University of Pennsylvania
ScholarlyCommons

Gansu Survey of Children and Families Papers | Gansu Survey of Children and Families

11-1-2010

Parental Migration and Child Development in China

Leng Lee
University of Oxford

Albert Park
University of Oxford

Suggested Citation:

Leng, L. and Park, A. (2010). *Parental Migration and Child Development in China* (Working Paper). Gansu Survey of Children and Families.

This paper is posted at ScholarlyCommons. http://repository.upenn.edu/gansu_papers/24
For more information, please contact repository@pobox.upenn.edu.

Parental Migration and Child Development in China

Abstract
In recent years, China has witnessed a massive wave of rural-to-urban migration, which frequently results in family separations. This study uses panel data from a longitudinal study of rural children inwestern China to analyze the impact of migration by fathers on the development of children left behind in rural villages. Child development indicators include both measures of academic attainment, such as enrollment, years held back, and test scores in math and language; as well as measures of non-cognitive skills, specifically children's internalizing and externalizing behavior which reflects their psychosocial development. To identify the effect of changes in parental migration on changes in child outcomes, we instrument changes in migration status with labor market shocks to village-specific migration destinations. Results suggest that fathers' migration reduces enrolment by sons, has significant positive effects on the academic outcomes of daughters, but has negative effects on the psychosocial well-being of both boys and girls.

Disciplines
Education

Comments
Suggested Citation:

Leng, L. and Park, A. (2010). *Parental Migration and Child Development in China* (Working Paper). Gansu Survey of Children and Families.

This working paper is available at ScholarlyCommons: http://repository.upenn.edu/gansu_papers/24

Parental Migration and Child Development in China

Leng Lee and Albert Park
University of Oxford

November 2010

Very preliminary draft: please do not cite without permission; comments welcome

Abstract

In recent years, China has witnessed a massive wave of rural-to-urban migration, which frequently results in family separations. This study uses panel data from a longitudinal study of rural children in western China to analyze the impact of migration by fathers on the development of children left behind in rural villages. Child development indicators include both measures of academic attainment, such as enrollment, years held back, and test scores in math and language; as well as measures of non-cognitive skills, specifically children's internalizing and externalizing behavior which reflects their psychosocial development. To identify the effect of changes in parental migration on changes in child outcomes, we instrument changes in migration status with labor market shocks to village-specific migration destinations. Results suggest that fathers' migration reduces enrolment by sons, has significant positive effects on the academic outcomes of daughters, but has negative effects on the psychosocial well-being of both boys and girls.

*Corresponding author is Albert Park (albert.park@economics.ox.ac.uk). The authors acknowledge support for the Gansu Survey of Children and Families by a grant from the United Kingdom Economic and Social Research Council and Department for International Development (ESRC RES-167-25-0250). Earlier support for data collection came from The Spencer Foundation Small and Major Grants Programs, The World Bank, and NIH Grants 1R01TW005930-01 and 5R01TW005930-02.

1. Introduction

In recent years, China has witnessed a massive wave of rural-to-urban migration. Nationally representative rural household surveys conducted by China's National Bureau of Statistics (NBS) find that the number of individual migrants leaving rural areas reached 118 million in 2004, the end of the period studied in this paper, and 137 million in 2007 (NBS, 2009).[1] In 2003, rural migrants were estimated to account for 21 percent of the rural work force, and 43 percent of the rural population lived in a household with at least one migrant (World Bank, 2009). Large-scale migration has been driven primarily by the pursuit of off-farm job opportunities in China's booming coastal regions, fueling rapid industrialization and urbanization.

In China, less than 10 percent of rural migrant workers migrate with their entire family (World Bank, 2009). As a result, migration is frequently associated with family separations, including between parents who migrate and children who are left behind. The extended absence of parents from the lives of their children could carry negative consequences for children's development that offset the positive influence of higher family incomes normally associated with migration. Many commentators have raised concerns about the neglect of left-behind children in China's rural villages (see discussion in Chen et al., 2009). The issue is similarly important for families throughout the world affected by domestic or international migration. The latter has become more prominent in an increasingly globalized world. In 2000, 175 million people, or 3 percent of the world's population, lived outside their country of birth (World Bank, 2008).

Despite the importance of understanding how migration affects child well-being, rigorous empirical research on this topic remains relatively limited. Much of the existing literature suffers from three shortcomings. First, all but a few studies rely upon cross-sectional data and so cannot

[1] These figures are for those who migrated to a location outside of their own township for any period of time during the year and include only individual migrants who leave rural family members behind. They do not capture migration of entire families, which was estimated to be 24 million people in 2003 based on village surveys conducted by NBS (Sheng and Peng, 2005).

control for unobservable characteristics of children and households. Second, previous studies examine a very limited set of child development outcomes, mainly school enrolment and health as measured by anthropometrics. In particular, given that the psychology literature suggests that the lack of close relationships with parents may lead children to suffer more from psychological and behavioral problems, the paucity of studies that examine how migration affects such dimensions of child well-being is glaring. This is of particularly concern given that research suggests that non-cognitive skills such as perseverance, motivation, self-esteem, and self-control influence future labor productivity even after controlling for education (Bowles et al., 2001; Heckman et al., 2006) and also affect health behaviors and thus physical health (Ross and Mirowsky, 1999; House et al, 1994). The third limitation of many previous studies is that many do not effectively address the endogenous nature of the migration decision, which may reflect unobserved shocks experienced by households as well as the abilities and preferences of parents, which influence how they treat children independently of migration. The handful of exceptions is reviewed below.

In this paper, we analyze data from the Gansu Survey of Children and Families conducted in western China, addressing each of the three deficiencies in the literature just described. First, the panel data enables to us to follow the same children over time and thus examine how changes in parental migration affects changes in child outcomes. Second, we examine multiple dimensions of child development, including measures of academic attainment, such as enrollment, years held back, and test scores in math and language; as well as measures of non-cognitive skills, specifically children's internalizing and externalizing behavior which reflects their psychosocial development. Finally, to address the endogeneity of changes in parental migration, we employ labor market shocks to village-specific migration destinations as instrumental variables, exploiting detailed information from village questionnaires on the main migration destinations of migrants from each village. Gansu

is a poor interior region of China where migration is common; one third of the sample children had fathers who migrated in 2000.

Previewing the results, we find that fathers' migration reduces the probability of enrolment of sons, positively effects academic outcomes of girls, and negative affects the psychosocial well-being of both boys and girls.

The rest of the paper is organized as follows. Section 2 discusses migration and child development, reviewing the theoretical pathways linking the former to the latter, and reviewing previous empirical studies. Section 3 discusses the data and section 4 presents the methodology. Section 5 presents the results and discusses the findings, followed by the conclusion in Section 6.

2. Parental migration and child development

It is well established that in developing countries, the decision to migrate, especially for a parent with children, is a household decision and not an individual one (Stark and Bloom, 1985). Given the interlinked nature of household decision-making, the migration of one household member is likely to influence the welfare of other household members through multiple direct and indirect pathways, greatly complicating empirical analysis. Despite this complexity, it is possible to theorize about specific pathways through which migration is likely to affect children.

