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Mother's Autonomy and Child Welfare - A New Measure and Some New Evidence *

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Abstract

We construct a new, direct measure of female autonomy in household decision-making by creating an index from the principal components of a variety of household variables on which mother of a child takes decision. We then examine its impacts on her child's secondary education in Mexico and find that the children of Mexican mothers with greater autonomy in domestic decision making have higher enrolment in and lower probability of dropping out of secondary school. We use the relative proximity of spousal parents as instruments for relative autonomy to ameliorate the potential endogeneity between autonomy and welfare outcomes. We argue that omitted variables that may drive education and autonomy are likely to be uncorrelated with the ones driving location choice of families given the migration patterns in Mexico. However, the positive autonomy effect is weaker and non-existent for older children and for girls suggesting that gender-directed conditional cash transfer policies may not necessarily hasten educational and gender transition in the process of development.

Keywords: Female Empowerment, Principal Component, Education, Instrumental Variable
JEL Codes: D1, I2, J1

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1 Introduction

Is greater mother autonomy in decision-making within the family associated with better child outcomes? Using a new, direct measure of female autonomy, and exploiting the longitudinal nature of the Mexican Family Life Survey, we find evidence that greater mother autonomy in household decision-making is associated with a higher probability of secondary school enrolment and retention. This effect, however, is more pronounced for boys and gets weaker for older children disappearing eventually.

Female autonomy in economic and other decision making has been at the forefront of academic and policy research over the last decade.[1] In the context of both developed and developing countries, it has been found that the effect of a dollar that is earned by a female member of a family is different from those of a dollar earned by a male member. Except for a few recent studies, evidence overwhelmingly fails to reject the conjecture that female members take decisions that are generally beneficial to the family members, particularly children, in the conventional economic sense - female autonomy leads to a reduction in fertility, a rise in birth-weight, and an increase in survival rates to name a few.[2] Taking this cue from academic findings, several countries have implemented policies that are geared towards empowering women ranging from micro-credit lending to reservation in the legislature to conditional cash payments.[3]

Measuring female autonomy empirically has always been a challenge, particularly from observed non-experimental data. Researchers have either used transitory income or condi-

[1]Female autonomy has been researched in various contexts. Some notables being (1) autonomy in household decision (Anderson and Eswaran, 2009; Kantor 2003), (2) autonomy in political participation in developing countries(Chattopadhyay and Duflo, 2004) and (3)autonomy in contraceptive use and labor market participation in the United States (Goldin and Katz, 2000)

[2]See Kantor (2003) and Rahman and Rao (2004)

[3]These range from micro-credit lending, to reservation in the legislature to conditional cash payments.

tional cash transfer programs as proxies for female autonomy in reduced form equations or have conducted randomized experiments to remove selection and other biases.[4] However, one known problem with these approaches, particularly the former, is that the inter-personal gendered dynamics among family members, particularly the parents, when decision regarding their child's human capital in concerned, remains unobservable to the researchers.[5] Therefore, even if a dollar goes to the female member, we cannot know if the spending decision is taken of her own volition or at the behest of her husband (and in some countries other family members who co-habit such as in-laws).

We create a direct measure of female autonomy constructed from the responses of each member of a couple regarding their own and partner's decision making with respect to a set of decision variables such as child schooling and food expenditure. Mexican Family Life Survey (henceforth, MxFLS) collects data on individual decision-making regarding various family matters by interviewing each adult in the family such that the husband independently gives his opinion about who takes the decision- himself, his spouse or both. Therefore, the setting is ideal to measure female autonomy "defined as the ability of women to make choices/decisions within the household relative to their husbands"(Anderson and Eswaran, 2009). However, working with twelve variables can be cumbersome and confusing. Therefore, we have reduced the dimensionality of the decision matrix by taking the principal component of the same and creating an index for female autonomy. This approach has several other advantages. First, it is a continuous, time-variant measure that gives a range of autonomy. Second, it takes on the issue of decision-making directly, instead of inferring from indirect proxy measures such

[4]Thomas (1990) was one of the first to point out that income effects across gender may be different. There is a vast literature that followed. Ashraf(2009) conducted a field experiment in Philippines where private and public behaviors of spouses were tracked to elicit differential spousal behavior. It also includes an excellent review of the intra-household decision-making literature.

[5]Anderson and Eswaran (2009) address this issue to some extent and find that income earned outside family farm generates greater autonomy.

as access to transitory or transfer income. Third, with more and more surveys asking such questions, this measure is easily replicable.[6] We then use our autonomy index to examine the effects of female autonomy on children's education, particularly enrolment and retention at the secondary school level. Mexico is at a stage of development where, except for some remote rural areas, primary schooling has been almost universal. Therefore, primary enrolment is likely to be invariant to the parental characteristics. However, secondary enrolment and completion have lagged much behind primary enrolment and completion and students have a tendency to drop out of secondary school (Angelucci et al.,2009). Therefore, a mother's autonomy in family decision-making is more likely to influence secondary enrolment.[7]

Our identification strategy proceeds in two parts. First, we exploit the longitudinal nature of the data by using lagged values for independent variables. Second, we use instrumental variables to address the possibility of the results being driven by omitted unobserved variables. Borrowing insight and evidence from the sociological and anthropological literature, we use the relative locations of husband and wife's parents as a determinant of mother's autonomy. This is a valid instrument if it induces variations in mother's autonomy but is uncorrelated with other individual characteristics that affect both female autonomy and schooling of children. We find that relative proximity does significantly explain autonomy.

While proximity to only wife's parents is likely to raise her autonomy, it might also improve child outcomes independently through greater child care. Hence we use we have used relative closeness to mother's vis-a-vis father's parents. There is no a priori reason why a child's paternal grandparent will care about her more(less) than her maternal grandparents.

[6]For example, Demographic Health Survey has been asking these questions for all its rounds. However, DHS asks these decision questions only to the female members of a family.

[7]In this paper we use female and mother interchangeably since we restrict our sample of children whose both parents are alive. However, the idea of using principal components for constructing an autonomy index can be extended to any woman within a family.

