

Labor Market Opportunities and Sex-Specific Investment in Children's Human Capital: Evidence from Mexico *

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Abstract

This paper examines the effects of changes in labor market opportunities for women on the bargaining power of women within households and, ultimately, on investment in children's human capital. I show that a positive demand shock for female labor in a woman's age category increases her bargaining power, and this raises investment in the health of girls relative to that of boys within the household. To identify this effect, I exploit the geographic heterogeneity in demand for younger versus older female labor within the Mexican export manufacturing sector and its differential changes across municipalities between 2002 and 2005. I find that a 1 percent increase in labor demand for older (mostly married) women, caused by a demand shock to the export manufacturing sector, raises the share of decisions made by the wife in a household by 1.3 percent and the chance of a daughter being in good health by 1.1 percent.

JEL-Code: O12, I12, J13, J16, O14, O54

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1 Introduction

Household investment in children’s human capital is of central importance to policy makers in developing countries; governments across the globe have designed and implemented policies to encourage parents to invest more in the health and education of their children.¹ However, there is little hope for designing the most effective policies without an understanding of what underlies the decisions made by parents.

There is a large literature on how parental characteristics and household environment affect investment in children’s human capital in developing countries.² However, there is much less known about the role of the state of the labor market on parental investment decisions.³ Using the geographic heterogeneity in labor demand for different genders and cohorts within the export manufacturing sector in Mexico and its differential changes across municipalities between 2002-2005, this paper identifies a mechanism through which changes in labor market opportunities could induce differential changes in parental investment in the health of boys and girls: changing women’s bargaining power within households.

A theory of household bargaining predicts that an increase in women’s bargaining power within households shifts household spending towards items that women value more. These items could be individual private goods or household public and collective goods, such as food, health services, and children.⁴ Existing evidence suggests that women value family’s health more than men do and that, across developing countries, mothers value daughters relatively more than fathers do.⁵ As a result, increased bargaining power for women could lead to greater investment in girls’ health relative to boys’.

I argue that an increase in demand for older women, who are mostly married, generated by an increase in labor market opportunities for them, raises women’s bargaining power within households, and expenditure share of health services and investment in girls’ health

¹Numerous conditional cash transfer programs across countries (e.g., PROGRESA in Mexico, Bolsa Familia in Brazil, and Familias in Colombia) are some examples.

²A number of studies have focused on the relationship between parents’ education and children’s health or education (Behrman and Wolfe 1987; Thomas, Strauss, and Henriques 1991; Desai and Alva 1998), while other papers have looked into the role of parents’ financial resources (Duflo 2000; De Carvalho Filho 2010). Household composition, including sibling composition and birth order, has also been studied as a determinant of investment in children (Parish and Willis 1993; Morduch 2000; Sawada and Lokshin 2009; Vogl 2011).

³An exception is the relationship between higher return to investment on girls, as labor market opportunities for women expand, and survival rate of girls that has been mostly studied in the context of India and China (Rosenzweig and Shultz 1982; Agnihotri, Palmer-Jones and Parikh 2002; Qian 2008).

⁴As first suggested by Weiss and Willis (1985), we can think of children as collective consumption goods from the parents’ point of view.

⁵Thomas(1990), Strauss and Thomas (1995), and Behrman (1997) provide surveys.

go up as a result. Investment in boys' health does not change significantly with changes in mothers' bargaining power.⁶

There are a number of challenges to identifying changes in mothers' bargaining power, as labor market opportunities for them expand and the link to investment in girls' health. One of the contributions of this paper is to show directly that an increase in demand for older female labor, and therefore mothers' employability and wage rate, is a determinant of women's bargaining power within households. To do this, first, following Bartik (1991), Blanchard and Katz (1992), Bound and Holzer (2000), and Autor and Duggan (2003), and using data from the Social Security Institute of Mexico (IMSS), I construct demand indices that capture exogenous shifts in local labor demand for different gender-age categories: women in the age category of 15-24 years (who are mostly single), women who are 25 years of age or older (who are mostly married), and men. The demand index for each gender-age-municipality cell is constructed based on the nationwide changes in employment of that gender-age category in different industries, weighted by the local labor market-specific shares of employment in each industry. I am able to identify differential demand shocks for younger versus older women since, as I will show later in the paper, the labor market for women in the Mexican manufacturing sector is segregated for older and younger women.

Next, using two panel waves of the Mexican Family Life Survey, I identify the effect of an increase in demand for younger versus older female labor on women's bargaining power, as proxied by the share of decisions made by wife in the household as well as the expenditure share of goods which are assumed to be favored more/(less) by women. The share of decisions made by each spouse is constructed using the data on who makes different decisions within the household in 12 different categories. The results show that it is demand for older women in the labor market that affects women's bargaining power within households; there is no effect of demand for younger women. The magnitudes I find suggest that a 10 percent growth in demand for older women in the export sector translates into a 13 percent increase in the share of decisions made by the wife in the household. Importantly, the effect is not limited to working women, confirming the idea that married women's bargaining power is a function of their wage rate and employability in the market and not their earnings while married.