The first pathway is a positive effect associated with higher incomes, which is typically the main motivation for migration. International migration is associated with large income increases (McKenzie, Gibson, and Stillman, 2007) and developing countries often exhibit large productivity and wage gaps between rural and urban sectors. One study on China found that having a migrant increased rural household income per capita by 18 percent (Du, Park, and Wang, 2005). Greater family resources enable the family to afford greater investments in multiple dimensions of children's human capital. Studies in the West find a strong association between higher household incomes and

a variety of child development outcomes (Blau, 1999; Duncan, Brooks-Gunn and Klebanov, 1994; Korenman, Miller and Sjaastad, 1995).

The second is a negative effect due to the lack of parental contact with children associated with long-term parental absence. This impact may differ for the absence of fathers versus mothers (or both) and may depend on the capabilities of substitute caretakers (usually relatives, in China frequently grandparents). Psychological research has found that parental support is a significant predictor of student's capacity to deal with stress, anxiety and loss of control (DeMarry et al., 2005). Children with strong parental support do better in school and develop mature psychological traits. They aspire to do good work, experience pleasure in one's work, and develop both initiative and a sense of control over events, and are better behaved (Dubow et al., 1991; Evans, 2004). Environments that destabilize a child's sense of self control over their life may increase the likelihood of internalizing problems (Dearing et al 2006; Chorpita and Barlow, 1998).

Research on other contexts in which parents are absent (e.g., single parenthood, divorce, military separation) focus mostly on father absence, which is usually negatively associated with a variety of child level outcomes in developed countries (Sigle-Rushton and McLanahan 2002). Children who live in single mother families have been found to have lower academic achievement scores (e.g. Entwisle and Alexander 1996; Lang and Zagorsky 2001; Fomby and Cherlin, 2007) and are more likely to drop out of school (Manski et al. 1992; De Leire and Kalil 2002). Children living with their mothers due to divorce or military separation also are more likely to suffer from psychological or behavioral problems (e.g., Jekielek 1998; Thompson, Hanson, and McLanahan 1994; Jensen et al., 1989; Jensen, Martin, and Watanabe, 1996). However, research has also shown that among children with non-resident fathers, the frequency of contact has little effect on child outcomes but the closeness of the relationship may be important (Amato, P. and Gilbreth, J., 1999, Seltzer, 1994). It also should be noted that the cause of father absence is likely important to its

impact on children, and absence due to parental migration has not been a significant focus of investigation in developed countries.

A third potential channel is the effect of parental migration on the labor supply decisions of other household members. For example, if mothers migrate daughters (or sons) may be expected to spend more time doing housework. Similarly, if men migrate women may be required to spend more time looking after the family farm, the so-called "feminization of agriculture", reducing time available to spend with children. Or children themselves could be expected to do more work on the farm. The main point is that household time allocation decisions are interdependent and influenced by migration, and how both parents and children spend their time will influence children's development.

A fourth channel is the impact of migration on parental information and/or attitudes. For instance, greater exposure to the outside world could alter beliefs about the returns to human capital investments in children. Or parents could learn more about the importance of investing in children's education or health, or gain knowledge about how to promote children's health.

A fifth impact of parental migration is that it may increase the probability of future migration by children. This can occur through better job information and job search networks that migrant parents can provide to the child, or through a role model effect. Recent theoretical work also argues that there can be a 'brain gain' whereby migration has an additional positive impact on education in the source economy; with increased returns to schooling, there are greater incentives to accumulate more education (see Mountford 1997; Stark, Helmenstein, and Prskawetz 1997; Beine, Docquier, and Rapoport 2001). However, high-paying migrant employment opportunities for less skilled work also could increase the opportunity cost of schooling and reduce educational attainment of children. Parental migration facilitates access to existing village social networks in destination areas that can also provide other benefits to the household (financial assistance, information, etc.).

A sixth factor influencing children is the impact of migration on household decision-making authority. If one parent is absent, the other may gain greater control over decisions affecting the child (especially through household spending decisions), which can be important when the preferences or views of the two parents differ. For example, if mothers care more about children and gain decision-making authority when fathers migrate, then fathers' migration may benefit the child through its impact on intra-household decision-making. If both parents are absent, other relatives may gain decision-making authority. There are sure to be other pathways through which parental migration affects child welfare beyond the ones described above, which reflects the interlinked nature of household decision-making.

Empirical studies of the impact of parental migration on child development that pay careful attention to potential selectivity bias find mixed results for education (McKenzie and Rapoport, 2006; Hanson and Woodruff, 2003; Mansuri, 2006a, de Brauw and Giles, 2008) but generally find positive impacts on health (Hildebrandt and McKenzie, 2005; McKenzie, 2006; Stillman, Gibson, and McKenzie, 2007; Mansuri, 2006b). McKenzie and Rapoport (2006) and Hanson and Woodruff (2003) use different cross-sectional datasets from Mexico and employ historical state migration rates as instruments (the latter includes interactions with mother characteristics) to study the impact of parental migration on children's enrolment, and reach opposite findings.[2] Mansuri (2006a) analyzes cross-sectional data from Pakistan using a similar identification strategy (her instruments are village migration rates interacted with the number of adult males in the household) and finds a positive impact on enrolment, with a larger effect on girls. Finally, a study by de Brauw and Giles (2008) analyzes panel data from China using as instruments variation in the timing of national identity card

[2] McKenzie and Rapaport (2006) find that migration negatively affect school attendance of boys aged 12-18 and girls aged 16-18, while Hanson and Woodruff (2003) find that years of schooling increases for girls aged 10-15 whose mothers have low education.

distribution (which facilitated migration) and finds that the size of village migration networks reduces the likelihood that children of high school entrance age continue schooling.[3]

Several studies adopt similar identification strategies to study the impact of parental migration on child health, measured by anthropometrics or by infant mortality, and uniformly find positive effects on health.[4] The stronger results for health could reflect the greater sensitivity of health investments to income changes, or the fact that migration opportunities increase the opportunity cost of educational investments much more than health investments. Among the previous studies described here, none examine test scores or noncognitive skills, and only one uses panel data (deBrauw and Giles, 2008).

3. Migration and left-behind children in China

As noted above, China's internal migration in recent years has uprooted over 150 million people, which may be the largest migration wave in human history, and most migrants leave family members behind in rural areas. A research group under China's State Council estimated that 20-25 million children have been left behind in rural villages by migrant parents (State Council Research Group, 2006). A survey conducted by the World Bank in collaboration with China's National Statistical Bureau in 2005 found that 7.9 percent of rural households are zero-parent households. A retrospective survey conducted in 4 provinces (Anhui, Henan, Jiangsu, Shanxi) as a supplement to the longitudinal survey conducted by the Research Center for Rural Economy (RCRE) under China's Ministry of Agriculture found that the share of children aged 7-12 living without a father present rose from less than 2 percent in the early 1990s to over 10 percent in 2003, while the share

[3] Another related study is by Yang (2008), who finds that in the Philippines international remittances from migrants increases investments in education, and increases student enrolment. Exchange rate shocks are used as an IV for changes in remittances priced in domestic currency.