Further concerns regarding the exogeneity of the instrumental variable arise if the same individual characteristics influence both whether grandparents locate themselves close to their grandchildren's families and affect child outcomes. We utilize information on the birth location of grandparents to construct our instrument. To the extent that birth locations are exogenous, our model is identified by the correlation between birth location and current location of grandparents. Moreover, we provide further evidence that, in Mexico, individuals do not principally move to relocate themselves close to family or to get away from them. Migration decisions are mainly driven by employment and education considerations. Hence our findings indicate that while relative grandparental proximity is a strong predictor of mother's autonomy, it is unlikely that variations in grandparental proximity are correlated with unobserved characteristics that affect child outcomes. Identification issues have been discussed in more detail in section 4.

We find that higher mother autonomy is generally associated with higher secondary school enrollment and retention. However, these effects are more significant for boys who are in their pre and early teens. For older boys, the autonomy effects get weaker. For instance, our estimates suggest that if the decision regarding child's education is taken by mothers instead of fathers, the probability of dropout decreases by 1.62 percentage points for boys in the 10-14 age group. Moreover, boys seem to gain at the expense of girls within the mixed-sex-sibling families.[8] There are no effects of autonomy on boys for families with only sons. Finally, our analysis also sheds light on the mechanism through which benefits from higher autonomy of mothers accrue differently to boys and girls.Our findings have important implications for the new trend in global development policy - conditional cash or in-kind transfers handed out directly to the female member of a family. This is particularly relevant in Mexico, the

[8]Changing one decision leads to a change in the value of the index leading to a change in outcome variable. This is discussed in detail in section 5.

country under study here, which implemented Progresa in 1999 and is currently carrying out the newer version of the program, Oportunidades - programs that give cash to families conditional on children's education and health outcomes.[9] Our work is also located within the strand of literature that rejects the unitary model of household a la Becker(1991) and questions whether income is not fungible. The theoretical question is whether household decisions are a result of utility maximization by a representative agent, or of a bargaining process between various members of the household, notably between husband and wife as far as decisions regarding the household resource allocation are concerned. If household welfare outcomes are sensitive to women's autonomy in intra-household decision- making, there is further evidence against the unitary model.[10]

However, while one of our findings rejects the unitary model, other findings caution against the ambitious policies directed towards women. The relevant policy question is whether redistribution of resources from a male to a female member would improve the welfare outcome for children. We show that it may not necessarily be the case even when the women in the family themselves choose how to spend the money.

The rest of the paper is organized as follows. We discuss the Mexican Family Life Survey dataset in the next section. Then we present the logic of using principal component analysis to form a measure of female autonomy in section 3. The following two sections specify our empirical model and identification strategy and discuss our empirical findings respectively. We conclude our paper by summarizing our findings and discussing their policy implications.

[9]Examples of conditional cash transfer programs abound. Apart from the Oportunidades, there are Bono de Desarrollo Humano (BDH) in Ecuador (Paxson and Schady, 2007) and Familias en Accin in Colombia (Attanasio et al., 2006)

[10]We use "household welfare" and "child welfare" interchangeably in this paper as children welfare has arguably been the most prominent focus of the researchers and policy-makers. In the rest of the paper, we talk about our specific welfare measures - secondary school retention and domestic child labor.

2 Data and Descriptive Statistics

The data come from the Mexican Family Life Survey (MxFLS) - a nationally representative longitudinal household survey in Mexico. There are two waves of the data. The first one took place in 2002, and a sizeable proportion of individuals were tracked in 2005 resulting in a two-year panel.[11]

The survey contains detailed information on a wide range of individual and household characteristics, including household demographics, dwelling characteristics,household financial and non-financial assets, household member income and education levels (thereby helping us construct parental education), household consumption and household labor supply. In addition, as expounded in more detail in the next section, the survey interviews each adult member of the household about various aspects of household decision-making allowing us to look into the black box of intra-household decision-making and power-sharing. Finally, there is information on spatial characteristics such as municipality, locality and urbanity allowing us to include spatial fixed effects in our specifications.

Please insert Table 1 here

Table 1 provides some basic characteristics of the data. There are 8044 households surveyed in 2002 and 8114 in 2005, respectively. Roughly 20% of the households are female-headed suggesting that decision-making power within a family still lies mostly with men. Additionally, only 20% of the female household heads are married implying that these women run the family because they do not have a husband. This information is probably banal in the context of most developing countries, but supports the fact in our context that women lack autonomy in decision making as a cultural default and a variation in such autonomy and

[11]It is difficult to calculate the exact attrition rate as the rate varies depending on the relevant sample we choose in terms of age and cohort.

its implications are no trivial questions. Female household heads also have significantly lower education. While roughly 40% of the male household heads have secondary education, the number is only 27% for the female household heads. A similar trend is present for workforce participation. Roughly speaking, the female workforce participation rate is about half of the male counterpart. Together, these statistics show us that Mexican families surveyed here are similar to the general experience of gender imbalance in developing countries - women study less, work more at home and for less wage income, and are less likely to run families while a man is alive and present.

Please insert Table 2 here

Table 2 profiles primary and secondary school enrollment for children aged between 5 and 16 years. Not surprisingly, primary enrollment is almost universal at more than 96%, but secondary enrollment has lagged behind, both for 2002 and 2005. [12] Interestingly, while primary enrollment rate is slightly higher for girls in the age group of 10-12 years, it is less than the boys in the next age group of 13-16 years suggesting that proportionally more girls drop out at the secondary level.

3 Measuring Female Autonomy - A Principal Component Approach

The MxFLS survey includes questions on various decision making aspects which are asked to both male and female adult members of the household. In our case, we consider decision-making only by the adult members who have children. In other words, we are interested in

[12] his is consistent with the aggregate, country-level data reported by World Bank (WDI, 2010). According to this database, net primary enrolment was 97.22% and 97.78% respectively for 2002 and 2005. However, secondary enrolment was only 61.65% in 2002, but grew to 67.57% in 2005.

the decision-making of parents, and consequently, various outcomes of their children. We consider the decisions made on the following 12 categories: household food consumption, husband's clothes, wife's clothes, child's clothes, child's education, child's health, and expenditure on durable, transfers made to parents or relatives of the husband, transfers made to parents or relatives of the wife, husband's labor force participation, wife's labor force participation and the use of contraceptives.

