariant household characteristics. Second, as MGS reiterate, the use of baseline outcome as a control variate gives the coefficient on migration a difference-in-difference interpretation, thus again eliminates effects of time-invariant household characteristics. Overall, the regression specification adjusts for time-invariant household characteristics, while the instruments provide adjustment for time-varying unobserved characteristics.

The probability of migration is a function of baseline outcomes, baseline exogenous characteristics and a set of instruments $\mathbf{z}_{io}$. In this instance, regardless of the fact that the outcome may not be linear and continuous and that the treatment is binary, 2SLS is an appropriate method, but it involves a substantial loss of efficiency vis-à-vis treatment effects models estimated using full information maximum likelihood (FIML). Therefore, in the case of normally distributed outcomes, we estimate Heckman's treatment effects model implemented in Stata 10 (*treatreg*) while in the case of integer valued outcomes, we estimate appropriate

treatment effects models using maximum simulated likelihood methods implemented in Stata (*treatreg2*). The latter method is a special case of the technique we use for the multinomial treatment effects model which is described in more detail below.

As mentioned above, it is reasonable to believe that specifying migrant status as a binary variable may result in a loss of important information as one might expect outcomes to be quite different depending on the "type" of migrant. For example, migrants who leave young children behind may have different human development outcomes as compared to those who do not have young children. Migrants who take their families with them may have different outcomes as compared to those that do not. Selection on observables and unobservables may affect migrants to the cities very differently than migrants who move within nearby rural areas. In each of these examples, migrant status should be specified as a multinomial variable. Consequently, specifying it as a binary variable gives rise to measurement error biases or worse. We use maximum simulated likelihood methods to estimate such multinomial treatment effects models following the approach of Deb and Trivedi (2006a, 2006b).

Consider the structural model given by

$$E(y_i \mid y_{i0}, \mathbf{x}_{i0}, \mathbf{m}_i, \mathbf{l}_i) = \mathrm{f}(\gamma y_{i0} + \mathbf{x}_{i0}\beta + \gamma \mathbf{m}_i + \lambda \mathbf{l}_i)$$

$$\Pr(\mathbf{m}_{ij} = 1 \mid y_{i0}, \mathbf{x}_{i0}, \mathbf{z}_{i0}, \mathbf{l}_i) = \mathrm{g}(\tau_j y_{i0} + \mathbf{x}_{i0}\zeta_j + \mathbf{z}_{i0}^{'}\alpha_j + \delta_j \mathbf{l}_i)$$

where $\mathbf{m}_i$ denotes the vector of migration choices and $\mathbf{m}_{ij}$ is the j^{th} migration alternative. The vector $\mathbf{l}_i$ denotes a vector of latent factors reflecting unobserved heterogeneity and $\boldsymbol{\lambda}$ and $\boldsymbol{\delta}$ are associated vectors of factor loadings. Then, the joint distribution of treatment selection and outcome variables, conditional on the common latent factors, can be written as

$$\begin{aligned}\Pr(y_i, \mathbf{m}_i \mid y_{i0}, \mathbf{x}_{i0}, \mathbf{l}_i) = {} & \mathrm{f}(\gamma y_{i0} + \mathbf{x}_{i0}\beta + \gamma \mathbf{m}_i + \lambda \mathbf{l}_i) \\ & \times \mathrm{g}(\tau_j y_{i0} + \mathbf{x}_{i0}\zeta_j + \mathbf{z}_{i0}^{'}\alpha_j + \delta_j \mathbf{l}_i)\end{aligned}$$

because *y* and **m** are conditionally independent.

The problem in estimation arises because $\mathbf{l}_i$ is unknown. The method of maximum simulated likelihood (MSL) (Gourieroux, Monfort and Trognon 1984) requires an assumption about the distribution of $\mathbf{l}_i$ denoted h which is used to integrate $\mathbf{l}_i$ out of the joint density, i.e.,

$$\Pr(y_i, \mathbf{m}_i \mid y_{i0}, \mathbf{x}_{i0}) = \int [\mathrm{f}(\gamma y_{i0} + \mathbf{x}_{i0}\beta + \gamma \mathbf{m}_i + \lambda \mathbf{l}_i) \times \mathrm{g}(\tau_j y_{i0} + \mathbf{x}_{i0}\zeta_j + \mathbf{z}_{i0}^{'}\alpha_j + \delta_j \mathbf{l}_i)] dh(\mathbf{l}_i)$$

and simulation techniques to conduct the multidimensional integration. These are described in detail in Deb and Trivedi (2006a). Gourieroux, Monfort and Trognon (1984) showed that maximization of the simulated likelihood is asymptotically equivalent to maximizing the likelihood and all standard inference procedures apply. We use this method for our models that distinguish migration by location and (separately) by duration, for continuous and integer-valued outcomes using a procedure implemented in Stata (*mtreatreg*).

Instrumental variables estimation relies on the existence of valid instruments which satisfy two requirements. First, valid instruments should be relevant, i.e., they should be substantially correlated with the endogenous regressors. Second, they should be exogenous, i.e., they should be uncorrelated with the outcome except through their effects on the endogenous regressors. In the context of this study, a valid instrument would be one that predicts whether or not people migrate, to which type of location and for what duration, but does not otherwise affect their outcomes conditional on all observed characteristics. Munshi (2003) uses rainfall in Mexican villages as an instrument for migration when looking at the effect of migration networks on job outcomes in the United States. MGS use the distance from the individual's residence in Tonga to the office from which lottery forms were handed out and had to be returned to. Following the spirit of these studies, we use a variety of distance and rainfall measures as instruments. We calculate distances from the center of each province in Indonesia and from each state in Mexico to important migration destinations within the country, in particular the distance to Jakarta, Surabaya, Medan and Palemban in Indonesia and the distance to Guadalajara, Monterrey, Cuidad Juarez and the US city of San Diego in Mexico. For Mexico, we also use deviations, from

historic state-level trends, of rainfall amounts two years prior to the baseline survey as measures of rainfall shocks.[2]

Relevance of these instruments is easily verified via joint tests for their significance. Exogeneity is harder to establish. Rainfall shocks are quite plausibly exogenous. Exogeneity of the vector of distances from the origin location to large cities is undoubtedly a harder case to make, a priori. First, note that the econometric specification for the outcome has a first difference or difference-in-difference flavor, both of which can be thought of as a household-level fixed effect. Therefore, origin specific unobserved characteristics such as culture and language are swept out of the analysis. Second, if we used distance to the migration destination as the instrument, it would likely be correlated with the outcome via independent channels, thus would not be exogenous. But distances to major cities only refer to the geography of the origin, not of the destination of migrants. Thus is it not immediately obvious that these distances are endogenous, especially given that most internal migration is relatively local.

4. The data

4.1. Context

Both Indonesia and Mexico have a rich history of research into migration. Research in Indonesia has mainly focused on the spatial distribution of internal migrants in particular the government sponsored transmigration programme (Tirtosudarmo 2009), while studies looking of Mexican migration have concentrated on flows to the United States, most notably, the much studied Mexican Migration Project. In both countries, much less attention has been devoted to studying the impacts of migration on measures of human development (notable exceptions for Mexico include Wodon, Diego, Gabriel, Diana, and Corinne (2003) and some references therein).

The continuing Indonesia Family Life Survey (IFLS) and the newly available Mexican Family Life Survey (MxFLS) will surely help to remedy this relative neglect and ours is an attempt in that direction. The IFLS and MxFLS are multipurpose surveys whose aim is to provide

[2] Despite having tried, we could not have access to locality specific rainfall data in Indonesia, but we do thank Sharon Maccini and Dean Yang for their tremendous help.

information on the socio-economic, demographic and health transitions of the Indonesian and Mexican populations. The baseline surveys were fielded in 1993 for Indonesia and 2002 for Mexico and covered respectively 7,224 and 8,440 households and are multi-staged, cluster sampled probabilistic survey largely representative of the respective populations.[3] The IFLS consists of three waves (1993, 1997 and 2000), with a fourth wave currently under way. For Mexico, a second wave was fielded in 2005 and both surveys included major efforts to recontact all of the baseline respondents and resulted in a remarkable success rate of over 90 percent for both countries (Strauss et al. 2004, Rubalcava and Teruel 2006). In both Indonesia and Mexico, internal migration—defined as moves outside the locality of residence lasting more than six months in Indonesia and a year in Mexico—is substantial, particularly in Indonesia where the surveys cover a longer time period. Table 1 shows the percentage of migrants by category. In Indonesia, almost half of all households had an internal migrant between 1994 and 2000 and the corresponding figure in Mexico is about 9 percent between 2003 and 2005. Return migration is substantial, accounting for 37 percent and 36 percent of all migrants in Indonesia and Mexico. In addition, the data shows that most movement was to a city, accounting for about two-thirds of all migrants during this period.

Table 1: Internal migration in Indonesia and Mexico (in annex)

Interprovincial and Interstate migration were the most prevalent kind during the periods in question. Table 2 shows the origin and destination matrix for households in the IFLS sample. The last column (bottom panel) of the matrix shows the origin of migrants.[4] The island of Java records the highest rates of out-migration, accounting for 15 percent in West Java, 13 percent in Central and East Java and 11 percent DKI Jakarta, perhaps reflecting the fact that Java is one of the most densely populated areas in the world, host to 60 percent of the Indonesian population,

[3] The IFLS covers 13 out of 26 Provinces in Indonesia and is representative of 83 percent of its population while the MxFLS is representative of the Mexican population (Frankenberg and Karoly 1995, Rubalcava and Teruel 2006).

[4] Strictly speaking, the fractions refer to households with a migrant. So "origin" should be understood as the fraction of households who had a member migrate from a given province, and "destination" should be understood as the fraction of households who had a member migrate to the province in question.

the fourth most populous country in the world.[5] In terms of destination (bottom row of each panel), the aforementioned provinces were also the most significant ones, but with some level of heterogeneity. For instance, while West Java received 20 percent of all migrants making it a net recipient, DKI Jakarta was a net sender, hosting only 8 percent of all migrants. Also noteworthy, the diagonal indicates that most movement was within the same province, but in the case of DKI Jakarta for example, although most migrants stayed within the province (185 households), a substantial number also moved to West Java (120 households).