[4] Hildebrandt and McKenzie (2005) and McKenzie (2006) use state migration rates as IVs using Mexican data, and Mansuri (2006b) uses the same identification strategy described above for Pakistan. Stillman, Gibson, and McKenzie (2007) use an immigration visa lottery to identify the impact of international migration on child health, and find positive effects, but these children migrate with their parents unlike in the other settings.

of children without a mother present reached 2 percent in 2003 (Park, Lee, and deBrauw, 2010). Analysis of data from the China Health and Nutrition Survey finds similar patterns.

In China, there is a glaring lack of studies of the impact of parental migration on child well-being. Studies in Chinese academic journals generally emphasize the negative aspects of parental neglect of children (described in Chen et al., 2009). As noted earlier, de Brauw and Giles find a negative impact of village migrant network size on high school enrolment, a finding consistent with Liang and Chen (2007), who find that in Guangdong, children living with temporary migrants are less likely to be enrolled than children living in their homes in rural areas or children of permanent migrants in 1995, although their study does not examine left behind children. One study using panel data from Shaanxi finds that parental migration does not adversely affect academic test scores of children in school (Chen et al., 2009).

There are many reasons that compel Chinese parents from rural areas to leave their children behind when migrating. First, housing in urban areas is expensive, and migrants often prefer living with other migrants in dormitories, with such housing often provided by employers. Second, children of migrants often are unable to attend public schools in urban areas unless they pay extra fees, because access is linked to one's place of household registration (hukou). Migrant communities have established their own schools, but such schools are variable in quality and have uncertain legal status (Xiang, 2007). Recent reforms aim to provide migrant children with free education in urban public schools, but implementation has been uneven. Third, migrant workers lack social support networks in distant cities that can provide assistance to them in child rearing while they work long hours.

3. Data

This paper uses data from the first wave (in 2000) and second wave (in 2004) of the Gansu Survey of Children and Families (GSCF), a longitudinal study of children co-directed by one of the authors. In the year 2000, the GSCF used a four-stage stratified sampling procedure to draw a sample of 2,000 children aged 9 to 12 living in 20 counties, 42 townships, and 100 villages. Each child's parents, village leader, school homeroom teacher, and school principal were also interviewed in both years. From the original sample of 2,000 children, data on 1,918 of them were successfully collected in the second wave, reflecting a low attrition rate of only 4.1 percent. Gansu is one of China's poorest provinces, ranking second to last among all provinces in rural per capita income in both 2000 and 2004 (NBS, 2001 and 2005). The province encompasses 390,000 square kilometers of flat Loess Plateau, Gobi desert, mountainous and hilly areas, and vast grasslands. According to the 2000 census, among the population of 25.6 million, 75 percent lived in rural areas (NBS, 2001).

In this study, we focus on the impact of changes in fathers' migration on children's development. Migration by mothers turns out to be a rare occurrence in the study area (Table 1),. To isolate the impact of fathers' migration, we restrict the sample to children with both fathers and mothers (excluding those with parents who are divorced or widowed) and whose mothers do not migrate.

A father is defined to be a migrant worker if he falls into one of two categories. First, if the number of months away from home was more than 3 months in the past year, the father is defined to be a migrant. Second, if the father was a wage earner for more than 3 months in the past year and the workplace was in a different county or province, the father is also defined as a migrant.

Children growing up with a migrant father is a common occurrence in Gansu, accounting for nearly one in three sample children in 2000 and one in five in 2004. Interestingly, paternal migration fell between 2000 and 2004 despite the broader trend of increasing migration in China. This could be due to the decline in manufacturing jobs in many Chinese cities during this period due

to state-sector restructuring, or the aging of parents in the sample over time, since younger adults are more likely to migrate.

The independent variable of interest is the change in fathers' migration ($\Delta Fmig_i$). This variable takes three possible values: -1 if the father migrated in 2000 but not in 2004, 0 if there is no change in migration status, and 1 if the father did not migrate in 2000 but did so in 2004. The group of fathers who do not exhibit a change in migration status comprises two sub-groups that are likely to have very different characteristics: those who did not migrate in either year and those who migrated in both years. Because the absence of parents in both periods could have cumulative effects on children's development, introducing complicated dynamics, we focus on children whose fathers did not migrate in either year as a more appropriate comparison group for children whose fathers changed migration status. For this reason, in our main specification, we exclude the sample of children whose fathers migrated in both years (11.2% of the sample, Table 2).[5] As shown in Table 2, the majority of children live in families whose fathers never migrated (63.7%). There are more than twice as many fathers who migrated in 2000 and stopped in 2004 (16.9%) than those who did not migrate in 2000 but did in 2004 (8.2%). After all of these sample restrictions, the usable sample size is 1,609. The final sample sizes for regressions for the determinants of different development outcomes varies depending on missing values of dependent and independent variables.[6]

We also have village-level data about the most common destination provinces of migrants from the village, broken down by gender. The top migration destinations for each village appeared to be relatively stable over the four years. Of the 89 villages that had migration in 2000, 75 (84.3%)

[5] One could of course include a separate dummy to test how migration in both periods affects child development relative to children whose fathers never migrate. However, our identification strategy is not well-suited to instrument for this second migration "treatment" variable.

[6] For instance, in 2000 half the students were given language tests and half were given math tests, reducing the sample sizes for these outcomes by half. Also, not all children completed child questionnaires, in which case no questions were asked about internalizing or externalizing behavior.

listed the same top migration destination in 2000 and 2004. Two thirds of the villages had the same first and second migration destination provinces in 2000 and 2004. Table 3 provides a table of the provinces which are the most popular destination provinces for migrant men. The most popular province is Gansu itself, accounting for about 30% of male migrants. Other common destinations include provinces near Gansu (Xinjiang, Ningxia, Shaanxi and Qinghai) or provinces in booming coastal regions (Guangdong, Beijing, Zhejiang)

This paper examines six measures of child development, four related to education and two related to psychosocial development. Enrollment is a dummy variable for whether the child was ever enrolled in the past academic year.[7] The second education measure is the number of years ever held back, the difference of which equal the number of years held back between 2000 and 2004. This variable is only calculated for the sample that is enrolled in both 2000 and 2004 in order to avoid selectivity bias associated with dropping out, since those who drop out cannot be held back. The math and language test scores are from standardized tests developed for the survey by test experts in the Gansu Educational Bureau. The test scores are normalized as the number of standard deviations from the mean score of children in the same grade level.