Each household member is asked about his/her perception of who takes the decision in each of these categories, but we focus only on the responses of the parents in cases where both parents are alive. Moreover, we construct the female autonomy indices based on father's responses rather than the mother's perception. In other words, our index, Mother's Autonomy Index (henceforth, MAI) can be thought of as an indicator of the degree of autonomy the husband is willing to give his wife.[13]

For any parent-child-combination, i, we assume that with respect to a particular decision category, female autonomy is strongest when husband(i) perceives that his wife(i) takes the decision in that category. On the other hand, female autonomy is weakest when the husband(i) perceives that he himself takes the decision in that category. The perception that both are involved in decision making lies somewhere in between. One way of computing an index would be to compute the average proportion of categories in which the husband thinks his wife takes the decision. However, this method assumes equal weight for all categories in determining overall bargaining power within the marriage, which need not be the case. For example, the husband can choose to let the wife decide on her own about her clothes,

[13]MxFLS is somewhat unique in asking these questions to both husbands and wives. Other surveys such as DHS and ENADID in Mexico ask these questions to only the female members of the family. We believe that in a mostly patriarchal society (see our discussion about households being mostly headed by male members), a male member's perception about the decision making autonomy of female members is a more accurate measure of female autonomy than their own perception of self-autonomy.

probably a less important category, but keep her decision to work to himself. Hence we adopt an alternative strategy and let the variability in the data decide how much weight to put on each category.[14] For each decision category, we create a categorical variable that equals 3 when the husband thinks that his wife takes the decision, equals 2 when he thinks that both take the decision and equals 1 when he thinks that he takes the decision. We use factor analysis to determine the weights that each decision category is assigned. We then use the first principal component as a measure of female autonomy as perceived by her husband. In our sample, the first principal component explains about 25% of the variability in the data.

3.1 Method

Intuitively, the principal components approach helps reduce dimensionality of the data and yet capture the underlying variability. It produces mutually orthogonal linear combinations (eigenvectors) of a set of variables that capture the common pattern in the data. The eigenvector that has the highest eigenvalue, (i.e. the linear combination that captures the highest variability) is the first principal component. Formally, the strategy underlying the principal component methodology is the following: Suppose we have k variables for k decision categories that together determine the bargaining power of the spouse within the marriage. Consider the following linear combinations:

[14]Nevertheless, we check the robustness of our results with average number of categories in which the mother takes decisions as a measure of her autonomy.

$$z_1 = a_{11} * x_1 + a_{12} * x_2 + ... + a_{1k} * x_k$$

$$z_2 = a_{21} * x_1 + a_{22} * x_2 + ... + a_{2k} * x_k$$

$$z_k = a_{k1} * x_1 + a_{k2} * x_2 + ... + a_{kk} * x_k$$

Where x_k is the variable denoting who takes decision in the kth category. In our case, $k \in \{1, 2, , 12\}$ and $x \in \{1, 2, 3\}$. For example, suppose category two is child's education.Then x_2 takes a value 3 if only the mother takes decision about her child's education. Likewise, x_2 takes a value 1 for the household where only the father decides about the child's education.Principal components maximizes the variance $V(z_1)$ subject to the restriction that $a_1'a_1$=1 The normalization of eigenvectors a_i to unity is done because if any z_1 (eigenvalue) maximizes $V(z_1)$ any other vector nz_1 will also have the same property. Thus principal component analysis minimizes the sum of the squared perpendicular distances unlike OLS that minimizes the sum of vertical distances. z_1 is called the first principal component and is the linear combination that has the highest variance. In a similar way we can find the kth principal component, the vector Xa_k , which maximizes $z_k'z_k$ subject to the normalization $a_k'a_k$=1 and subject to the additional restriction that these principal components are orthogonal to each other. The variances of the k principal components decrease from 1 through k. i.e. $V(z_{k-1}) > V(z_k)$.[15] Table 3 provides a summary of the index in our sample. The mean value of the index is zero by construction. The standard deviation is 1.63. Recall that each decision category takes a value of 1, 2 or 3 depending on whether only father decides, both

[15] An ad hoc strategy to construct an index of the mother's autonomy would be to set the weights $a_ij = 1$ (for all i and j) and hence use the average of all categories. We use that index for testing the robustness of our results.

parents decide or only mother decides, respectively.

Please insert Table 3 here

Thus, if a category moves from the 1 to 2 (or 2 to 3), the index increases by the amount of its weight. For example, the index of female autonomy increases by approximately 0.87 units when the decision about child's education is taken by both parents as opposed to only by the father. However, female autonomy is higher by (0.87*2) 1.8 units when the decision is taken only by the mother as opposed to only by the father. In other words, as explained before, the weights in column 4 indicate the relative importance of each category in the construction of the index, where they are themselves determined by their variability in the data. Thus, a child's education decision seems to be the most important variable with regard to female empowerment, followed by decisions about child health.

3.2 Validation

One way to validate whether our index truly reflects female autonomy within marriage is to check its association with other measures of bargaining power or female autonomy that have been used in the literature. While there is a dearth of direct measures of female empowerment, the literature on power sharing within marriage outlines several important correlates of female bargaining power viz. parental education, outside options (employment status) and parental age among other things.

Table 4 illustrates the relationship between various parental characteristics and our index of female autonomy. Specifically if we compare the high (75th percentile) and low ends (25th percentile) of the distribution of the female autonomy index, we find that in households where mothers have a greater autonomy in decision making, they are also more likely to have

completed secondary education, younger in age and slightly more likely to be employed. The same is true for father's characteristics.

Please insert Table 4 here

However, we do not find a significant difference in urbanization between households with high and low female autonomy.

3.3 Mother's Autonomy and Child Education - Stylized Facts

Given the strong evidence on the validity of our index, we next turn to our second question in the paper - whether mother's autonomy in decision making affects child outcomes. The basic idea behind our regression strategy is illustrated in table 5. It shows mean education and employment of the children for high and low degrees of mother's autonomy in decision making.