Table 2: Interprovincial moves in Indonesia (in annex)

4.2. Variable definitions

We examine a broad range of human development outcomes for the two countries, comparing families with at least one migrant between the two surveys and those without. Our first set of results use a definition of internal migration at the household level as a binary process. Migration is defined as moves outside the locality of residence lasting more than six months in Indonesia and a year in Mexico. In addition, to further investigate these outcomes, we categorise migrants into two kinds: those who migrated but have returned home (households with return migrants), and those who are currently in their destination location (households with current migrants).[6] We also classify migrants by their destination: households with city-migrants and those with migrants in other non-city locations. We measure its effects on household consumption, average body mass index of adult household members, self-reported illness and emotional wellbeing for adults within the household. For children, we look at self-reported illnesses, education (grade-for-age), and time spent on household chores during the past week (for Mexico only).

Consumption: Our measure of consumption in both surveys is the annualized amount the household spent/produced on food products within the past week, the amount spent on household and individual products such as cleaning supplies, shampoo and so forth within the last month,

[5] Source: Statistics Indonesia: http://www.bps.go.id/sp2010/eng_general_information.shtml . Accessed 3, June 2009.

[6] In each case, there were a negligible number of households that saddled both categories. They were subsequently defined as households with returnees.

the amount spent on semi-durables such as clothes in the past quarter and the amount spent on durable goods in the last year.[7] In both countries the latter survey's values were deflated using the national CPI, The use of a common CPI for all households is likely to overstate the gains from migration as migrants are likely to move to communities with higher prices. Community-level prices are preferable, in principle, but their implementation is problematic for two reasons. First, although we know the location of the origin, we do not know the location of the destination of migrants. Even if we knew the destination, calculating real household consumption is complicated by the fact that most migrant households leave behind a number of individuals at the origin location; we do not have individual-level consumption.

Body Mass Index (BMI) is measured as weight in kilogrammes divided by height in metres squared. It is used to monitor nutrition and health in adults. According to standards developed by the World Health Organisation, a BMI below 18.5 is generally considered underweight and values above 30 are considered obese.

Self-Reported illnesses: are questions that are routinely included in household surveys. They range from questions such as "did you have a headache in the past 4 weeks", "aches and pains", "infections", "do you have rheumatism or joint discomfort" etc. They have been found to predict adult mortality levels in a population, are highly predictive of objective health status, and can be used to monitor general health status in adult populations (O'Donnell et al. 2007). Our measure of health is simply the sum of the number of reported illnesses by all adult household members. A similar measure was used for children. These self-reports are generic conditions that do not need professional diagnosis and are therefore more likely to be immune from certain types of measurement issues. For instance, most chronic condition such as diabetes and heart conditions are likely to be diagnosed by a health professional which can be the result of better access to health information and health facilities and/or improved socio-economic outcomes.

[7] In Indonesia, the way consumption was recorded in the first survey differed from the record in the last survey and so the consumption figures can serve as appropriate controls but are not strictly comparable.

Emotional well-being: Similar to self-reported illnesses, measures of emotional well-being are quick assessment tools where people are asked if questions such as “have they felt sad during the past 4 weeks”, “have they felt depressed” etc…

For children, we use variables related to time use, health and education. For instance, hours children spent performing household related chores: These include running errands for the household, time spent collecting water, doing laundry and so forth, and education is measured as being in an appropriate grade-for-age.

We also included a number of controls such as the education of the head of the household, the proportion of male household members, the number of adults and children in the household (which in a sense accounts for equivalence scales without constraining the coefficients to 1), the occupation of household members and so forth. Summary statistics are presented in Table 3.1 and 3.2.

Table 3.1 and 3.2: Table of Summary Statistics (in annex)

4.3. Who Selects into Migration?

The literature on internal and international migration has long insisted on the selectivity of migrants. The direction of selectivity depends on a host of factors such as the structure of the economy—nature and level of development for example—and what opportunities are available in the major destination areas. In that respect, migrants may be very different from non-migrants which can greatly affect their outcomes after migration. Tables 4.1 and 4.2 present some basic descriptive statistics at baseline for non-migrant and migrant households in Indonesia and Mexico, with the last column showing the standard difference in means one sided student t-statistics.[8] Although these are unconditional means, they show some interesting patterns. While households with internal migrants in Indonesia tend to be positively selected, in many respects we observe an opposite result in Mexico. This can be seen by looking at some of the variables

[8] An absolute value of 1.96 or above signifies a confidence level of 95% confidence level or more.

that to a large extent capture socio-economic characteristics such as the education of the head of the household.

Table 4.1: Some Descriptive Statistics by internal migrant status in Indonesia

Table 4.2: Some Descriptive Statistics by internal migrant status in Mexico

(in annex)

Figures 1.1 and 1.2 present the marginal effects from simple Probit regressions looking at the probability of migrating by deciles of consumption in Indonesia and Mexico. While for Indonesia one can see a clear stepwise linkage between the level of consumption and the probability of the household having a migrant (in other words the probability of migrating significantly increases with the level of consumption), in Mexico, the results are only significantly different than zero for the poorest 20 percent, and even then the marginal effects (4 and 2 percentage point respectively for the two poorest deciles) are relatively small compared to those in Indonesia (30 and 35 percentage points respectively). Both figures are also consistent with the somewhat stylized fact that the poorest of the poor generally do not migrate.

Figures 1.1 and 1.2 (in annex)

From tables 4.1 and 4.2, it can also be seen that there are generally more adult household members in migrant households perhaps denoting the fact that in both countries having access to spare labour increases the probability of having a household member migrate. People living in agricultural communities are much less likely to migrate than those living in industrial areas, perhaps reflecting the transferability of some of their acquired skills as well as access to capital and networks. Another interesting difference between Indonesia and Mexico is that households living in agricultural communities in Indonesia are more likely to have a return migrant than those in Mexico, possibly pointing to some degree of seasonal circularity in the former (see column 3 of Tables 5.1 and 5.2). Similarly, people who are vested in their communities through home ownership are also less likely to move.

These findings and patterns of selection are confirmed using multivariate regression analysis for both countries. These regressions form the basis of the first stage of the IV regression results presented below and are presented in Tables 5.1 and 5.2. While in Mexico a head of household with primary and secondary or higher education reduces the probability of migrating internally by 2 and 3 percentage points respectively, these characteristics increase the probability of migrating in Indonesia by 9 and 18 percentage points (see column 2 in Tables 5.1 and 5.2). In both countries, greater the number of adult household members at baseline the larger is the the probability of migrating internally. In Indonesia it also has an impact on having a return migrant, although the marginal effects of 11 percent is substantially lower than that of having a current migrant of 27 percent (see columns 2 and 3 of Table 5.2). In both countries, the number of adults at baseline is a strong determinant of whether the move is to a city or not.

The instruments also seem to perform well as determinants of migration status. In Indonesia for example, the distance to the various cities increase the likelihood of migrating by about 2 to 3 percent, except for the distance to Palemban whose sign is negative. In Mexico, the magnitudes are much larger as exemplified by the distance to Monterey which seems to decrease the likelihood of migrating by almost 100 percent. We find that distance is generally positively correlated to the probability of migration. Note that distance embodies push and pull factors. Push factors include the costs of migration. Pull factors include the relative gains from migration. Thus, a positive association implies that pull factors outweigh push factors for internal migrants.

The rainfall variables also seems to perform well, indicating that the higher the variation in rainfall relative to the state level long term average, the higher the likelihood of migrating, but the relationship is not linear as shown by the coefficient of the squared term. In addition the interaction term between rainfall variation and agricultural community indicates that households in agricultural communities tend to move in Mexico as rainfall variability increases. These results are consistent with the fact that high rainfall variability and unpredictability is a negative shock for these households, and leads to higher levels of outmigration.

5. Results

5.1. Consumption and socio-economic mobility

It is now almost a stylized fact that migration increases levels of income and/or consumption and thereby reduces poverty. Looking at internal migration in Tanzania, Beegle et al. (2008) find that between 1991 and 2004, consumption for individual migrants was 36 percentage points higher than that of original household members who didn't migrate. Similarly, those who moved outside the origin community had on average 10 times higher consumption growth than those who stayed behind. The impact on poverty was highest (23 percentage points) for those who moved outside the region (Kagera). For those who moved within the region, they dropped by 12 percentage points and by only 4 percentage points for those who stayed behind. Our simple cross-tabulations seem to confirm those results.

Beyond looking at just consumption, we also look at socio-economic mobility, which reveals some interesting patterns. Table 6 shows the real total consumption for those who did not migrate and those who did in Indonesia and Mexico. While on average non-migrant household had an increase in real consumption of around 27 percent between 1993 and 2000, the average migrant household's real consumption increased by 84 percent during the same period.[9] For Mexico, we observe a decline in consumption for households that did not have a migrant of around 10 percent between 2002 and 2005 and the corresponding figure for households with a migrant is an increase of nearly 30 percent, all leading to a decline of 5.8 percent for the entire sample.

Table 6 (in annex)

An examination of socio-economic mobility confirms these observations and uncovers some valuable insights about the role of migration as a livelihood strategy. Figures 2.1 and 2.2 show the transition probabilities of migrant and non-migrant households in terms of quintiles of consumption for Indonesia and Mexico respectively. For migration to have clear distributional impacts in terms of consumption, one should expect migrants to move into higher quintiles of

[9] As mentioned above, the two surveys in Indonesia did not collect consumption in the same way and so these are not true growth rates. However, is these values are used in a difference in difference context as we do in this paper we would have a classical measurement error meaning that our conclusions would still stand.

consumption both in absolute and in relative terms when compared to non-migrants. This is exactly what the graphs show. For Mexico, while the percentage of non-migrant households in the poorest quintile of consumption changed by a mere 1 percentage point between 2002 and 2005, the corresponding change for migrant households during the same period is almost 5 percentage points. The same pattern is observed for the second and third quintiles. Looking at quintiles 4 through 5, the picture is reversed with migrant households enjoying significantly higher levels of upward mobility—to the order of 15 percentage points for the richest quintile. Similar patterns are also observed in Indonesia. In both cases, while migrant households made up less than half of all households in the richest 40 percent at baseline, following the migration of at least one household member, that proportion increased to nearly two-thirds.