While measures of psychosocial well-being and mental health among adolescents have been widely used in developed countries (Weil et al, 1999; Kenny et al,1998; Shek and Ma, 1997; Fletcher, Steinberg, and Sellers, 1999; Ary et al, 1999; McLeod and Shanahan, 1993; Voydanoff and Donnelly ,1999; Alain, 1989; Chase-Lansdale et al, 1995; O'Connor et al., 1999; Rutter et al, 2001), few surveys in developing countries have measured psycho-social factors, particularly among children. The GSCF asked two scales that measure noncognitive skills, or psychosocial well-being, in both survey waves—one for internalizing behavior and one for externalizing behavior. Internalizing problems are intrapersonal in nature. The internalizing index captures the extent to which the child suffers from

[7] Only one child was not enrolled in 2000 and was dropped from the sample.

anxiety, depression and withdrawal. Externalizing problems are interpersonal in nature and are characterized by destructive behavior, impulsivity, aggression and over-activity (Achenbach and Edelbrock, 1978; Hinshaw 1992; Dearing et al 2006). The child psychology literature suggests that environments which impede a child's self-regulatory efforts, or the presence of anti-social role modeling increase the likelihood of a child developing externalizing problems (Evans, 2004). Environments that destabilize a child's sense of self control over their life may increase the likelihood of internalizing problems (Dearing et al 2006; Chorpita and Barlow, 1998). In our survey, each child was asked 36 questions about a 'general description of their life' and asked to score the extent to which they agreed with the statement. Half of these questions were used to create an internalizing behavior index and the other half were used to create an externalizing behavior index (see list of questions included in both scales in the Appendix). As for test scores, the two indices are normalized as standard deviations from means, with higher values corresponding to better outcomes. Table 4 below reports the mean values of each dependent variable for all households, migrant households (where a father migrates either in 2000 or 2004) and non-migrant households.

From the descriptive statistics of the dependent variables, no clear trends emerge about the possible relationship between father migration, educational performance and child psychosocial behavior. In both 2000 and 2004, enrollment is consistent across both migrant and non-migrant household types, although children from migrant households are held back for more years than children from non-migrant households. On average, migrant children out-performed their peers in math and language in both years except for math in 2004. When we consider the child psychosocial behavior, children from non-migrant households perform better in 2000 but worse in 2004. It is not possible from the descriptive statistics to develop strong a priori beliefs about the differences between children from migrant and non-migrant households.

Because the regression specification looks at changes in outcomes, Table 5 provides the mean changes to the outcome values for children from different household types. The household types in this table are based on changes in migration behavior so there are three household types. There are households where the fathers migrate only in 2000, only in 2004, or never migrates. A number of interesting observations are worth noting. First, regardless of household type, there were falls of about 10% in the enrollment rates. Second, there were increases in the number of years a child is held back for all household types, though households where the father never migrated had the smallest increases. Third, and most interestingly, between 2000 and 2004, children from households where the father never migrated were the only group to record falls in internalizing and externalizing behavior, as well as language. Conversely, there were improvements to nearly all the psychosocial, math and language outcomes for migrant children.

To better understand the context within which the children are growing up, it is worthwhile examining the household and village data. Table 6 provides summary statistics about the child's household and village characteristics in 2000. The household characteristics show that the demographic and composition of the different household types do not vary much. Across the different household types, children were about 11 in 2000 and are marginally more likely to be male. There are few only children in the sample with only about 6% of each household type having an only child, though this is slightly higher for children whose fathers migrated only in 2000. Most children grew up with about 1.3 siblings. Based on a question asking respondents to self-assess their health on a 4-point scale, the children were, on the whole, uniformly healthy. Demographic and health information about the parents was also consistent across household types. Fathers were a little older than mothers, and self-assessed that they were slightly healthier than their wives. They also had on average three more years of education compared to mothers. While fathers averaged about seven years of education, mothers only had about four years. Parents from non-migrant

households had slightly more education than those from migrant households. Grandparents were present in about one-fifth of the households. While one may have expected grandparents to be most present in migrant households to help with child rearing and household tasks, they were most present in non-migrant households.

There are differences among households who migrated in different periods. Households which had fathers who migrated only in 2004 had the lowest income and wealth levels. A look at the village characteristics reveal that this same group of households tended to live in villages that were more remote and less well endowed. Compared to the village characteristics of the average household, the villages these families lived in were over 60% further away from the township seat (about 3.3 kms), and 2 kms further away from the county seat, and were less likely to have a bus running through their village. Their villages had less arable land per capita and were more likely to be in mountainous terrain. In contrast, those households where the father did not migrate in either year had greater wealth, lived in villages closer to the township seat, and were more likely to live in an area of flat terrain. Given these differences, it will be important to control for differences in the initial characteristics of households in the empirical analysis.

4. Empirical Strategy

Consider the following linear specification for the determinants of child development outcome Y_{it} for a child in household i at time t:

$$Y_{it} = a + bMig_{it} + cX_{it} + u_i + v_{it} \quad (1)$$

Here, $Fmig_{it}$ is an indicator variable for whether the child's father migrates, X_{it} is a set of household control variables, and the error term has a fixed component u_i and a time-varying component v_{it}. We can subtract Y_{it-1} from Y_{it} to get an expression for the change in child outcomes ΔY_{it} as a function of the change in migration ΔMig_{it} and the change in control variables ΔX_{it}:

$$\Delta Y_{it} = a + b\Delta Mig_{it} + c\Delta X_{it} + \Delta v_{it} \quad (2)$$

As is well-known, estimating equation (2) instead of equation (1) has the desirability property that fixed unobserved factors u_i drop out of the equation and so do not influence estimates of b. This is because b is now identified from how outcomes for the same child change over time in response to changes in parental migration, which does not involve comparisons across households that may differ in unknown ways. We are cautious in including changes in control variables (ΔX_{it}) that may be influenced by changes in migration (e.g., income). To better control for unobserved heterogeneity that is correlated with changes in child development, we add a number of initial period control variables (X_{it-1}) to equation (2).

At the same time, estimating equation (2) using panel data does not solve all of our problems. Changes in migration are unlikely to be random; rather they could be a response to shocks affecting the household, such as illness or poor weather, which also affects children's development. In other words there could still be omitted time-varying factors that confound the relationship between changes in child outcomes and changes in parental migration. In addition, the dynamics of the relationship between children's outcomes and parental migration as expressed in (2) could be more complicated. For instance, changes in children's outcomes may differ when parents are always away than when they are never away, even though in both of these cases there is no change in parental migration. Relatedly, the impact of a migrating parent returning home may not be exactly opposite in magnitude to the impact of a non-migrating parent who later decides to migrate.

The main approach taken by empirical researchers to address the possibility of omitted variable bias has been the use of instrumental variables for migration. An ideal instrument is a factor that strongly predicts migration but does not affect child development except via migration. More technically, a good instrument is a variable that is strongly correlated with migration (ΔMig_{it}) but not with the error term (Δv_i), such as factors that are external to the household that influence the

likelihood of migration. As described earlier, previous authors have used a variety of instruments to try to identify the impacts of migration on household outcomes in origin areas.

In this study, we use demand shocks in migration destination locations to instrument for migration to study impacts in the source region, which following a strategy similar to McKenzie and Rapoport (2004) [check what they do and make sure earlier description is accurate, also cite new study sent by Abhijeet]. Theory (Harris-Todaro, 1970) as well as empirical evidence (Zhu, 2002) suggest that changes to wages and employment opportunities in migration destination provinces should be important determinants of migration. Our instrumental variable strategy makes use of changes in the wages and employment levels from different sectors in each destination province. Rural migrant men tend to work in the manufacturing and construction sectors, so that changes in wage and employment levels in those sectors are likely to affect migration behavior but are unlikely to affect children's development directly.