Please insert Table 5 here

As before, high and low are defined as greater-than-75th and lower-than-25th percentile of the distribution of MAI, respectively. As shown earlier, enrollment drops significantly as children progress from lower to higher secondary. However, a comparison of rows 1 and 2 show that the drop in enrollment is much higher for lower levels of Mother's Autonomy. For male children, while enrollment drops by 24 percentage points in households with higher Mother's Autonomy, it drops by 32 percentage points in households in the bottom 25 percent of the Mother's Autonomy distribution, similarly for girls. However, this is a descriptive snapshot of the data, without controlling for other relevant variables.

4 Regression Specification and Identification Strategy

4.1 Effects of Mother's Autonomy on her child's Retention in secondary school

While the evidence in Table 5 suggests that children with more autonomous mothers have a higher rate of secondary enrollment on an average, it does not imply any causal link. Omitted variables may drive both education choice and mother's autonomy. Hence, we turn to a formal analysis to see if there exists a causal relationship between mother's autonomy and child outcomes. We first look at the secondary enrollment outcome of the students in 2005 with the lagged value of mother's autonomy from 2002 to ameliorate the simultaneity problem.[16] However, this measure can be imprecise because it includes students who were never enrolled in the first place in 2002, the year from which the autonomy index variable comes. Therefore, we also look at secondary enrollment of students who are 10-14 years old in 2005 conditional on the criterion that they were enrolled in school in 2002, either primary or secondary. Accordingly, if a student is not enrolled in secondary school in 2005, then she is categorized as a dropout. We also control for several candidate alternative explanations cited in the literature such as wealth and parental education.

Formally we start with estimating the non-linear regression equations of the following form:

$$O_{i,2005} = \beta_0 + \beta_1 * MAI_{i,2002} + X_i * \gamma + u_i, \tag{1}$$

where for each individual child i, $O_{i,2005}$ is the respective binary outcome variable,

[16]Since our dependent variable is binary, using an individual fixed-effects model is problematic as pointed out by Fernandez-Val (2009).

$MAI_{i,2002}$ is the measure of mother's autonomy within family in 2002, and X is the matrix of control variables that includes various individual, parental and household characteristics such as gender, age, family wealth and parental education. Our main coefficient of interest is $beta_1$, in terms of the direction of change. We provide the marginal coefficients from the latent model to understand the magnitude of the effect. As discussed above, $O_{i,2005}$ represents secondary enrollment dummy in the first specification, which is equal to unity if the relevant child is enrolled in school in 2005; it represents secondary dropout in the second specification where it is equal to unity if the relevant child is not enrolled in school in 2005, but was enrolled in 2002, either at the primary or at the secondary level.

4.2 Instrumental Variable Strategy

While using a lagged value of MAI by exploiting the panel structure of the data accounts for any concerns of simultaneity, it cannot address the possibility of omitted variable biases. To account for both measurement error and omitted variable biases, we construct an instrumental variable by combining insights from the other social science literature with the pattern of domestic migration in Mexico.[17] Our instrumental variable strategy is based on the twin observation that proximity to natal kin increases female bargaining power within her family, and forces behind location choice of agents are exogenous to the autonomy-child education relationship. In particular, the MxFLS asks all adult household members whether their parents were born in the same locality (in geographic terms, this is a subcategory of munici-

[17]The previous literature has used a wide range of variables as exogenous determinants of female autonomy or bargaining position of female within marriage. For example, Hoddinott and Haddad (1995) use relative income while Schultz (1990) and Thomas (1990) use non labor income as proxy for bargaining power. Others have used current or inherited assets (Doss 1999, Quisumbing 1994). Brown (2009) uses dowry to proxy for bargaining position and then goes on to instrument dowry by grain shocks. However, most of these methods make strong assumptions about exogeneity. Finally, there are studies that use changes in divorce laws or other exogenous policies to proxy for female bargaining position. (Lundberg, Pollak and Wales 1997; Chiappori, Fotin and Lacroix 2002).

pality) as they currently live in or whether they were born in a different locality. Husband's parents are proximate if the couple lives in the same locality as where the husband's parents were born. On the other hand, wife's parents are proximate if the couple lives in the same locality as where the wife's parents were born.[18] We construct relative parental proximity as a categorical variable that takes the value 3 when only wife's parents are proximate, the value 2 when both husband's and wife's parents are proximate or none is proximate and it takes the value 1 when only husband's parents are proximate. For example, we define wife's parents to be proximate when either the wife's mother, or her father or both live in the same locality. Husband's parental proximity is defined similarly.

Sociological and anthropological literature has long documented that proximity to the natal kin influences women's position within marriage. For example, Dyson and Moore (1983), argue that patrilocal kinship structures like village exogamy in marriage leads to lower autonomy of women. By contrast, matrilocal kinship systems endow greater autonomy to women. Yanca and Low (2004) and Chen (2004) provide evidence in different contexts that geographic proximity to the natal kin positively influences various indicators of female empowerment like control over household resources or household work arrangement. Therefore, empirically, relative proximity of the wife's parents should be positively correlated with her autonomy. However, to be a valid instrument, the proximity measure should be excluded from the structural equation - i.e. proximity should not directly affect the outcome variable, nor should parental proximity be determined simultaneously with female autonomy.

It is conceivable that proximity to wife's parents can improve child outcomes not only through an her improved bargaining position but also through care-giving from maternal grandparents to grandchildren. On the other hand proximity to husband's parents may have

[18]This is the minimum spatial unit in the survey.

a similar independent effect on child outcomes other than the effect through the lowering the bargaining position of the wife. However, a , relative proximity measure is likely to affect child outcomes only through MAI since there is no a priori reason to believe that there exists systematically differential care-giving to grandchildren from the two sets of grandparents.

To understand the other threats to the exogeneity of our instrument concerns, first consider the case that proximity to respective parents might be determined as a result of selective migration of spouses towards or away from their respective parents. However, investigating the reasons for movement within Mexico, we find that employment is the most important determinant of migration for the adult members of the household (please refer to Appendix Table A1). With motive of moving close to or away from family explaining only 1% of overall adult migration in Mexico, it is unlikely that our instrument of relative proximity is determined by systematic migration of spouses towards their respective parents. Moreover, note that for the instrument to be invalid, the husband (wife) must choose to relocate away from his own parents and specifically locate closer to his wife's (husband's) parents. In general, this appears to be an unlikely scenario.