Figures 2.1 and 2.2 (in annex)

Further disaggregating these changes reveals some interesting results. Figures 3.1 and 3.2 look at the percentage of all households moving between quintiles of consumption in Indonesia and Mexico respectively. Panels A and B show migrant and non-migrant households that have moved up the consumption ladder and those who have moved down during the same period. The arrows denote moving from quintile to quintile between the baseline and the follow-up surveys with longer arrows simply denoting a higher percentage. For example, figure 3.1 panel A shows that, of those who were in the poorest quintile in 1993 in Indonesia, 5.7 percent of non-migrants and 3.6 percent of migrants moved into the second quintile, 2.7 percent and 2.6 percent moved into the third quintile, 0.9 percent and 2.4 percent moved into the fourth quintile and 0.3 percent and 1.2 percent moved into the richest quintile. A careful look at panel A in figures 3.1 and 3.2 reveals the same pattern of results: while non-migrant households are more likely to be mobile in the poorest quintiles of consumption, higher upward mobility into the fourth and richest quintiles is strongly associated with migration. Turning to panel B, the same consistent pattern is observed: in all but one case in each country, do migrants have a higher probability than non-migrants of falling into a lower consumption quintile. In each case, migrant households overwhelmingly have a lower propensity of moving downward. The last category that is not shown graphically is composed of households whose quintile of consumption did not change

during this period. Consistent with the findings above, they also show that there are more non-migrant households at the bottom of the consumption ladder and that migrant households that did not change quintiles are more likely to be found in quintiles 4 and 5.

Figures 3.1 and 3.2 (in annex)

Table 7 summarizes the changes described above. While the percentage of households that did not change quintile roughly stayed the same for both groups, migrant households are about 15 percentage points more likely to move into a higher quintile of consumption and equally unlikely to move into a lower quintile. In fact, it can be seen that in both countries a majority of migrant households moved into a higher quintile between the two surveys while for non-migrant households, the majority either moved downward (Indonesia) or did not experience a change (Mexico).

Table 7 (in annex)

Taken together and given that the survey period in Indonesia saddles the devastating financial crisis of 1997, these results may be indicative of the fact that not only does migration contribute greatly to upward socio-economic mobility, it can also serve as a risk diversification strategy as it provides a strong buffer against downward mobility. Therefore, in contrast to some livelihood strategies that have a high potential payoff but can also greatly increase the risk of loss, migration as evidenced above can serve the twin goals of greatly aiding upward mobility while also preventing a worsening of the household's socio-economic conditions during times of stress.

The findings described above looked at simple cross-tabulations and therefore did not account for selection. More rigorous estimation methods accounting for migration selection confirm these results.

An examination of consumption (food, durable and non-durables), indicates that there is a substantial causal impact of migration: overall the consumption gains from migration are estimated at 25 percent in Indonesia and at 67 percent in Mexico, in the process confirming the existence of positive selection in Indonesia—estimates are lower than unconditional means—and

negative selection in Mexico—estimates are higher than the unconditional means. This translates into a reduction in poverty of nearly 90 percent in Mexico and 23 percent in Indonesia.[10]

These figures translate to approximate annualized increases of 4 percent in Indonesia and 17 percent in Mexico. In the case of Indonesia, we speculate that part of the relative small annual gains might be due to the 1997 financial crisis which lies between our baseline and followup surveys. Furthermore, it is also possible that over time, there is a regression to the mean as non-migrant households "catch-up" to migrant households. This can be the case if migrants are negatively selected, meaning that income/consumption growth can stay flat beyond the initial jump following migration. However, testing this hypothesis would require a much longer panel dataset with multiple time points. This will become possible as subsequent waves of MxFLS are fielded and become available.

An examination of migrant status by duration (return or current migrant) shows that the gains are substantial for both return and current migrants but are higher for households with a current migrant in Mexico and those with a return migrant in Indonesia. The point estimates are 29 percent for households with a return migrant and 62 percent for households with a current migrant in Mexico, versus 68 percent and 42 percent in Indonesia.

We find some unexpected results for migrant status by location: while migrating to a city has a large but statistically insignificant impact on household consumption, migrating to a non-city location increases consumption by about 50 percent in Mexico and 40 percent in Indonesia (Figures 4.1 and 4.2). Nevertheless, these results are in line with those found by Beegle et al. (2008).

Figures 4.1 and 4.2 (in annex)

[10] Poverty estimates are based on the official poverty line and were calculated as the average treatment effect for the entire sample of migrant and non-migrant households, calculated as ATE = Treat (Pr| T=1) – Treat (Pr| T=0), or the average treatment effect (poverty estimates) on the treated (migrant households) minus the average treatment effect on the un-treated.

5.2. Nutrition and Health

Health selectivity has received a great deal of attention with respect to migration, both internal and international. Halliday and Kimmitt (2008) in the case of the United States, Lu (2008) for Indonesia using the IFLS, Arenas (2008) for Mexico are all examples of studies looking at internal migration and health selection. Quite consistently, these studies have found that there is a great deal of polarized selectivity in terms of migration depending critically on the particular age group, with younger cohorts more likely to be favourably selected and older ones more likely to move as a results of health challenges. Although this focus on health selection is important in its own right, these results say nothing about the impact of migration on health.

Surprisingly, the literature on internal migration has been silent on this topic even though many studies of international migration have documented what is often referred to as the "Healthy Migrant Paradox" where new international migrants are generally observed to be healthier than the population at destination but eventually their health deteriorates to levels observed in the general population (Fennelly 2005; Antecol and Bedard 2005). However, to our knowledge, these observations have only been made in the context of international migration. Most of the literature on internal migration has focused on the receipt of remittances and their impact on health or migration and the spread of diseases such as HIV/AIDS (some of these are reviewed in greater detail in Azcona and Ha (2009)).

An advantage of the IFLS and MxFLS is that anthropometric measures and self-reported illnesses questions and questions regarding emotional well-being are similar to the two surveys and enable a straightforward reporting of the results. Regarding the methodology, the issue of migration externalities and who should be the appropriate treatment unit becomes even more salient, particularly when one is looking at emotional well-being. Individual migrant often leave behind household members such as their parents, spouses and children. In such instance, it is reasonable to assume that both migrants and those family members would be emotionally affected. As a result, ignoring these externalities and treating household members as a control group for migrants would miss the true impact. To circumvent this problem, some studies only look at the family left behind—which is fine but essentially takes the migrant out of the equation.

Looking at changes in body mass index, the results of the analysis are at first counterintuitive. While the results for Mexico point to increases in average BMI for households with a migrant, those for Indonesia paint a different picture (Figures 5.1 and 5.2). However, looking at the unconditional means in Tables 8.1 and 8.2, we can see that these results are mainly driven by convergence between migrants and non-migrants in both countries: While at baseline, migrant families had on average a lower body mass index than non-migrant households, in the follow-up surveys, they "catch-up" to non-migrant households.

Figures 5.1 and 5.2 (in annex)

Looking at health status, the picture is slightly worse for migrant households at baseline and we observe a further deterioration in the follow up survey. These simple observations are further substantiated when we control for household characteristics such as household size, other socio-economic variables and more importantly selection bias. The results are presented in Figures 6.1 and 6.2. In both Indonesia and Mexico, migrant households are much more likely to report a higher prevalence of morbidity. This is unlikely to be the result of reporting errors as this specification controls for baseline socio-economic status as well as a similar measure of health status reported in the previous survey. These results may be due to the fact that migrants need to acclimate to the place of destination and therefore would be prone to some illnesses. Stress could also be a factor for all household members as the results for emotional well-being reported below will indicate. The point estimates for Mexico are about "1.7 extra illnesses" for migrant households, are much higher for households with a return or current migrant (2.8 and 1.5 respectively) and also somewhat higher for households whose members migrated to a city or a non-city location. The results for Indonesia point in a similar direction but are a bit higher in magnitude for Mexico due to a larger number of illness categories in that survey.

Figures 6.1 and 6.1 (in annex)

As mentioned above, emotional wellbeing is a real challenge for migrants and their extended family members. Emotional wellbeing is defined as having "felt sad or depressed", "felt like crying", "hard time sleeping", "waking up tired and lacking energy", "problems focusing on

daily activities" etc… Again, figure 7.1 and 7.2 show the point estimates from treatment effect regressions controlling for selection. The results indicate that migrant households at the margin report about 2 more emotional conditions than non-migrant households. Looking at return versus current migrant status, the picture is somewhat clearer as households with a return migrant report a lower prevalence of these conditions than those with a current migrant. Similarly, migrating to a city carries with it a higher emotional toll. The results for Indonesia are similar but point estimates are not comparable with Mexico due to the fact that there was a much lower number of "emotional categories" in Indonesia.

Figures 7.1 and 7.2 (in annex)

Together, these findings lend credence to the fact that migration may actually worsen health status for those who migrate and/or their family members. The reasons for this may vary as mentioned above, but a step towards better understanding the aforementioned challenge should perhaps involve looking particularly at migrants and their extended families' mental health. As we found here, emotional well-being deteriorates significantly for migrants and their families—understandably due to separation—and to the extent that mental health and physical health are correlated, one would also expect the physical health of migrants and their families to deteriorate as the duration of stay in the host area lengthens.

5.3. Children's Outcomes

For children's outcomes, we look at the number of reported illnesses for both countries and grade for age and time spent doing household related chores for Mexico.[11]

Looking at children's reported illnesses, the results mirror those of adults for both Indonesia and Mexico: children in migrant households on average report .5 to 1 more episode than those in non-migrant households, with households with return migrants accounting higher point estimates (figures 8.1 and 8.2).

[11] The latter was not available in the Indonesian survey while the time span (1993-2000) was too long to capture the same cohort of children in Indonesia.

Figures 8.1 and 8.2 (in annex)

For household related chores (figure 9), the results indicate that children in migrant households spend on average more than 6 hours doing household related work. Once migrant status is disaggregated, we can see that households with a current migrant and those with a migrant in a distant location almost exclusively account for the point estimates.

Figure 9 (in annex)

Looking at education, assuming that school starts at age 7, we define grade-for-age as Age – Grade – 7 and positive values are taken to mean that the children is one grade or more behind. The dependent variable is constructed as a dummy taking the value of 1 if the child is in a proper grade for her age and 0 otherwise. The results are presented in figure 10. They indicate that children in migrant households are less-likely to be held back in school, or in other words, they have a higher probability of being in an appropriate grade for their age, with the marginal effect between 7 and 5 percentage points for the different groups (figure 10). This translates into a percentage increase of about 30-45 percent compared to children in non-migrant households.