The construction of the instrumental variables involved three steps. First, we used the 2000 and 2004 China Labor Statistical Yearbook to gather data on changes in the wages and employment in manufacturing and construction for each province in 1999 and 2003. The survey waves were conducted in mid-2000 and mid-2004, so migration decisions in the one-year period prior to the survey are most likely to be influenced by labor market conditions in 1999 and 2003. Second, each village provided data on the top three migration destination provinces, the number of migrants who went to those provinces, as well as the total number of village laborers that worked outside the county. We calculate the shares of male outmigrants from each village in 2000 to different provincial destinations to serve as weights for calculating migration destination labor market shocks. Specifically, the weights are calculated by dividing the number of male migrants from village i who went to a particular province p (M_{vp}) by the total number of male out-migrants from that village (M_v). Then the labor market shock variable can be created using the formula:

$$Shock_{vL} = \sum_{p=1}^{3} \frac{M_{vp}}{M_v} (LM_{pL}^{2003} - LM_{pL}^{1999}) \quad (3)$$

where the migration destination labor market shock $Shock_{vL}$ for village v and labor market indicator L is a weighted average of changes in labor market variables (LM^{t}_{pL}) from 1999 to 2000 for the three main destination provinces p for migrants from village v. For villages that had missing data for the number of migrants or their destinations, we used data from other villages in the same county to create the village migration destination weights. However, we had to drop all observations from one county (out of twenty) because no villages in this county had data on village outmigration.

We also interacted the labor market shocks with fathers' years of schooling to account for the fact that those with more education are more likely to migrate, especially for manufacturing jobs. We now have a large number of instruments for the endogenous variable, $\Delta Fmig_i$.

Control variables. The initial period control variables X_{it-1} included in the regressions control for family composition and demographics, as well as material (income per capita, wealth per capita) and physical well-being (health). Initial village characteristics included as controls include whether the village had a bus service in 1999; arable land per capita; terrain of the village (plains, hills, mountains or other); and the distance to the closest township and county. All specifations also include county-level dummies to account for unobserved county-specific trends.

5. Results and Discussion

In this section, we first present the first-stage estimation results, and then present the main results on the impact of changes in father migration on changes in the following child outcomes: the likelihood of being enrolled; number of years held back in a four year period; standardized math test scores; standardized language test scores; standardized internalizing index score; standardized externalizing index score.

The first stage regression results are presented in Table 7.[8] Changes in wages and employment in the construction and manufacturing sectors are included separately as instruments along with interaction terms with years of fathers' education. The interactions capture the fact that more educated workers have greater job opportunities as migrants. Five of the eight instruments are statistically significant, all at the 1 percent significance level. Changes in construction employment in migrant destinations increases the probability of fathers migration, and there is a small negative but statistically insignificant coefficient on the interact term with fathers' education, suggesting that employment in the construction sector does not favor the educated. Construction wages have similar signs but the coefficients are smaller and statistically insignificant. For the manufacturing sector, there is a positive, statistically significant interaction term between fathers' education and both change in destination employment and change in destination wages, suggesting that better educated workers respond more to demand shocks. However, the uninteracted terms are negative and statistically significant, which suggests that for all except those with very high levels of education, the impact of a change in manufacturing employment on migration propensity is negative or close to zero. This could reflect the fact that migration to distant destinations with rising demand are is shifting to other regions.

Tables 8 to 13 provide the results for each dependent variable. Each table has regressions results for the full sample, a sub-sample for boys and a sub-sample for girls with three sets of results provided for each sample. First, coefficient estimates using the OLS estimator are provided. Given that these estimates do not take into account the selection and endogeneity of father migration, we expect these results to differ markedly from the instrumental variable regressions and this is the case. The second set, those results in the column titled 'ivreg', provide coefficient estimates using the 2SLS estimator. F-stats and p-values for the Hansen J-statistic test of over-identification are

[8] These results are for the enrolment regressions. The results for other child outcome measures vary slightly because the samples are slightly different, but the results are nearly exactly the same.

provided for this estimator. There may be some concerns about the validity of these coefficient estimates given the small size of the F-stats. Given the difficulty of making accurate inferences in instrumental variable regressions with weak instruments (see Stock and Andrews, 2005), a further set of conditional instrumental variable regressions are provided as a check for the robustness of our study. Employing the methodology suggested by Andrews, Moreira and Stock (forthcoming), the third set in the column titled 'condivreg' presents regression results where the standard errors and the significant tests are adjusted given the presence of weak instruments. With the exception of the effects of migration on language, the results from the conditional instrumental variable regressions are wholly consistent with the baseline instrumental variable regression results.

Enrollment. Table 9 shows that for the full sample, there is not much of an effect of father migration on enrollment. The estimates from the different estimators show enrollment does not change much for the full sample. However, an examination of the boy and girl samples reveals a clear gender difference. Father migration has a positive effect on girl enrollment, though is not statistically significant. However, father migration has a strong negative effect on the enrollment of boys, with a boy 21.2% less likely to be enrolled if his father migrates. This is significant at the 10% level.

The finding of a fall in boys' enrollment if their father migrates seems wholly plausible and consistent with the literature (see de Brauw an Giles, 2006). As the boys in our sample near the end of middle school or are in the early years of high school, the decision about whether to continue in school presents itself. The alternative to migrate and try their luck in an urban labor market is a tempting proposition. If a migration networks exist, there is more information about the logistics of moving and how to find work, increasing the attractiveness of migrating. Boys who have fathers that migrate would directly benefit from their father's network and firsthand experience. They are also less likely to meet resistance from their fathers about migrating to the cities as their fathers would be

aware of the true nature of life as a migrant worker, and fathers may even be able to afford their sons protection and support if they migrated to the same city.

Years Held Back. The effects of father migration on the number of years a child is held back provides further evidence of the impact migration has on the educational outcomes of left-behind children. The more years a child is held back, the more it suggests they are lagging their classmates academically. Further, holding a child back is an expensive proposition for families and such an action no doubt affects the social standing of both the child and the family.

Table 10 shows that for the full sample and both gender sub-samples, father migration reduces the number of years a child is held back over the four year period. For the full sample, if a father becomes a migrant, a child was held back by half a year less than they otherwise may have been if the father had not migrated. This result is significant at the 5% level. Boys also see a drop in the number of years held back of a similar duration but this is not statistically significant. Girls seem to benefit more, and their drop in the number of years held back is statistically significant at the 10% level. The number of years that girls were held back fell by two thirds of a year over the four year period. This suggests an explanation centering on an increased income from remittances coupled with the increased bargaining power of the sole remaining household head – the mother. Women with migrant spouses have greater decision making of the day to day running of the household. They are able to more fairly distribute household resources and perhaps ensure their daughters are not disproportionately burdened with household tasks. The result is that such girls do not fall behind as much, or as often, as they otherwise would have and thus are not held back for as many years.

Test scores. Father migration tends to have positive effects on child math and language outcomes, with the exception of girls' language scores. Such an outcome is unsurprising given that we already know that father migration leads to a reduction in the number of years a child is held

back. If a child is held back for fewer years, this indicates there is likely to be some improvement in their math and language outcomes.