Finally, our IV would also fail if proximity is determined by the current location of grandparents who endogenously choose to move to a locality where adult sons or daughters currently live. For example, parents of a pro-active wife could choose to move close by raising her autonomy level. The omitted variable, "pro-activeness" of the wife might affect both parental proximity and child outcomes in this case.

Thus in order to avoid estimates that are contaminated by endogenous living locations of grandparents, identifying instrument is based on exogenous birth locations of grandparents. Since birth locations are arguably exogenous and are correlated with current locations of grandparents, our model is identified by this correlation of current locations to birth loca-

tions. We define husband's parents to be proximate if the couple lives in the same region as where the husband's parents were born. On the other hand, wife's parents are proximate if the couple lives in the same region as where the wife's parents were born.

Next we provide evidence on the "relevance" of our instruments - that relative parental proximity of spouses and MAI are indeed correlated.

Please insert Table 6 here

Table 6 shows the effect of the relative proximity of wife's parents to husband's parents on the index of female autonomy. Relative proximity of wife's parents has a significant positive impact on the relative decision making power of wives and the coefficient remains unchanged with the inclusion of various controls. Moreover, as the last column shows, when we separate out the indicators of wife's parent's proximity and husband's parent's proximity, it is the proximity of the former that increase female autonomy; female autonomy decreases when of husband's parents live nearby (however, the coefficient is imprecisely estimated). Given that our relative proximity measure strongly predicts MAI we present Two Stage Least Square (TSLS) estimates of model (1) to allay any endogeneity concerns arising from unobserved heterogeneity.

5 Discussion of Results

5.1 Secondary Enrollment

Probit estimates of the effects of mother's autonomy on child's secondary school enrollment status are shown in table 7. The estimates are provided separately for lower secondary (10-14) and higher secondary (15-16) age groups. The estimates in column 1 suggest that mother's

autonomy is positively and significantly associated with enrollment in the lower secondary school. However MAI does not seem to matter for education status at upper secondary levels (column 4). As expected, enrollment decreases at higher ages. Father's education seems to be a robust predictor of overall secondary enrollment. Surprisingly, wealth, proxied by landholding, does not have an effect on secondary enrollment.

Please insert Table 7 here

Moreover, when we decompose the sample into boys and girls, only boys seem to benefit from greater autonomy of mothers. MAI does not have a significant impact on secondary schooling for girls in either of the age categories. The marginal estimates corresponding to the probit estimates in Column 2 are reported in Column 1 of Table 11. The estimates suggest that a 1 percentage point increase in MAI leads to 1.3 percentage point increase in probability of secondary enrollment for a child whose mother has mean MAI.[19]

5.2 Secondary Dropout

Table 8 reports the educational status of the child in 2005 conditional on the fact that she was enrolled in school in 2002. In particular, our dependent variable is the probability of dropping out while still in the school going age.[20] As before, columns 1-3 show results for children who are 10-14 years old and columns 4-6 show results of children aged 15 and 16 years.

Please insert Table 8 here

[19] All marginal effects are calculated at the mean value of MAI and the results are summarized in Table 11 to avoid clutter.

[20] Note that from the conventional point of view, dropout being equal to unity is the undesirable outcome, opposite to enrollment.

Mother's autonomy index has a negative and significant impact on dropout from secondary school in the 10-14 age group but has no effect on higher secondary schooling. Again this result holds only for boys, not for girls. In this case, the marginal effects imply that a one unit increase in MAI leads to a 1 percentage point fall in the dropout rate (Table 11, column 2).

5.3 Results Using Instrumental Variables

We now turn to the instrumental variable estimates. As argued above, our measure of relative grandparental proximity induces variations in MAI but is uncorrelated with underlying variables that affect both schooling and MAI. The instrumental variable estimates are reported in table 9 (enrollment) and table 10 (dropout). We restrict our attention to the younger age group, because as shown above, education outcomes at the higher levels remain indifferent to variations in mother's autonomy.

Please insert Table 9 here

Please insert Table 10 here

Please insert Table 11 here

The IV estimates confirm that greater mother's autonomy leads to higher enrollment and lower dropout for boys. The marginal effects for the enrollment and dropout results are reported in column 3 and 4 respectively of Table 11. To understand the magnitude of the effect, consider the dropout results in column 4. Overall, a one percentage point increase in MAI implies a 3 percentage point fall in the dropout rate. In particular, a shift in the decision making power from fathers to mothers, in the category of child's education

for instance, reduces the probability of dropping out from school by 5.7 percentage points. [21] All IV coefficients are larger than their probit counterparts. Given the nature of potential omitted variable bias in this situation, it is not straightforward to form a prior as to which way the probit estimates will be biased. For example, suppose the omitted variable from equation (1) is the relevant student's IQ, a staple variable in the labor literature. It is not straightforward if this leads to higher autonomy for the mother (where the father wants to give more decision space to wife, or wants more autonomy for himself). However, since our IV estimates are bigger than the probit estimates for both outcome variables, it may be the case that for more able children, the father takes over the decision-making (so that the correlation between IQ and mother's autonomy will be negative creating a downward bias for the positive probit estimates). Contrary to the boys, IV results for girls in lower secondary school (Column 2, Table 10) imply that higher mother's autonomy leads to higher dropout rates for girls. At first glance this might appear to be counter intuitive. However, a closer look reveals that intra household dynamics might be driving the results. We deal with this issue in further details in section 7.

[21] To see this, note that from (1),

$$MAI = \sum_i w^i (d_3^i - \overline{d_3^i}) = \sum_i w^i d_3^i - \sum_i w^i \overline{d_3^i}$$

Let us consider the category education (i=5).

In this category, $w_5 = 0.87$ (from author's calculation). If d_3^5 changes from 1 to 3 (decision taken by father alone to decision taken by mother alone), then MAI increases by 0.87*2 = 1.8 units. To see the eventual impact on dropout, let us consider the estimated marginal effect from the IV regression for boys in the 10-14 age group i.e. for $\beta_1 = 0.322$. i.e. a 10 percentage point increase in MAI results in a 3 percentage point reduction in the dropout rate. Therefore, a switch in decision-making power, for child's education, in favor of the mother leads to 5.7 (1.8*3.2) percentage points decline in the probability of dropout.