6. Conclusion

Despite much theorizing and decades of research into the topic, the reasons why some individuals and households migrate while others don't continue to be a research puzzle. Furthermore, although there is a large literature on the association between migration and outcomes, primarily consumption and remittances, only a small fraction of this literature attempts to ascertain the causal impacts of migration. Thus, there appears to be no consensus on the returns to migration, especially those associated with measures of human development other than consumption and income. In this research agenda, we sought to fill some of these gaps. The consistency of our results for the two countries we analyse, Mexico and Indonesia, is remarkable and point to significant trade-offs related to migration. On the one hand, we found that migration can greatly improve socio-economic status through increases in income or consumption. However, this is just one side of the story since we also found that migration can also be

detrimental to the health status and emotional well-being of migrants and/or their extended families. These results are not entirely new and have been recognized in the literature, albeit in piecemeal fashion. However, to our knowledge, this is the first research of its kind that measures an extensive array of outcomes, using the same consistent data and methodological framework for two countries.

These results have an immediate bearing on theories of migration as most of them, to date, only consider economic motivations (e.g. wage and income gains) as the only motivation to enter explicitly into the optimisation decision. This exception or omission is not adequate on at least two levels. First, worsening health status clearly entails a cost as people have to seek medical care. This is an explicit cost of the migration decision that needs to be factored in. Second, as the results on emotional well-being also show, the emotional tool of migration is substantial, which can turn out to be one of the deciding factors of whether one migrates or not.

Examination of outcomes other than income and consumption can perhaps go a long way in shedding light on who migrates and why; and more importantly on why some people would simply eschew potentially large financial returns to migration, by either deciding not to migrate or by deciding to return following important upfront investments.

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Annexes

Table 1: Internal migration in Indonesia and Mexico

Household	Indonesia (1994-2000)		Mexico (2003-2005)	
Migrant Status	Freq.	Percent[@]	Freq.	Percent[@]
Non-migrant	3,503	52.7	5,130	90.7
Migrant	3,141	47.3	529	9.4
Returned	1,177	37.5	189	35.7
Current	1,964	62.5	340	64.2
To City	2,161	68.7	330	62.4
To Non-city	980	31.2	199	37.6

[@]The percentage of returned, current, city and non-city migrants refer to the share with respect to the total number of migrant households. For instance, from the third row, column 3, one should read that out of the number of migrant households in Indonesia, 37.5 percent have had a return migrant between the two surveys.

Table 2: Interprovincial moves in Indonesia

ORIGIN \ DESTINATION	DISTA ACEH	NORTH SUMATERA	WEST SUMATERA	RIAU	SOUTH SUMATERA	BENGKULU	LAMPUNG	DKI JAKARTA	WEST JAVA	CENTRAL JAVA
NORTH SUMATERA	1	186	2	18	1	0	0	3	9	3
WEST SUMATERA	0	1	135	18	0	0	2	6	2	2
SOUTH SUMATERA	0	0	0	2	142	1	3	7	12	1
LAMPUNG	0	0	0	1	3	0	93	6	12	1
DKI JAKARTA	0	2	0	0	1	0	3	185	120	25
WEST JAVA	0	0	0	0	0	0	0	21	440	8
CENTRAL JAVA	0	2	0	3	1	0	2	15	18	336
DI YOGYAKARTA	0	0	0	0	1	0	1	2	12	9
EAST JAVA	0	0	0	1	0	0	0	2	6	0
BALI	0	0	0	0	0	0	0	0	1	0
WEST NUSA TENGGARA	0	0	0	0	0	0	0	1	1	0
SOUTH KALIMANTAN	0	0	0	0	0	0	0	1	2	4
SOUTH SULAWESI	0	0	0	0	0	0	0	1	0	0
Total	1 (0.0%)	191 (6.0%)	137 (4.3%)	43 (1.4%)	149 (4.7%)	1 (0.0%)	104 (3.3%)	250 (7.9%)	635 (20.0%)	389 (12.2%)

ORIGIN \ DESTINATION	YOG YAKARTA	EAST JAVA	BALI	WEST NUSA TENG.	CENTRAL KALI.	SOUTH KALI.	EAST KALI.	SOUTH SULAWESI	SULAWESI TENG.	Total
NORTH SUMATERA	3	0	0	0	0	0	1	0	0	227 (7.1%)
WEST SUMATERA	0	2	0	0	0	0	0	0	0	168 (5.3%)
SOUTH SUMATERA	4	8	1	0	0	0	0	0	0	181 (5.7%)
LAMPUNG	2	5	2	0	0	0	0	0	0	125 (3.9%)
DKI JAKARTA	2	5	4	0	0	0	0	1	0	348 (10.9%)
WEST JAVA	2	7	0	0	0	1	0	0	0	479 (15.1%)
CENTRAL JAVA	11	13	1	0	0	0	0	0	0	402 (12.6%)
DI YOGYAKARTA	142	3	3	0	0	0	0	1	0	174 (5.5%)
EAST JAVA	1	392	6	0	0	0	1	0	0	409 (12.9%)
BALI	0	1	129	3	0	0	0	1	0	135 (4.2%)
WEST NUSA TENGGARA	0	2	0	175	0	0	0	1	0	180 (5.7%)
SOUTH KALIMANTAN	0	0	0	1	4	173	3	0	0	188 (5.9%)
SOUTH SULAWESI	0	0	0	0	0	0	0	161	1	163 (5.1%)
Total	167 (5.3%)	438 (13.8%)	146 (4.6%)	179 (5.6%)	4 (0.1%)	174 (5.5%)	5 (0.2%)	165 (5.2%)	1 (0.0%)	3,179

Table 3.1: Indonesia Summary Statistics

Variable	Obs	Mean	Std. Dev.
Variables of interest			
Household has Migrant	6644	0.47	0.50
Total Household consumption 1993	6644	280.3	469.7
Total Household consumption 2000	6644	452.6	658.9
Average adults BMI 1993	6568	23.8	100.90
Average adults BMI 2000	6621	21.9	3.93
Number of Reported illnesses 1993	6629	2.82	2.43
Number of reported illnesses 2000	6644	6.19	5.27
Adults: Number of reported emotional conditions 1993	6547	2.01	2.31
Adults: Number of reported emotional conditions 2000	6644	6.90	6.13
Children: Number of reported emotional conditions 1993	4529	2.00	2.14
Children: Number of reported emotional conditions 2000	5064	5.96	5.85
Household Characteristics			
Age of Head	6644	45.7	14.1
% hh. members male 1993	6644	0.46	0.20
Number of Adult members	6644	3.04	1.51
Number of Children	6644	1.63	1.42
Head Male	6644	0.85	0.36
Muslim	6644	0.89	0.32
Head's Education: Primary	6644	0.51	0.50
Head's Education: Secondary+	6644	0.30	0.46
Dwelling Owned	6644	0.80	0.40
Subjective Health Measure	6644	0.12	0.32
Community Characteristics			
Rural	6644	0.54	0.50
Farming Community	6644	0.84	0.37
Industrial community	6644	0.45	0.50

Table 3.2: Mexico Summary Statistics

Variable	Obs	Mean	Std. Dev.
Variables of interest			
Household with migrant 2003-05	5659	0.09	0.29
Total Household consumption 2002	5659	60.5	202.6
Total Household consumption 2005	5659	57	234.7
Adults: Number of reported illnesses 2002	5659	5.9	5.46
Adults: Number of reported illnesses 2005	5659	5	5.76
Adults: Average Body mass index 2002	5266	27.7	4.28
Adults: Average Body mass index 2005	5199	27.6	4.21
Adults: Number of reported emotional conditions 2002	5659	15	12.21
Adults: Number of reported emotional conditions 2005	5659	14.1	14.18
Children: weekly average hours chores 2002	3001	11.9	17.15
Children: weekly average hours chores 2005	5659	5	12.2
Children: Number of reported illnesses 2002	3594	4.4	5.08
Children: Number of reported illnesses 2005	5659	1.6	3.44
Household Characteristics			
Head's Education: Primary	5659	0.4	0.49
Head's Education: Secondary or higher	5659	0.3	0.46
Spouse's Education: Primary	5659	0.4	0.48
Spouse's Education: Secondary	5659	0.3	0.44
Number of Adults household members	5659	2.3	0.99
Number of children 0-14	5659	1.4	1.43
Head's age	5659	4.8	1.58
Number of household members in agriculture	5659	0.3	0.6
Number of household members in manufacturing	5659	0.2	0.49
Own dwelling family lives in	5659	0.8	0.4
Family own other dwelling	5659	0.2	0.43
Community Characteristics			
Agricultural community	5659	0.7	0.45
Manufacturing community	5659	0.3	0.47

Table 4.1: Some Descriptive Statistics by internal migrant status in Indonesia

Variable at baseline (1993)	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in means (t-stat)[a]
Outcomes at baseline	Non-Migrants		Migrants		
Total consumption	219,903	319,610	347,594	586,698	-11.60
Average body mass Index (Adults)	24.1	114.6	23.6	82.8	0.19
Reported number of illnesses	2.77	2.43	2.88	2.44	-1.71
Reported number of emotional problems	1.94	2.25	2.09	2.37	-2.70
Children's reported illnesses	2.07	2.16	1.93	2.11	2.18
Household characteristics					
Age of Head	45.2	14.9	46.4	13.2	-3.60
Share of members male	0.45	0.19	0.47	0.20	-3.77
Number of Adult members	2.67	1.22	1.49	1.35	-22.03
Number of Children	3.46	1.69	1.79	1.48	-8.83
Head's Education: Primary	0.52	0.50	0.50	0.50	1.94
Head's Education: Secondary or more	0.25	0.43	0.35	0.48	-8.91
Dwelling owned	0.82	0.39	0.77	0.42	4.30
Head male	0.85	0.36	0.85	0.36	0.03
Muslim	0.88	0.32	0.89	0.31	-0.93
Health status: Acute conditions (bad health=1)	0.11	0.31	0.13	0.34	-2.51
Community characteristics					
Rural	0.59	0.49	0.48	0.50	9.17
Farming community	0.87	0.33	0.80	0.40	8.43
Industrial community	0.44	0.50	0.46	0.50	1.50

[a] An absolute value of 1.96 or above signifies a confidence level of 95% confidence level or more.