Looking firstly at math in Table 11, father migration sees an improvement of 1.289 standard deviations for the full sample, significant at the 10% level. This is a very significant improvement in a child's math outcomes. It appears that this result for the full sample is driven by girls, with their math outcomes improved by 1.953 standard deviations (significant at the 5% level). This is a very large improvement, though it is achieved over a four year period. Boys record a more modest 0.762 standard deviation improvement, though this is not statistically significant. It is again likely that the effects of father migration on math are operating via the increased income of the family from remittances, and girls benefit more because of the increased empowerment of mothers.

The language results in Table 12 sees an improvement of about one standard deviation for the full sample and for the boy sub-sample, though neither are statistically significant once the conditional instrumental variation regressions are run. Girls record a small fall in language outcomes but this is also not statistically significant. This is the only outcome related to education that girls failed to see a benefit from father migration.

Explaining why there is such a large and statistically significant effect of father migration on math but no statistically significant effect on language is difficult. There is a general finding that schools can have more influence on math than on a child's language skills because parents are more inclined to read to their children than do math puzzles. The argument is that there is greater untapped capacity for schools to elevate a child's math outcomes than for language given how little attention is given to math at home. If the home environment matters more for language development, the absence of a parent to talk to could be more detrimental relative to math development. Furthermore, if the father migration leads to higher family income and the family can send the child to a better school, the explanation of the school's role in math may be believable.

However, if parents living in rural villages in Gansu do not have many schools to choose from, this explanation falls down.

Internalizing and Externalizing Behavior. What effect does father migration have on the psychosocial behavior of their left-behind children? Table 13 and 14 provide the results. The full sample and the boy sample show that father migration results in a worsening in the internalizing behavior, but an improvement for girls. However, none of these results are statistically significant.

In contrast, the externalizing behavior index falls by 1.624 standard deviations for the full sample, significant at the 5% level. This is a very large fall and represents a much higher incidence of children 'acting out' once the father migrates away. This result is not driven by either gender. It is interesting that father migration has a negative effect on a child's externalizing behavior but no statistically significant effect on a child's internalizing behavior.

6. Conclusion

This paper has investigated the impact of fathers' migration on the well-being of children using panel data on multiple indicators of childrens' cognitive and noncognitive skills. Migration destination labor market shocks are used to instrument for changes in fathers' migration status. We find evidence that migration of fathers has both positive and negative impacts on children's development. While boys are more likely to drop out of school if their fathers migrate, there is no statistically significant effect on a girl's enrollment. Girls are held back less by two thirds of a year while the full sample sees a fall in the number of years held back by only half a year. Furthermore, while the full sample improves math score outcomes by 1.289 standard deviations over the four year period if a father migrates, girls improve their scores by 1.953 standard deviations in the same four year period. Boys do not see statistically significant improvements in any of the four measure of education. However, fathers' migration has large negative effects on children's externalizing

behavior. Children record a fall of 1.624 standard deviations in their externalizing index when their fathers migrate. This represents a significant worsening of their inter-personal behavior, and this is equally true for boys and girls. We find no effect on the internalizing behavior of children. These differences in the impact of parental migration on cognitive and noncognitive skill development highlight the importance of expanding the number of indicators used to measure child development.

References

Achenbach, T.M. and C.S. Edelbrock (1978) The Classification of Child Psychopathology: A Review and Analysis of Empirical Efforts. *Psychological Bulletin* 85, 1275-1301.

Acosta, P. (2006) Labor Supply, School Attendance, and Remittances from International Migration: The Case of El Salvador. *World Bank Policy Research Working Paper No. 3903.*

Andrews, D.W.K. and Stock, J.H. (2005) Inference with Weak Instruments. Cowles Foundation Discussion Paper No. 1530. Available at SSRN: http://ssrn.com/abstract=781286.

Andrews, D.W.K., et al (forthcoming). Optimal Two-Sided Invariant Similar Tests for Instrumental Variables Regression, *Econometrica.*

Angrist, J. D. and A. B. Krueger (2001) Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments. Journal of Economic Perspectives 15(4), 69-85.

Anh, D., C. Tacoli and H. X. Thanh (2003) Migration in Vietnam: a review of information on current trends and patterns, and their policy implications, paper presented at the Regional Conference on Migration, Development and Pro-Poor Policy Choices in Asia, organised by Bangladesh Refugee and Migratory Movements Research Unit, Bangladesh/ DFID,UK, Dhaka, 22–24 June in Deshingkar, P. and S. Grimm (2004), Voluntary Internal Migration: An Update, Overseas Development Institute.

de Brauw, A. and J. Giles (2008) *Migrant Opportunity and the Educational Attainment of Youth in Rural China.* World Bank Working Paper No. 4526.

Beine, M. et al (2001). Brain Drain and Economic Growth: Theory and *Evidence. Journal of Development Economics* 64(1), 275–89.

Borjas, G. J. (1999) *Heaven's Door: Immigration policy and the American economy*, Princeton University Press: Princeton, New Jersey.

Cameron S. and J. Heckman (1993) The Nonequivalence of High School Equivalents, *Journal of Labor Economics* 11(1) 1-47.

Dearing, E. et al (2006) Within-child Associations Between Family Income and Externalizing and Internalizing Problems. *Developmental Psychology* 42(2) 237-252.

Du, Y., Park, A. and S. Wang (2005) Migration and Rural Poverty in China. *Journal of Development Economics* 82(1), 1-42.

Frank, R. and R. Hummer (2002) The Other Side of the Paradox: The Risk of Low Birth Weight among Infants of Migrant and Nonmigrant Households within Mexico. *International Migration Review* 36(3), 746-65.

Ginther, D. and Pollak, R. (2003) Does Family Structure Affect Children's Educational Outcome? NBER Working Paper No. 9628.

Hanson, G. and C. Woodruff (2003) Emigration and Educational Attainment in Mexico. Unpublished mimeo, University of California, San Diego, 2003.

Harris, J. and M. Todaro (1970) Migration, Unemployment and Development: A two-sector analysis. *American Economic Review* 60(1), 126-142.

Hildebrandt, N. and D. McKenzie (2005) The Effects of Migration on Child Health in Mexico. *World Bank Policy Research Working Paper No. 3573*.

Hinshaw, S. (1992) Externalizing Behavior Problems and Academic Underachievement in Childhood and Adolescence: Causal Relationships and Underlying Mechanisms. *Psychological Bulletin* 111(1), 127-155.

Hu, D. (2002) Trade, Rural-Urban Migration, and Regional Income Disparity in Developing Countries: A Spatial General Equilibrium Model Inspired by the Case of China. *Regional Science and Urban Economics* 32(3), 311-338.

Kandel, W. and G. Kao (2001) The Impact of Temporary Labor Migration on Mexican Children's Educational Aspirations and Performance. *International Migration Review* 35(4), 1205-1231.

Kanaiaupuni, S. and K. Donato (1999) Migradollars and Mortality: The Effects of Migration on Infant Survival in Mexico. *Demography 36*(3), 339-353.