6 Robustness Checks

In this section, we perform a couple of sensitivity analysis to see if our results are robust to various alternative definitions of mother's autonomy. In particular, we construct an index of mother's autonomy using two alternative approaches: (i) from the responses of the mothers (as is more common in literature) and (ii) the average number of all categories in which the mother takes decisions within the family.

6.1 Index using mothers' responses

Evidence from MxFLS survey shows that not only are the actual decisions taken by different members of the family, but also perceptions differ with respect to who takes decision in particular categories. Hence mother's response to questions of who takes household decisions do not necessarily match that of father's response. Therefore, we construct the same index using the mother's responses and estimate the same model. The results are presented in Table 12

Please insert Table 12 here

Table 12 is estimated in the same way as Table 9, controlling for all relevant variables as before. Results from Probit and IV estimations are reported in Column (1) and (2) respectively. The results are qualitatively the same as before - greater autonomy of mothers leads to lower dropout for sons and, IV estimates are higher than the Probit results.

6.2 Index using average number of categories

As discussed above, a more common approach in this literature is to work with average number of categories in which a mother takes the decision as a measure of her autonomy.[22] Panel B in Table 12 presents results from estimating the same model with the Mother Autonomy Index being calculated as proportion of cases in which the mother of a child takes decision alone.

Looking at Panel B and comparing the results with row 1 in Table 12, we see again that the results are qualitatively similar. Together, these tables show us that the positive causal relationship between greater autonomy of mothers and better lower secondary education of sons is robust to differences in the specification and definition of MAI. We next turn to investigate the gender differences in results.

7 Discussion of Gender Differences in Results

While differences in outcome between boys and girls are not new in developing countries, the reason is often complex and specific to the underlying social, economic and institutional features. A comprehensive analysis of the conflict of gender interests for children is beyond the scope of this paper. However, one important question in the intra-household resource allocation is whether boys and girls compete with each other for resources. This effect can be confounded in the regression analysis comprising the entire sample as no distinction is made between families with single sex children and families that have both boys and girls in the secondary school age group. To test this hypothesis, we divide our sample between mixed-gender sibling families (families with at least one boy and one girl) and single-gender

[22] See Jensen and Oster (2010) among others.

sibling families (families with male only or female only siblings). Then we estimate the same model in (1) separately for them. Results from this estimation have been presented in table 13.[23]

Please insert Table 13 here

Column 1 shows results for mixed-gender families. These results are qualitatively similar to that of our main results in table 9. However, for columns 2 and 3, showing results for boys-only and girls-only families, mother's autonomy is not a significant variable in explaining dropout anymore. These results point out the possibility that higher autonomy for mothers, as opposed to the previous literature, leads to greater resource allocation to young boys within mixed-gender families.

8 Summary and Policy Implications

We have constructed a new measure of female autonomy to address the issue of whether children benefit more when decisions are taken by the mother than when decisions are taken by the father within family. Our index of mother's autonomy, constructed using a rich set of information on spousal decision making from the MxFLS survey seems to fare well in terms of its associations with variables like education and labor force participation, which are commonly believed to be determinants of female empowerment.

Using this measure we then analyze the effect of mother's autonomy on child's outcomes. The past literature predicts significantly better outcomes for children when mothers have greater bargaining power, the latter being measured by some changes in income. On the

[23]We restrict our analysis to Probit estimates in this case, as the sample size is too small for meaningful IV estimations.

contrary, our results, based on the direct measure of autonomy, are somewhat mixed. While mother's autonomy in family decision making lowers dropout rates from secondary school, boys seem to be the primary benefactors with no similar effect on girls' dropout rates. Moreover, the results weaken with age of the child and finally disappear for children in the upper secondary age ranges. Differences in results between boys and girls seem to come from the fact that they compete for resources within family and boys get more, even when the mother has more autonomy in household decision making. In other words, our results imply that mother's autonomy may not necessarily hasten educational and gender transition in the process of development and any development policy attempting to reach this goal by gender-sensitive transfers should take into account the effectiveness of such policy in general and potentially different implications for boys and girls in particular.

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Table 1: Characteristics of Household Heads in Mexican Family Life Survey

	2002			2005		
Variable	Male HH Head	Female HH Head	Total	Male HH Head	Female HH Head	Total
Age	46.2094	51.8129	47.344	47.4051	54.5806	48.9135
	(15.1624)	(16.5693)	(15.6198)	(15.5882)	(16.1963)	(15.9866)
HH Size	4.4298	3.4546	4.2322	4.7396	3.9719	4.578
	(1.9873)	(2.0407)	(2.0362)	(2.2275)	(2.402)	(2.2867)
Married Dummy	0.7799	0.1933	0.661	0.7715	0.1786	0.6467
	(.4144)	(.395)	(.4734)	(.4199)	(.3831)	(.478)
Secondary and Above	0.4177	0.2748	0.3887	0.4288	0.2758	0.3966
	(.4932)	(.4466)	(.4875)	(.4949)	(.447)	(.4892)
Working for Last 12 Months	0.8843	0.4859	0.8036	0.8581	0.4501	0.7723
	(.3199)	(.5)	(.3973)	(.3489)	(.4977)	(.4194)
Land Owner	0.2109	0.1393	0.1964	0.1733	0.1159	0.1612
	(.408)	(.3463)	(.3973)	(.3785)	(.3202)	(.3677)
House Owner	0.7741	0.7571	0.7706	0.7938	0.7699	0.7888
	(.4182)	(.429)	(.4204)	(.4046)	(.421)	(.4082)
Observations	6414	1630	8044	6406	1708	8114

Note: Standard Deviation in parentheses

Table 2 Primary and Secondary School Enrolment

Age	All	Male	Female
5-9	.9602	.969	.9514
	(.1955)	(.1734)	(.215)
	3292	1645	1647
10-12	.9723	.9691	.9755
	(.1642)	(.1731)	(.1548)
	2704	1359	1345
13-16	.7802	.7925	.7682
	(.4142)	(.4057)	(.4221)
	3430	1696	1734

Notes:
1. Pooled data for 2002 and 2005
2. Each cell represents proportion of students enrolled.
3. Standard Errors are in parenthesis.
4. The third row represents numbers of observations.