Table 4.2: Some Descriptive Statistics by internal migrant status in Mexico

Variables at baseline (2002)	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in means (t-stat)[a]
Outcomes at baseline	Non-Migrants		Migrants		
Total consumption	60,516	211,088	60,315	844,795	0.02
Average body mass Index (Adults)	27.75	4.29	27.53	4.16	1.08
Reported number of illnesses	5.86	5.43	6.70	5.72	-3.36
Reported number of emotional problems	14.78	12.08	17.37	13.17	-4.65
Children's reported illnesses	4.34	5.01	4.58	5.63	-0.09
Hours doing house chores	11.68	16.82	13.76	19.75	-2.00
Household characteristics					
Head's age	47.9	16.0	45.5	14.3	3.26
Number of Adults household members	2.27	0.97	2.53	1.14	-5.70
Number of children 0-14	1.39	1.42	1.61	1.50	-3.28
Head's Education: Primary	0.43	0.50	0.40	0.49	1.28
Head's Education: Secondary or higher	0.32	0.47	0.30	0.46	0.79
Spouse's Education: Primary	0.37	0.48	0.36	0.48	0.31
Spouse's Education: Secondary	0.26	0.44	0.27	0.45	-0.74
Own dwelling family lives in	0.80	0.40	0.73	0.45	4.14
Family owns other dwelling	0.24	0.43	0.25	0.43	-0.41
Number of household members in agriculture	0.28	0.59	0.31	0.70	-0.88
Number of household members in manufacturing	0.20	0.48	0.27	0.59	-3.14
Self-assessed health status (scale of 1-5)	2.52	0.53	2.49	0.49	1.09
Community characteristics					
Agricultural community	0.72	0.45	0.69	0.46	1.66
Manufacturing community	0.33	0.47	0.44	0.50	-5.26

[a] An absolute value of 1.96 or above signifies a confidence level of 95% confidence level or more.

Table 5.1: Determinants of migration in Indonesia (1993-2000)

VARIABLES	(1) HH with Migrant	(2) HH with returnee	(3) HH with current	(4) HH with city Migrant	(5) HH with non-city migrant
Log Num. Adults	0.388***	0.115***	0.274***	0.240***	0.139***
	(0.023)	(0.016)	(0.019)	(0.021)	(0.012)
Log Num. Children	0.100***	0.013	0.089***	0.048***	0.052***
	(0.013)	(0.010)	(0.012)	(0.012)	(0.008)
% Male	0.099**	0.032	0.069*	0.103***	0.002
	(0.039)	(0.027)	(0.035)	(0.036)	(0.024)
Age of Head	0.136***	0.100***	0.036	0.113***	0.020
	(0.032)	(0.027)	(0.028)	(0.031)	(0.020)
Age of Head Squared	-0.011***	-0.009***	-0.003	-0.010***	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Head Male	-0.166***	-0.056***	-0.110***	-0.084***	-0.081***
	(0.021)	(0.017)	(0.021)	(0.021)	(0.017)
Muslim	0.026	0.003	0.023	0.052***	-0.024*
	(0.021)	(0.016)	(0.018)	(0.019)	(0.014)
Education of Head: Primary	0.090***	0.019	0.075***	0.055***	0.036***
	(0.019)	(0.014)	(0.018)	(0.018)	(0.013)
Educ. of Head: Secondary+	0.178***	0.023	0.160***	0.076***	0.099***
	(0.022)	(0.017)	(0.022)	(0.022)	(0.019)
Own Dwelling	-0.094***	0.017	-0.107***	-0.074***	-0.022**
	(0.018)	(0.014)	(0.017)	(0.018)	(0.011)
Rural	-0.017	-0.004	-0.014	0.030**	-0.057***
	(0.016)	(0.012)	(0.014)	(0.015)	(0.010)
Subjective Health measure	-0.001	-0.020	0.018	0.002	-0.003
	(0.020)	(0.014)	(0.018)	(0.019)	(0.011)
Agricultural community	-0.066***	0.035**	-0.097***	0.088***	-0.113***
	(0.022)	(0.015)	(0.020)	(0.020)	(0.016)
Manufacturing community	-0.002	0.004	-0.006	-0.005	0.001
	(0.007)	(0.005)	(0.006)	(0.006)	(0.004)
Log Dist. Jakarta	0.012**	-0.004	0.014***	0.040***	-0.015***
	(0.006)	(0.004)	(0.005)	(0.006)	(0.003)
Log Dist. Surabaya	0.023***	0.006	0.017**	0.018**	0.003
	(0.008)	(0.006)	(0.008)	(0.008)	(0.006)
Log Dist. Medan	0.030***	0.010	0.020***	0.029***	0.002
	(0.008)	(0.007)	(0.008)	(0.008)	(0.006)
Log Dist. Palemban	-0.023*	0.010	-0.029***	-0.029**	-0.003
	(0.013)	(0.010)	(0.011)	(0.011)	(0.007)
Observations	6649	6649	6649	6649	6649

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.2: Determinants of migration in Mexico (2002-05); all controls are baseline characteristics

VARIABLES	(1) HH with Migrant	(2) HH with returnee	(3) HH with current	(4) HH with city Migrant	(5) HH with non-city migrant
Log number adults	0.075***	0.012	0.061***	0.043***	0.026***
	(0.014)	(0.008)	(0.011)	(0.009)	(0.008)
Log number children	0.008	0.001	0.007	0.002	0.004
	(0.007)	(0.004)	(0.005)	(0.005)	(0.004)
Education of Head: Primary	-0.020**	-0.014***	-0.004	-0.008	-0.010**
	(0.008)	(0.004)	(0.007)	(0.006)	(0.004)
Educ. of Head: Secondary	-0.030***	-0.019***	-0.008	-0.007	-0.021***
	(0.009)	(0.005)	(0.007)	(0.006)	(0.005)
Educ. Spouse: Primary	-0.017**	-0.007	-0.010	-0.010*	-0.004
	(0.008)	(0.005)	(0.006)	(0.006)	(0.005)
Educ. Spouse: Secondary+	-0.013	-0.002	-0.010	-0.007	-0.004
	(0.010)	(0.006)	(0.007)	(0.006)	(0.006)
Age of Head	0.015	0.014	0.001	0.024*	-0.007
	(0.017)	(0.011)	(0.013)	(0.012)	(0.008)
Age of Head Squared	-0.003*	-0.002*	-0.001	-0.003**	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
N. hh. members in Agric.	0.005	0.004	0.001	-0.003	0.005*
	(0.006)	(0.003)	(0.005)	(0.004)	(0.003)
N. hh. members in Manuf.	0.013**	0.006	0.006	0.002	0.010***
	(0.006)	(0.003)	(0.005)	(0.004)	(0.004)
Own Dwelling	-0.043***	-0.003	-0.040***	-0.029***	-0.011*
	(0.011)	(0.006)	(0.009)	(0.008)	(0.006)
Own other property	0.009	0.003	0.005	0.009	-0.001
	(0.008)	(0.005)	(0.007)	(0.006)	(.)
Subjective Health measure	0.001	-0.001	0.002	-0.005	0.006
	(0.007)	(0.004)	(0.005)	(0.005)	(0.004)
Agricultural community	-0.037***	0.004	-0.039***	-0.039***	0.006
	(0.013)	(0.006)	(0.011)	(0.010)	(0.006)
Manufacturing community	0.033***	0.012**	0.021***	0.041***	-0.011**
	(0.009)	(0.005)	(0.007)	(0.007)	(0.005)
Log Dist. Guadalajara	0.055***	0.023***	0.029***	0.041***	0.012***
	(0.009)	(0.005)	(0.007)	(0.007)	(0.005)
Log Dist. Monterrey	-0.969***	-0.248**	-0.668***	-0.628***	-0.277***
	(0.153)	(0.105)	(0.111)	(0.108)	(0.093)
Log Dist. Cuidad Juarez	0.900***	0.233**	0.617***	0.577***	0.261***
	(0.140)	(0.096)	(0.101)	(0.098)	(0.085)
Log Dist. San Diego	0.067***	0.033***	0.029***	0.041***	0.022***
	(0.013)	(0.009)	(0.010)	(0.010)	(0.008)
Sd. Rain (2000)	-0.100***	-0.033***	-0.060***	-0.048***	-0.047***
	(0.017)	(0.011)	(0.013)	(0.011)	(0.011)
Sd. Rain squared (2000)	0.030***	0.019***	0.009	0.014**	0.014**
	(0.010)	(0.006)	(0.008)	(0.007)	(0.006)
Sd. Rain*Comm. Agric.	0.054***	0.007	0.042***	0.030***	0.022**
	(0.014)	(0.007)	(0.011)	(0.010)	(0.009)
Observations	6104	6104	6104	6104	6104

Table 6: Real household consumption before and after for migrants and non-migrants in Indonesia and Mexico

	Non-migrants		Migrants	
	Mean	Std. Dev	Mean	Std. Dev
Indonesia Total Consumption (2000)	280,158	378,277	641,217	827,044
Mexico Total Consumption (2005)	54,563	244,892	80,270	843,237

Table 7: Between Surveys changes in quintiles of consumption

	Mexico (2002-05)		Indonesia (1993-2000)	
percent of households	**Migrants**	**Non-migrants**	**Migrants**	**Non-migrants**
Did not change quintile	35.40%	36.10%	37.60%	38.10%
Moved into a higher quintile	46.50%	32.90%	38.10%	23.00%
Moved into a lower quintile	18.20%	31.00%	24.30%	38.90%

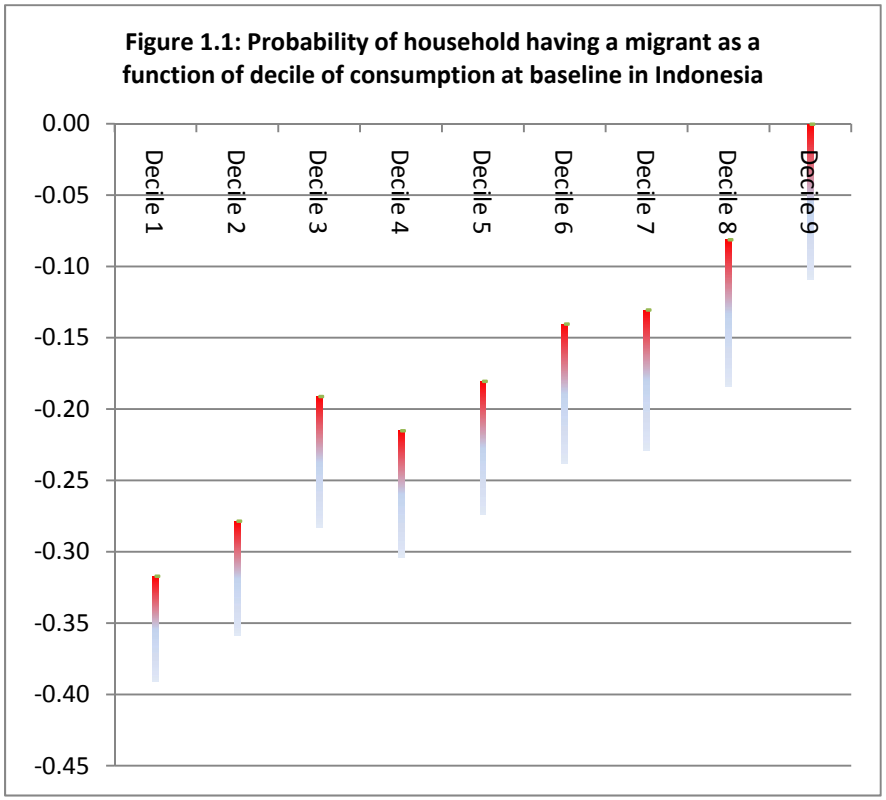
Table 8.1: Distribution of Nutrition and Health variables in 1993 and 2000 by migrant status in Indonesia