Liang, Z. and Y.P. Chen (2007) The educational consequences of migration for children in China. *Social Science Research* 36, 28-47.

Mansuri, G. (2006) Migration, School Attainment and Child Labor: Evidence from Rural Pakistan. *World Bank Policy Research Working Paper No. 3945*.

McKenzie, D. and H. Rapoport (2006) Can Migration reduce educational attainment? Evidence from Mexico. *World Bank Policy Research Working Paper No. 3952*.

Mountford, A. (1997) Can a Brain Drain be Good for Growth in the Source Country? *Journal of Development Economics* 53(2), 287–303.

Park, A. (2008) Rural-Urban Inequality, in China in Yusuf, S. and T. Saich (ed) *China Urbanizes: Consequences, Strategies and Policies*. Washington: The World Bank.

Schacht, P.M. et al (2009) Fathering in Family Context and Child Adjustment: A Longitudinal Analysis. *Journal of Family Psychology* 23(6), 790-797.

Stark, O. et al (1997). A Brain Gain With a Brain Drain. *Economics Letters* 55(2), 227–234.

Stark, O. and D.E. Bloom (1985) The New Economics of Labor Migration. *American Economic Review* 75(2), 173-178.

Woodruff, C. and R. Zenteno (2001) Remittances and Microenterprises in Mexico. Working Paper, University of California, San Diego (UCSD) and ITESM-Guadalajara, December.

World Bank (2008), *Migration and Remittances Factbook*.

World Bank (2009), *World Development Report: Reshaping Economic Geography*.

Xiang, B. (2007), How Far are the Left-behind Left Behind? A preliminary study in rural China. *Population, Space and Place* 13, 179-191.

Yang, D. (2008) International Migration, Remittances, and Household Investment: Evidence from Philippine Migrants' Exchange Rate Shocks. *Economic Journal* 118 (528) 591-630.

Zhu, N. (2002) The Impacts of Income Gaps on Migration Decisions in China. *China Economic Review* 13, 213-230.

Table 1: Incidence of Father and Mother Migration

	Fmig (%)	Mmig (%)
2000	28.62	2.52
2004	19.37	2.19

Table 2: Change in Migration Behavior

	Fathers		Mothers	
Migration Change	**No.**	**%**	**No.**	**%**
-1	316	16.91	30	1.61
0	1400	74.91	1803	96.47
Migrate both years	[209]	[11.18]	[5]	[0.28]
Never migrated	[1191]	[63.72]	[1798]	[96.2]
1	153	8.19	36	1.93
Total	1869	100	1869	100

Table 3: Most Popular Migration Destinations

2000		**2004**	
Province	% male migrants	Province	% male migrants
Gansu	31.12	Gansu	29.86
Xingjiang	28.58	Xinjiang	22.67
Ningxia	10.19	Guangdong	10.83
Guangdong	7.14	Ningxia	9.71
Shaanxi	5.22	Qinghai	6.42
Qinghai	4.85	Beijing	4.42
Beijing	3.66	Zhejiang	3.72
Zhejiang	3.40	Shaanxi	3.41
Shanxi	2.01	Tianjin	1.86
Inner Mongolia	1.03	Inner Mongolia	1.83
Anhui	0.82	Tibet	1.36
Hebei	0.62	Hebei	0.92
Sichuan	0.52	Shanxi	0.87
Fujian	0.32	Sichuan	0.71
Tianjin	0.31	Shanghai	0.60
Tibet	0.12	Fujian	0.37
Shanghai	0.09	Hainan	0.37
		Shandong	0.11
Total	100.00	Total	100.00

Table 4: Mean Values of the Dependent Variables

	No. Obs	All HHs	Mig HHs	Non-mig HHs
2000				
Enrolled	1633	1	1	1
Held-back	1444	0.338	0.441	0.299
Internalizing	1714	0.012	-0.051	0.041
Externalizing	1714	0.015	-0.041	0.040
Math	816	0.013	0.032	0.004
Language	868	-0.004	-0.003	-0.004
2004				
Enrolled	1609	0.897	0.892	0.900
Held-back	1443	0.654	0.813	0.594
Internalizing	1216	-0.006	0.039	-0.023
Externalizing	1216	-0.001	0.042	-0.017
Math	1532	0.006	-0.013	0.013
Language	1532	0.019	0.109	-0.016

(NOTE: The samples used to get these mean levels are once the sample has been reduced. However, this sample tends to be slightly bigger than the size of the regression sample. A few drop out for the regression sample because of missing control variable data)

Table 5: Mean Values of the Change in Dependent Variables

	No. Obs	All HHs	ch_Fmig = -1	ch_Fmig=0	ch_Fmig = 1
ch_enrolled	1609	-0.102	-0.114	-0.100	-0.097
ch_held-back	1443	0.316	0.398	0.296	0.313
ch_internalizing	1216	-0.012	0.099	-0.049	0.072
ch_externalizing	1216	-0.017	0.096	-0.051	0.054
ch_math	729	0.013	0.148	0.009	-0.243
ch_language	787	0.027	0.164	-0.043	0.271

Table 6: Summary Statistics of Household and Village Characteristics

	No. Obs	All HHs	ch_Fmig = -1	ch_Fmig=0	ch_Fmig = 1
Household Characteristics					
Child					
Male (%)	1609	53.14	57.19	52.53	49.66
Age (years)	1609	11.01	10.94	11.04	10.92
Only child (%)	1609	6.22	7.36	6.01	5.52
Child health (max = 4)	1609	3.69	3.67	3.70	3.60
No. siblings	1609	1.33	1.35	1.33	1.28
Parents					
Father's age	1609	37.67	37.26	37.91	36.59
Mother's age	1608	35.30	34.90	35.47	34.73
Father health	1604	3.62	3.61	3.62	3.61
Mother health	1605	3.53	3.52	3.52	3.57
Father married	1602	98.81	98.66	98.88	98.60
Mother married	1606	98.44	97.99	98.62	97.93
Father educ (yrs)	1604	7.16	7.08	7.20	6.95
Mother educ (yrs)	1605	4.40	4.00	4.52	4.23
Presence of grandparents	1609	22.68	20.07	23.35	22.76
ln(net income pc)	1609	5.67	6.56	5.59	4.43
ln(wealth pc)	1609	6.20	6.04	6.26	6.04
Village Characteristics					
Bus service (%)	1609	61.53	57.86	63.61	52.41
Arable land p.c. (mu)	1609	2.14	2.15	2.15	2.05
Distance to township (km)	1609	5.34	5.14	4.98	8.69
Distance to county (km)	1609	27.03	26.10	26.96	29.51
Terrain type (%)					
plains	1609	43.44	39.46	46.52	26.9
hills	1609	18.15	23.75	16.57	19.31
mountains	1609	28.84	25.08	28.67	37.93
other	1609	9.57	11.71	8.24	15.86