Table 3: Mother's Autonomy in different categories of decision-making

Decision Category	Scoring Factors	Mean	Std. Dev.	weights = Score/SD
MAI		0	1.63	
Food	0.1249	2.4046	0.6815	0.1832722
Father's clothes	0.1341	1.6016	0.7912	0.1694894
Spouse's clothes	0.0812	2.6334	0.6418	0.1265192
Child clothes	0.4482	1.8556	0.7978	0.5617949
Child education	0.5036	1.8033	0.5749	0.8759784
Child health	0.4896	1.8238	0.5839	0.8384997
Durable expend	0.1961	1.6978	0.5666	0.3460995
Transfer to parents-relative	0.2579	1.4917	0.5705	0.4520596
Transfer to spouse parents-relative	0.2388	1.843	0.7238	0.3299254
Father LFP	0.1307	1.3706	0.5943	0.2199226
Spouse LFP	0.0491	2.0701	0.7937	0.0618622
Contraceptive	0.2901	1.7081	0.5511	0.5264017

Note: The mean is the proportion of cases in which the mother decides when we define decision as a binary taking value one when only mother decides and zero otherwise

Table 4: Characteristics of parents and relation to mother's autonomy

	All			MAI high			MAI low		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
M Age	16817	36.87	8.84	4210	35.65	8.14	4205	40.25	9.75
M Sec Edu	16836	0.42	0.49	4210	0.45	0.50	4211	0.32	0.47
M Employ	16836	0.26	0.44	4210	0.28	0.45	4211	0.23	0.42
F Age	16811	40.50	10.00	4205	39.31	9.42	4202	44.20	10.79
F Sec Edu	16836	0.46	0.50	4210	0.46	0.50	4211	0.37	0.48
F Employ	16836	0.96	0.19	4210	0.97	0.17	4211	0.94	0.24
Urban	16836	0.55	0.50	4210	0.56	0.50	4211	0.53	0.50

Note: M represents Mother; F represents Father

Table 5: Relationship between MAI and secondary enrolment

	MALE		FEMALE	
Age	10-14	15-16	10-14	15-16
MAI high	.9452	.7055	.9256	.7039
	(.2278)	(.4574)	(.2627)	(.458)
	511	146	484	152
MAI low	.9267	.6077	.9277	.5896
	(.261)	(.4896)	(.2593)	(.4931)
	341	181	401	212

Notes:
1. Standard Errors are in parenthesis.
2. The third row in each panel represents numbers of observations.

Table 6: Determinants of Mother's Autonomy – First Stage

Dependent Variable: MAI in 2002					
	(1)	(2)	(3)	(4)	(5)
Relative Proximity	0.102***	0.0922**	0.0998***	0.0805**	
	(0.037)	(0.037)	(0.037)	(0.037)	
Mother Education		0.0865***	0.0801***	0.0717***	0.0516***
		(0.02)	(0.02)	(0.021)	(0.016)
Father Education		-0.0353**	-0.0474***	-0.0435**	-0.0360***
		(0.017)	(0.018)	(0.018)	(0.013)
Urban			0.186***		
			(0.057)		
Land owner				0.0232	-0.0279
				(0.067)	(0.059)
Matrilocal					0.0947**
					(0.048)
Patrilocal					-0.0748
					(0.048)
Constant	0.472***	0.322***	0.284***	0.939***	0.935***
	(0.078)	(0.1)	(0.1)	(0.23)	(0.14)
Observations	2198	2198	2198	2198	3137

Notes: Robust standard errors are in parenthesis, *** significant at 1%, ** significant at 5%, * significant at 10%

Table 7: Probit Results: Effects of mother's autonomy on secondary school Enrolment

	10-14 All	10-14 Male	10-14 Female	15-16 All	15-16 Male	15-16 Female
	(1)	(2)	(3)	(4)	(5)	(6)
MAI	0.0812**	0.158***	0.0179	0.0309	0.0489	0.0140
	(0.041)	(0.058)	(0.055)	(0.040)	(0.068)	(0.051)
age	-0.234***	-0.175***	-0.286***	-0.391***	-0.517***	-0.295**
	(0.037)	(0.056)	(0.050)	(0.11)	(0.16)	(0.15)
Mother Edu	0.140	0.324	0.00234	0.632***	0.712***	0.619***
	(0.13)	(0.20)	(0.17)	(0.14)	(0.21)	(0.20)
Father Edu	0.421***	0.492***	0.470***	0.411***	0.620***	0.241
	(0.12)	(0.18)	(0.16)	(0.14)	(0.22)	(0.19)
Land owner	0.0336	-0.174	0.320*	-0.0334	0.0486	-0.113
	(0.12)	(0.16)	(0.18)	(0.12)	(0.19)	(0.17)
Male	0.115			-0.0194		
	(0.100)			(0.11)		
Constant	4.640***	3.270***	4.195***	5.895***	8.287***	4.873**
	(0.61)	(0.89)	(0.71)	(1.66)	(2.48)	(2.28)
Observations	1753	826	855	707	325	370

Notes: Robust standard errors are in parenthesis. *** significant at 1%, ** significant at 5%, * significant at 10%

Table 8: Probit Results: Effects of mother's autonomy on secondary school dropout