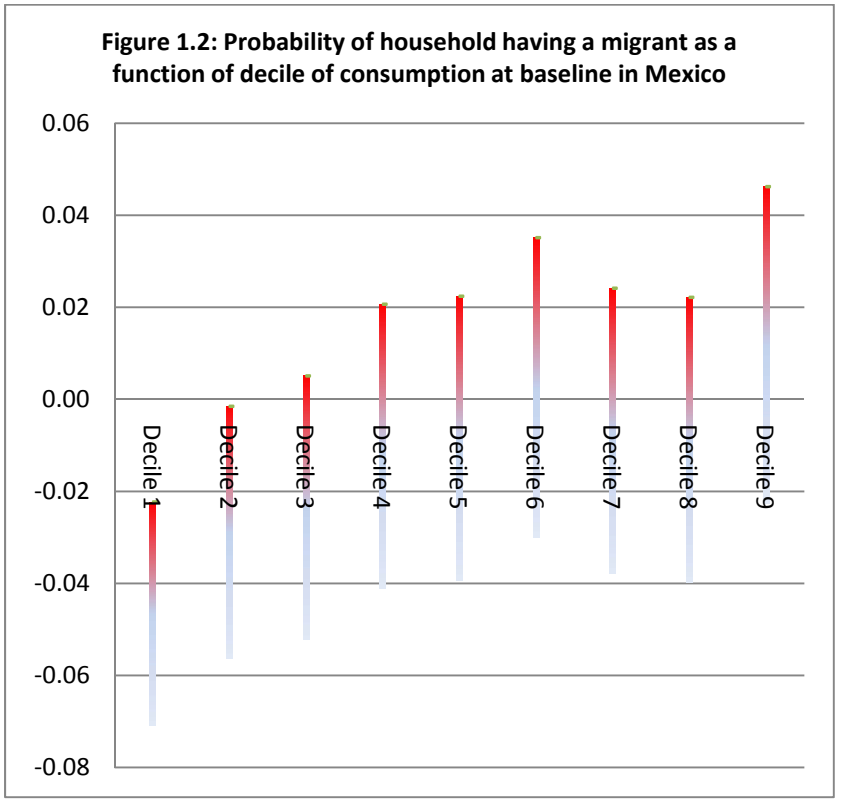
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Adult Health and nutrition	Non-Migrants		Migrants	
Average body mass Index 1993 (Adults)	24.1	114.6	23.6	82.8
Average body mass Index 2000 (Adults)	21.8	4.8	21.9	2.6
Reported number of illnesses 1993	2.77	2.43	2.88	2.44
Reported number of Illnesses 2000	4.9	4.4	7.62	5.77
Reported number of emotional problems 1993	1.94	2.25	2.09	2.37
Reported number of emotional problems 2000	5.33	4.96	8.66	6.8
Children's Health				
Children's reported illnesses 1993	2.07	2.16	1.93	2.11
Children's reported illnesses 2000	5.38	5.27	6.54	6.33

Table 8.2: Distribution of Nutrition and Health variables in 2002 and 2005 in Mexico

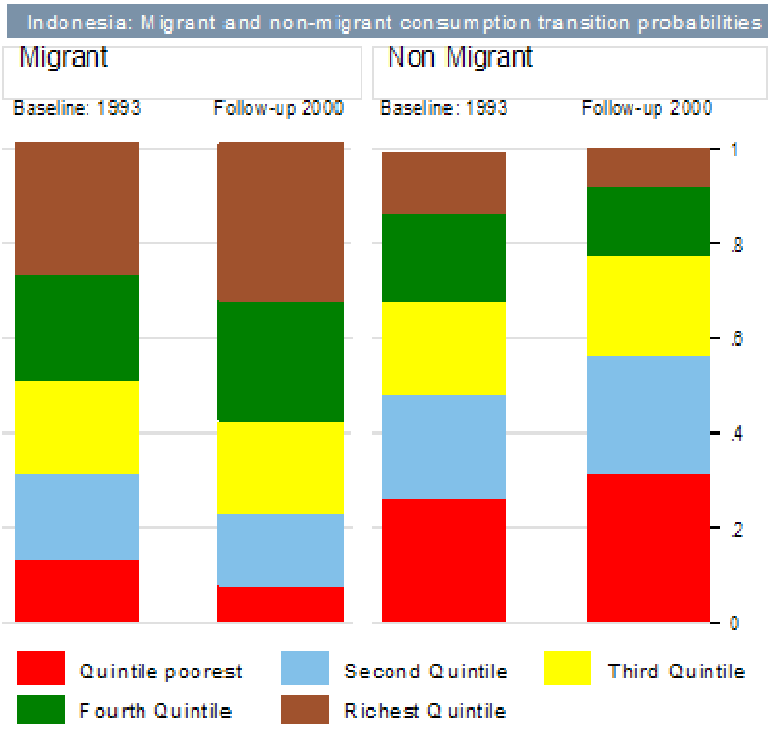
	Mean	Std. Dev	Mean	Std. Dev
	Non-migrants		Migrants	
Adult Health and nutrition				
Body mass index 2002	27.75	4.29	27.53	4.16
Body mass index 2005	27.61	4.23	27.67	4.02
Number of reported illnesses 2002	5.86	5.43	6.7	5.72
Number of reported illnesses 2005	4.75	5.48	7.62	7.47
Number of reported emotional problems (2002)	14.78	12.08	17.37	13.17
Number of reported emotional problems (2005)	13.52	13.7	20.01	17.16
Children's Outcomes				
Number of reported illnesses 2002 (children)	4.34	5.01	4.58	5.63
Number of reported illnesses 2005 (children)	1.55	3.3	2.56	4.46
Hours doing house chores 2002	11.68	16.82	13.76	19.75
Hours doing house chores 2005	4.92	12.04	5.87	13.64

Figures 1.1 and 1.2: Probability of households having a migrant as a function of decile of consumption at baseline in Indonesia and Mexico





Figures 2.1 and 2.2: Migrant and non-migrant quintiles of consumption transition matrices in Indonesia and Mexico