NB - Health scores are out of 4 with higher scores indicating better health

Table 7: First Stage results change in fathers' migration

	Ch_Fmig	
	coef	**s.e.**
ch_manufac_emp	-0.033***	0.007
ch_construc_emp	0.014***	0.004
ch_manufac_wage	-0.017***	0.005
ch_construc_wage	0.002	0.004
ch_manufac_emp*Feduc	0.003***	0.001
ch_construc_emp*Feduc	-0.001	0.001
ch_manufac_wage*Feduc	0.002***	0.001
ch_construc_wage*Feduc	0.000	0.000
male	-0.045*	0.025
ln (netincome pc)	-0.050***	0.005
ln (wealth pc)	0.030*	0.016
Child health	0.037	0.025
Father health	0.034	0.024
Mother health	0.009	0.021
Father married	-0.119	0.193
Mother married	0.129	0.163
Father education	-0.029*	0.016
Mother education	0.007*	0.004
Grandparents present	0.034	0.030
age10	-0.058	0.036
age11	-0.036	0.037
age12	-0.047	0.040
Father age	-0.002	0.004
Mother age	0.008	0.005
Village bus service	-0.027	0.033
Arable land p.c	0.010	0.019
Terrain - hills	-0.102	0.064
Terrain - mountains	-0.100	0.064
Terrain - other	-0.045	0.067
Distance to township	0.005**	0.002
Distance to county	-0.000	0.001
Number siblings	-0.016	0.019
Constant	-0.184	0.286
Number of observations	1,577	
Adjusted R2	0.114	

Table 8: Effect of a change in Father Migration on Change in Enrollment

	Full Sample			Boy Sample			Girl Sample		
	OLS	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**
ch_Fmig	0.009	-0.013	-0.013	-0.012	-0.212	-0.212*	0.020	0.111	0.111
	(0.016)	(0.101)	(0.103)	(0.021)	(0.131)	(0.128)	(0.021)	(0.131)	(0.156)
Sample Size	1,577	1,577	1,577	839	839	839	738	738	738
Adjusted R2	0.128	0.127	0.127	0.084	-0.045	-0.045	0.176	0.159	0.159
F-statistic		4.05			2.53			2.1	
Hansen J statistic P value		0.1813			0.154			0.6976	

Table 9: Effect of a Change in Father Migration on Change in Years Held Back

	Full Sample			Boy Sample			Girl Sample		
	OLS	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**
ch_Fmig	-0.045	-0.527**	-0.527**	-0.062	-0.469	-0.469	-0.015	-0.668*	-0.668*
	(0.032)	(0.242)	(0.238)	(0.041)	(0.344)	(0.292)	(0.052)	(0.343)	(0.342)
Sample Size	1,413	1,413	1,413	767	767	767	646	646	646
Adjusted R2	0.140	-0.016	-0.016	0.157	0.041	0.041	0.122	-0.153	-0.153
F-statistic		3.38			2.04			1.93	
Hansen J statistic P value		0.0694			0.0155			0.11	

Table 10: Effect of a Change in Father Migration on Change in Math

	Full Sample			Boy Sample			Girl Sample		
	OLS	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**
ch_Fmig	-0.110	1.289*	1.289*	-0.205	0.762	0.762	0.003	1.953**	1.953**
	(0.097)	(0.686)	(0.682)	(0.147)	(0.948)	(0.962)	(0.118)	(0.779)	(0.907)
Sample Size	718	718	718	361	361	361	357	357	357
Adjusted R2	0.079	-0.209	-0.209	0.017	-0.116	-0.116	0.173	-0.424	-0.424
F-statistic		2.25			1.06			1.4	
Hansen J statistic P value		0.727			0.9798			0.712	

note: *** p<0.01, ** p<0.05, * p<0.1

Table 11: Effect of a Change in Father Migration on Change in Language

	Full Sample			Boy Sample			Girl Sample		
	OLS	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**
ch_Fmig	0.020	0.959*	0.959	0.021	1.225*	1.225	0.036	-0.114	-0.114
	(0.109)	(0.523)	(0.639)	(0.127)	(0.725)	(0.835)	(0.157)	(0.570)	(0.809)
Sample Size	769	769	769	433	433	433	336	336	336
Adjusted R2	0.086	-0.035	-0.035	0.125	-0.077	-0.077	0.067	0.064	0.064
F-statistic		2.36			1.4			1.36	
Hansen J statistic P value		0.6057			0.7688			0.2718	

Table 12: Effect of a Change in Father Migration on Change in Internalizing

	Full Sample			Boy Sample			Girl Sample		
	OLS	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**
ch_Fmig	-0.020	-0.253	-0.253	0.015	-0.541	-0.541	-0.050	0.212	0.212
	(0.085)	(0.630)	(0.599)	(0.112)	(0.830)	(0.763)	(0.130)	(0.814)	(0.704)
Sample Size	1,187	1,187	1,187	670	670	670	517	517	517
Adjusted R2	0.069	0.062	0.062	0.036	-0.002	-0.002	0.081	0.067	0.073
F-statistic		2.69			1.77			1.92	
Hansen J statistic P value		0.0864			0.3537			0.1419	

Table 13: Effect of a Change in Father Migration on Change in Externalizing

	Full Sample			Boy Sample			Girl Sample		
	OLS	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**	**OLS**	**Ivreg**	**Condivreg**
ch_FmigD	-0.065	-1.624*	-1.624**	-0.070	-1.127	-1.127	-0.052	-0.932	-0.932
	(0.069)	(0.834)	(0.664)	(0.108)	(0.873)	(0.777)	(0.114)	(0.940)	(0.691)
Sample Size	1,187	1,187	1,187	670	670	670	517	517	517
Adjusted R2	0.073	-0.252	-0.252	0.051	-0.094	-0.094	0.090	-0.023	-0.020
F-statistic		2.69			1.77			1.92	
Hansen J statistic P value		0.2673			0.5684			0.1082	

note: *** p<0.01, ** p<0.05, * p<0.1

Appendix : Questions used to construct internalizing and externalizing behavior indexes

Fully agree – 1
Somewhat agree – 2
Somewhat disagree – 3
Totally disagree - 4

Internalizing Behavior Index Questions	Externalizing Behavior Index Questions
I don't want others to meddle in my own business	I break things on purpose.
I can't concentrate on what I am doing	I lose my temper.
I have many strange / weird ideas (often daydream)	Even if I know I am wrong, I am reluctant to listen to others.
I easily get flushed. (I am easily frustrated or anxious)	I steal things from others or my home.
I can't do things well when my parents are not present (I usually need help from adults to do something well)	I like to show off my strengths in front of others.
I am very indifferent to others	I always want to be the center of attention.
I am very shy	I quarrel with others.
I always want to be the center of attention	I do not observe school discipline.
I am often teased by classmates	I like to brag.
I do not feel guilty, even if I have done something wrong	It bothers me if others do things better than I do.
My temper changes quickly and easily	I act impulsively.
I feel inferior to others	I often am suspicious of others.
I often am suspicious of others	I often say obscenities.
I prefer to be alone	I often make fun of others.
I often feel nervous	I sometimes tell lies.
I am often bored	I am easily angered.
I stay quiet when I am with my classmates or friends	I often disregard other people's ideas.
There is always something to worry about	I sometimes menace and even hurt others.