	(1)	(2)	(3)	(4)	(5)	(6)
	10-14 All	10-14 Male	10-14 Female	15-16 All	15-16 Male	15-16 Female
MAI	-0.0691	-0.149**	-0.00817	-0.0227	-0.0628	0.00925
	(0.042)	(0.060)	(0.057)	(0.041)	(0.069)	(0.053)
age	0.239***	0.179***	0.300***	0.354***	0.562***	0.174
	(0.037)	(0.058)	(0.053)	(0.11)	(0.16)	(0.15)
Mother Edu	-0.129	-0.365*	0.0421	-0.638***	-0.697***	-0.641***
	(0.13)	(0.21)	(0.17)	(0.15)	(0.22)	(0.21)
Father Edu	-0.453***	-0.538***	-0.505***	-0.339**	-0.588***	-0.144
	(0.13)	(0.19)	(0.17)	(0.14)	(0.23)	(0.19)
Land owner	-0.165	-0.0128	-0.405**	0.0616	0.00785	0.136
	(0.13)	(0.17)	(0.19)	(0.13)	(0.19)	(0.18)
Male	-0.149			0.0254		
	(0.10)			(0.11)		
Constant	-4.685***	-3.663***	-4.364***	-5.461***	-8.658***	-2.680
	(0.62)	(0.81)	(0.75)	(1.71)	(2.56)	(2.33)
Observations	1716	814	830	671	308	351

Notes: Robust standard errors are in parenthesis. *** significant at 1%, ** significant at 5%, * significant at 10%

Table 9: Instrumental variable Results: Effects of mother's autonomy on secondary school Enrolment

	10-14 Male	10-14 Female	10-14 All
	(1)	(2)	(3)
MAI	0.891***	-0.749**	0.380
	(0.072)	(0.30)	(0.60)
age	-0.0658	-0.135	-0.204***
	(0.064)	(0.19)	(0.067)
Mother Edu	0.0468	0.241*	0.106
	(0.17)	(0.14)	(0.22)
Father Edu	0.293*	0.0313	0.234
	(0.16)	(0.16)	(0.15)
Land owner	-0.189	0.0200	-0.105
	(0.14)	(0.16)	(0.15)
urban	-0.0658	0.128	0.139
	(0.20)	(0.13)	(0.20)
Male			0.0258
			(0.13)
Constant	0.527	2.901	3.491**
	(1.25)	(2.95)	(1.53)
Observations	507	517	1024

Notes: Robust standard errors are in parenthesis. *** significant at 1%, ** significant at 5%, * significant at 10%

Table 10: Instrumental variable Results: Effects of mother's autonomy on secondary school dropout

	(1)	(2)	(3)
	10-14 Male	10-14 Female	10-14 All
MAI	-0.900***	0.814***	-0.333
	(0.051)	(0.13)	(0.68)
age	0.0602	0.108	0.213***
	(0.052)	(0.13)	(0.068)
Mother Edu	-0.0504	-0.222*	-0.104
	(0.15)	(0.13)	(0.22)
Father Edu	-0.289**	-0.0264	-0.283*
	(0.14)	(0.14)	(0.16)
Land owner	0.155	0.0150	0.0783
	(0.13)	(0.14)	(0.15)
urban	0.107	-0.141	-0.151
	(0.15)	(0.12)	(0.23)
Male			-0.0366
			(0.15)
Constant	-0.356	-2.430	-3.668**
	(0.89)	(2.04)	(1.56)
Observations	502	500	1002

Notes: Robust standard errors are in parenthesis. *** significant at 1%, ** significant at 5%, * significant at 10%

Table 11 : Marginal Effects: mother's autonomy on secondary school dropout

	Probit		IV	
	Enrol	Dropout	Enrol	Dropout
MAI	0.013**	-0.010**	0.302**	-0.322***
	(0.005)	(0.004)	(0.134)	(0.075)
Age	-0.014***	0.012***	-0.022	0.022
	(0.004)	(0.004)	(0.016)	(0.016)
Mother Edu	0.025	-0.024	0.016	-0.018
	(0.015)	(0.014)	(0.053)	(0.051)
Father Edu	0.038**	-0.036**	0.098**	-0.102*
	(0.014)	(0.013)	(0.039)	(0.041)
Land Owner	-0.015	-0.001	-0.066	0.056
	(0.015)	(0.012)	(0.047)	(0.047)
Urban			-0.022	0.038
			(0.076)	(0.059)
Observations	826	814	507	502

Notes: Robust standard errors are in parenthesis. *** significant at 1%, ** significant at 5%, * significant at 10%

Table 12: Robustness Checks: Results with

Panel A: Mother's Response; Panel B: Proportional Measure

Dependent variable: Dropout(Male: 10-14 Years)		
	Panel A	
	(1)	(2)
	Probit	**IV**
MAI	-0.126*	-0.952***
	(0.07)	(0.055)
	Panel B	
MAI	-0.0811*	-0.494***
	(0.042)	(0.026)
Observations	795	486

Notes: Robust standard errors are in parenthesis,
*** significant at 1%, ** significant at 5%, * significant at 10%

Table 13: Sibling sex composition and the Effects of MAI on Retention

	Mixed Sex Sibling	Same Sex Sibling	
	10-14 Male	10-14 Male	10-14 Female
MAI	-0.140**	-0.0745	-0.0977
	(0.062)	(0.13)	(0.12)
age	0.133*	0.291***	0.271***
	(0.073)	(0.095)	(0.067)
Mother Edu	-0.447*	-0.267	0.101
	(0.27)	(0.33)	(0.24)
Father Edu	-0.325	-0.732**	-0.264
	(0.26)	(0.35)	(0.25)
Land owner	0.0132	-0.251	-0.742**
	(0.20)	(0.36)	(0.33)
Constant	-2.817***	-4.870***	-4.551***
	(0.86)	(1.19)	(0.85)
Observations	480	396	399

Notes: Robust standard errors are in parenthesis, *** significant at 1%, ** significant at 5%, * significant at 10

Appendix Table 1: Reason of Migration (Percent)

	Male	Female
Education/training of any home member	11.44	9.48
Going back to place of origin	7.03	4.97
Job of any household member	56.26	40.24
Marriage/union	4.9	23.27
Pregnancy	0.05	0.37
Death of the spouse/couple	0.16	0.33
Somebody else's death	0.63	1.02
Own or spouse's/couple's health	1.05	1.11
Health reasons of somebody else	1.03	1.82
To be closer to the family	7.31	7.45
For insecurity reasons	0.75	0.84
Because of political issues or disturbances	0.3	0.06
To be independent from your family	1.28	1.11
Like that place	2.45	2.21
Natural disasters	0.4	0.31
Deported	0.26	0.08
Other (specify)	4.69	5.34
Total	4,282	4,886