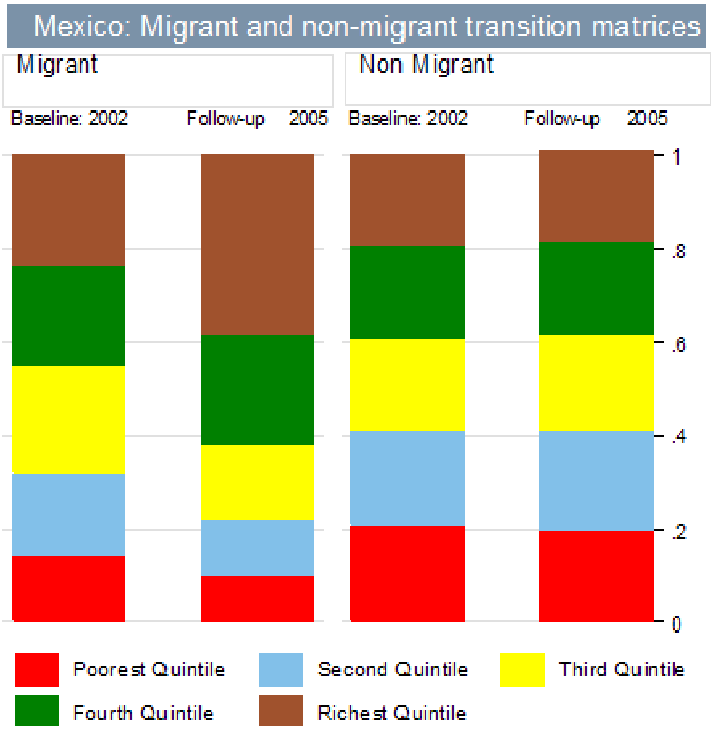


Figure 3.1: Migration and socio-economic mobility in Indonesia

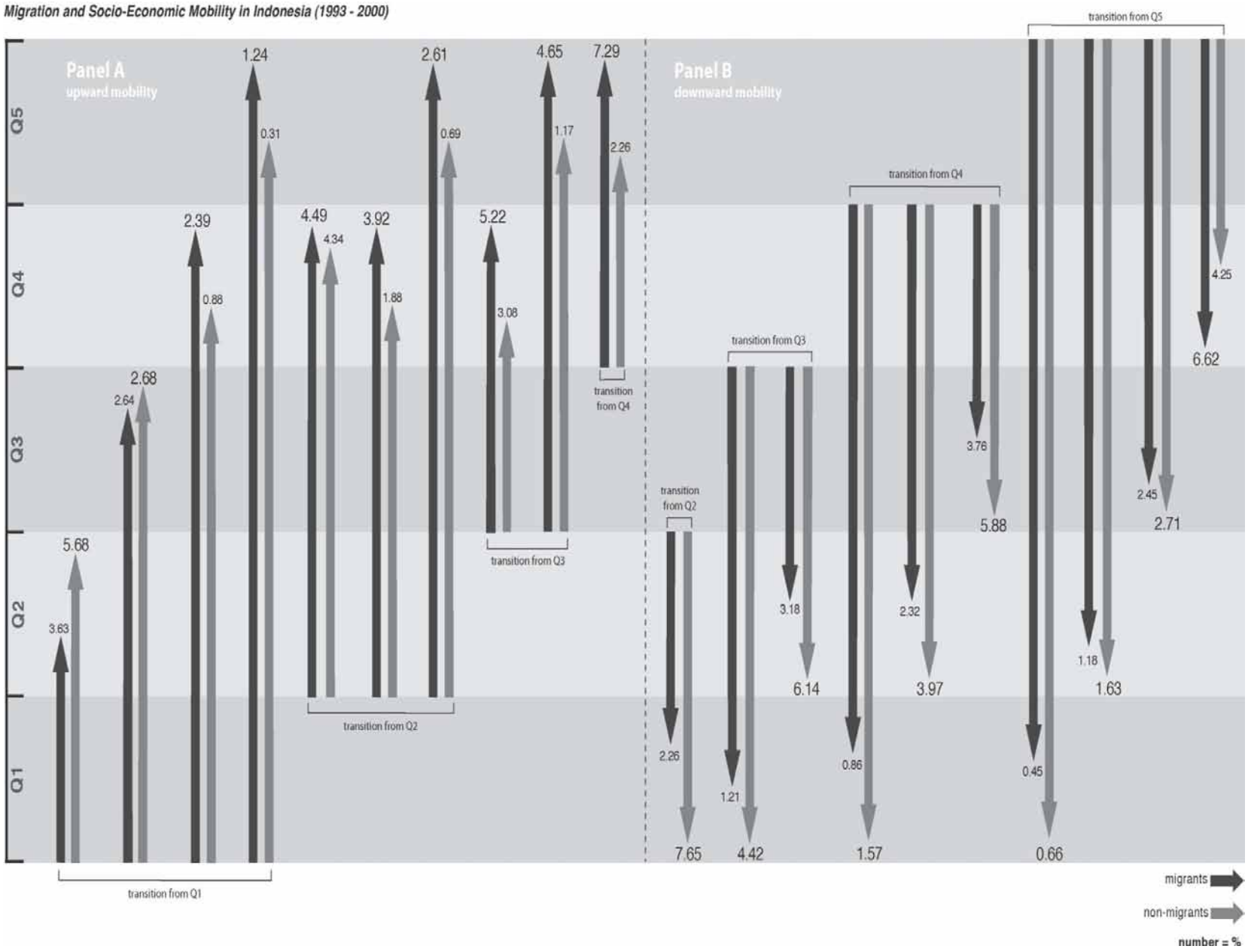
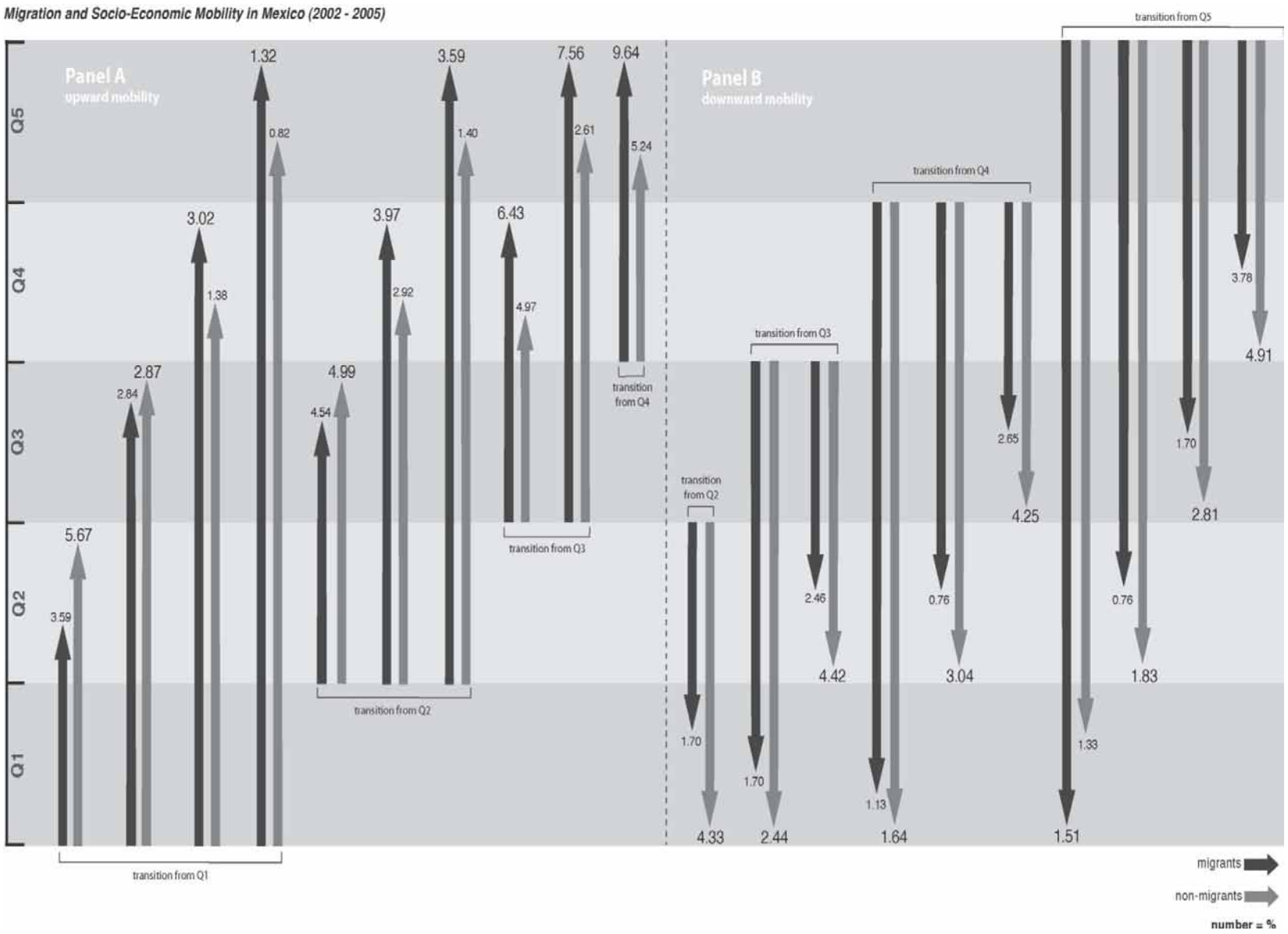
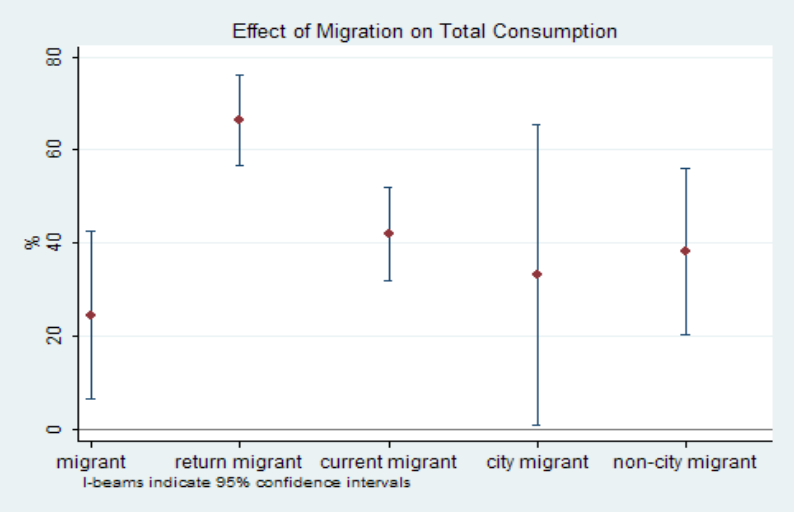
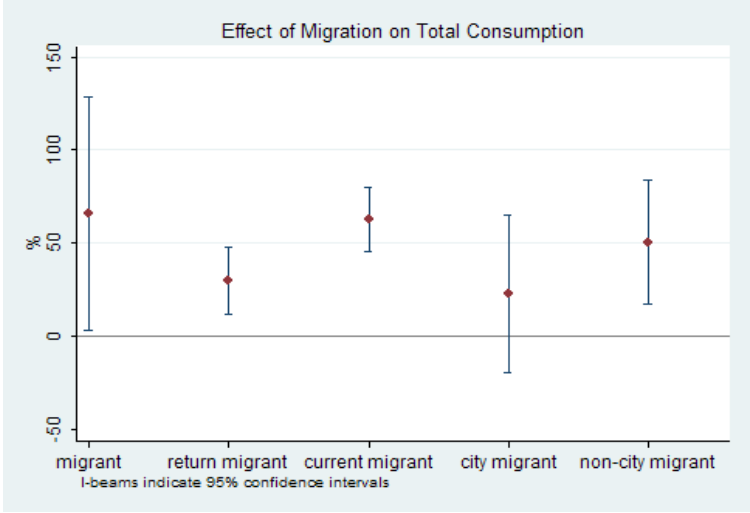


Figure 3.2: Migration and socio-economic mobility in Mexico

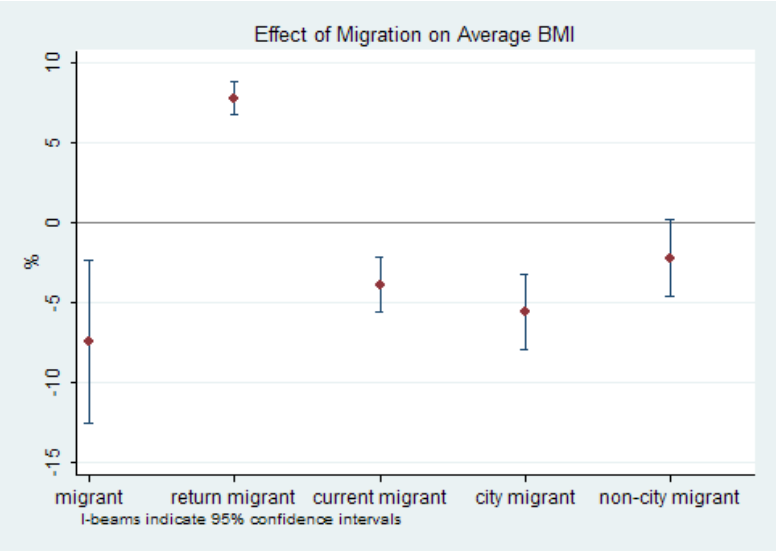


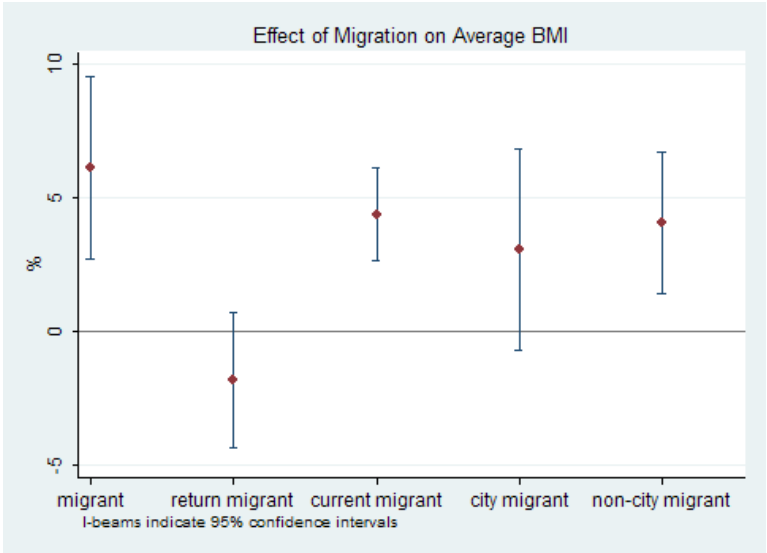
Figures 4.1and 4.2: Effect of Migration on Yearly Real household consumption in Indonesia and Mexico



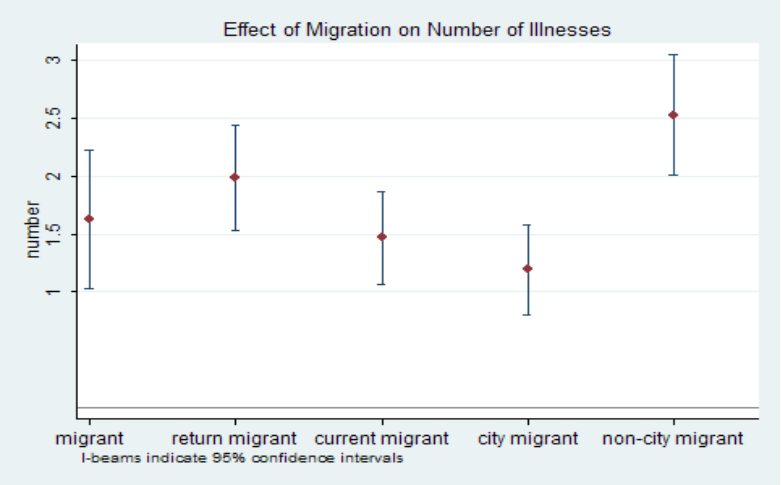


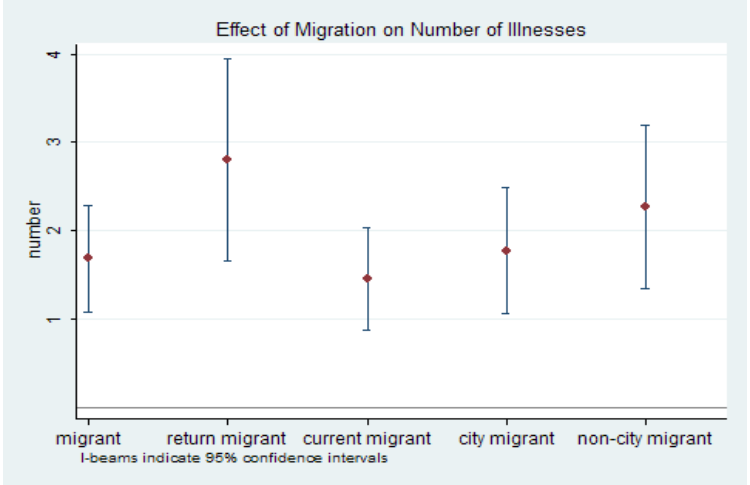
Figures 5.1and 5.2: Effect of Migration on Body Mass Index in Indonesia and Mexico



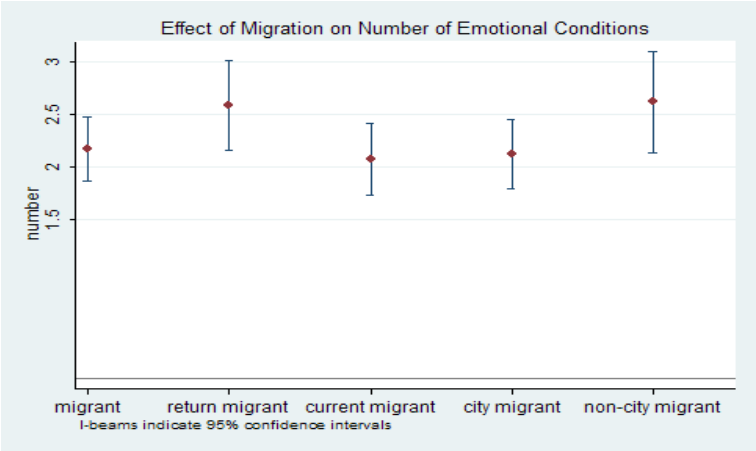


Figures 6.1and 6.2: Effect of Migration on number of reported illnesses in Indonesia and Mexico





Figures 7.1 and 7.2: Effect of Migration on number of reported emotional conditions in Indonesia and Mexico



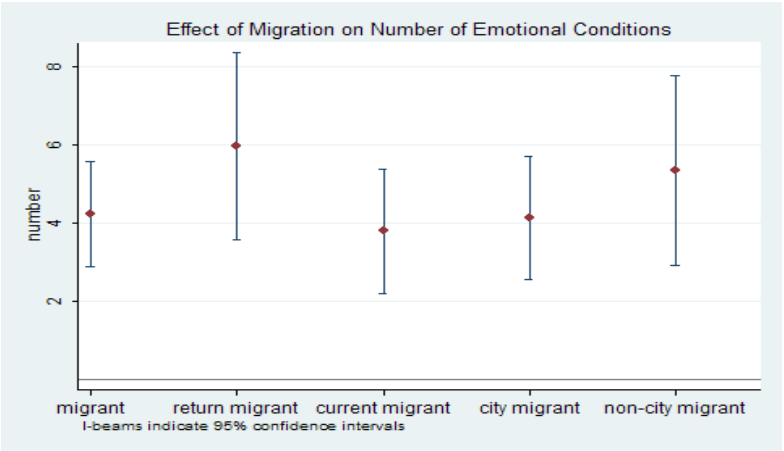


Figure 8.1: Effect of Migration on children's number of reported illnesses in Indonesia and Mexico

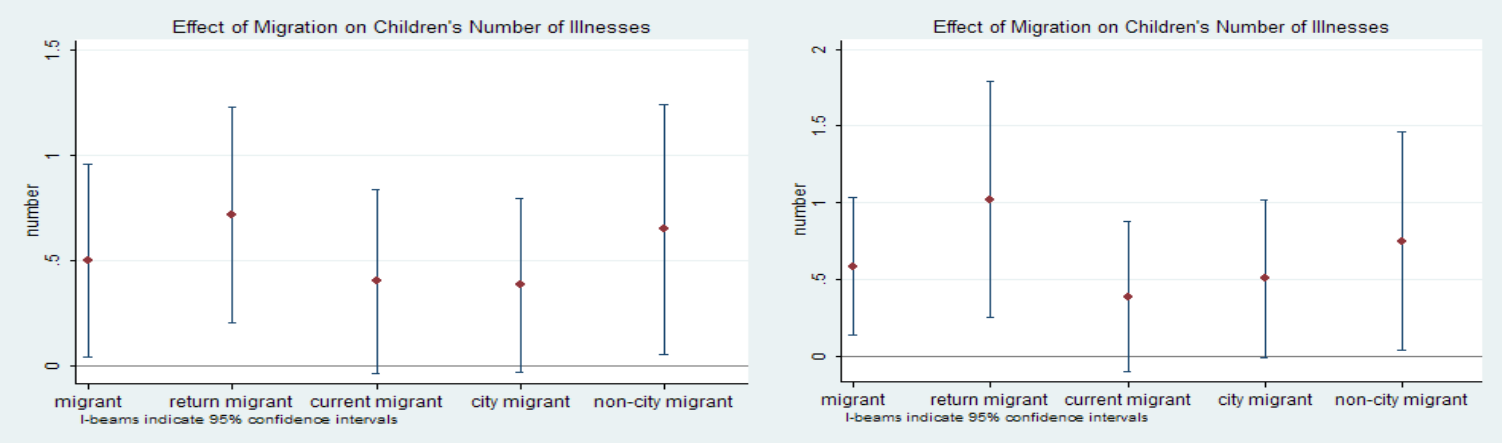


Figure 9: Effect of Migration on children's time use for Mexico

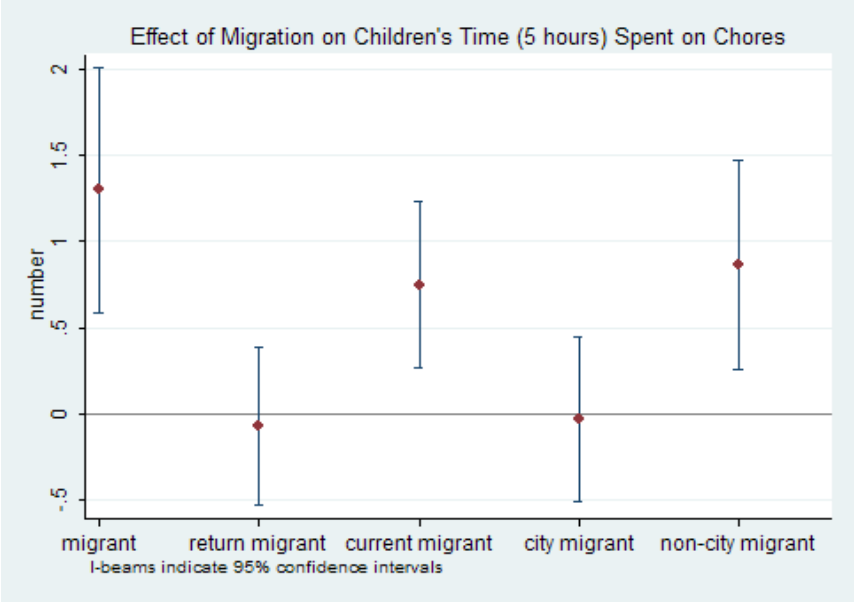


Figure 10: Effect of Migration on children's grade-for-age in Mexico