⁶Atkin (2009) looks at the provision of manufacturing jobs in Mexico and finds that relative to all other women, including those who never work, child height improves for women who end up working in manufacturing due to the new factory openings. That paper does not address the question of whether shifting the bargaining power between parents has had any effect on children's height. Also, given that about 70 percent of women did not work during the period of study, Atkin (2009) does not offer any insight into the potential effect of the new manufacturing jobs on investment in children in the majority of households.

This paper also shows that an increase in demand for older female labor, thus women’s bargaining power within households, results in more investment in girls’ health without any significant effect on boy’s health. One challenge with attempting to isolate the effect of mothers’ bargaining power, as generated by increased labor demand for older women, on investment in daughters is that the increase in labor demand for older women may influence investment in girls through another avenue as well. Families may invest more in girls because the returns to that investment, in terms of longer-run labor market success, have increased. I address this by looking separately at the changes in demand for younger women and older women. I show that while the latter changes mothers’ bargaining power within households, the former does not. If households invested in daughters’ health as the result of better employment prospect for them, one would expect a positive demand shock for younger women to result in a positive and significant effect on investment in girls’ health as well; this does not play out in the data. Instead, it is an increase in demand for older women that has a positive and significant effect on investment in girls’ health. I find that a 1 percent increase in labor demand for older (mostly married) women, caused by a demand shock to the export manufacturing sector, increases the chance of a daughter being characterized as “in good health” by 1.1 percent, and a daughter completing the vaccination course by 1.4 percent.

As it is not obvious how to best measure labor market demand shocks, I test the robustness of my results to the use of another methodology. Increases in Chinese exports to the U.S. following China’s entry into the WTO in 2001 had a differential effect across industries in Mexican export manufacturing sector. I use this differential effect to estimate a change in demand for different gender-age cells in each municipality. I then estimate the effect of changes in demand for labor, brought about by China joining the WTO, on measures of women’s bargaining power and children’s health. These findings are consistent with the earlier results.

The Mexican export manufacturing sector provides an ideal setting to empirically identify the household bargaining mechanism. In Mexico, like many other developing countries, the export manufacturing sector is a major source of employment for women, and shocks to this sector generate large variations in demand for women in the labor market.^{7 8}

⁷According to the World Bank (2007) estimates, in 2003, 60 percent of the total labor force in export processing zones in Mexico were female.

⁸Juhn et al, (2010) examines the changes in the women’s labor market in Mexico during the 1990’s and concludes that between-industry shifts, consistent with trade-based explanations, account for 40 percent of the growth in women’s wage bill share between 1990 and 2000. According to that study, women benefited

By focusing on the export sector, this paper contributes to the very recent literature on how the provision of export jobs changes the incentives to invest in human capital.⁹ In recent decades many developing countries have relied on exports for growth and, since human capital is considered a major determinant of long run growth, it is important to understand how investment in human capital responds to the growth in exports.

Finally, this paper also contributes to our understanding of the gender gap in human capital that has been of considerable concern in developing countries.¹⁰ Depending on whether a country's export specialization patterns are male or female-intensive, export manufacturing could have different effects on the decisions made within households, including investment in children's human capital. More specifically, export specialization towards female-intensive industries could result in disproportional investment in girls' health, if mothers face more and better options to participate in the labor market.

The remainder of this paper proceeds as follows. Section II provides the theoretical framework. Section III discusses the data, empirical strategy, and empirical specification. Section IV shows the results, and Section V concludes.

2 Theoretical framework

Appendix B presents a household decision model in which parents make decisions about their private expenditures as well as public consumption (such as spending on children). The model is based on collective models of the household proposed by Blundell, Chiappori, and Meghir (2005) and Bourguignon, Browning, and Chiappori (2009). These models allow for each parent to care differently about the private and public goods and cover all cooperative bargaining models that take Pareto efficiency as an axiom. Because of that, their empirical predictions are consistent with all possible consumption externalities between household members, and all types of individual preferences.

The solution to the household decision making problem implies that households will have demand functions for private and public goods as functions of total resources (i.e., expenditures), individual and household characteristics, and women's relative bargaining

because some of the fastest growing industries in this period were female-intensive industries.

⁹Atkin 2010 (Mexico); Jensen 2010 (India); Oster and Millet 2010 (India); and Shastry 2010 (India) study the provision of low-skill and high-skill export jobs and changes in incentives to stay (enroll) at school.

¹⁰Sen and Sengupta 1983; Das Gupta 1987; Behrman et al. 1988; Baird, Friedman, Schady 2011 provide evidence.

power within the household.

In the literature, different factors have been proposed as determinants of women's bargaining power. Examples of these include, but are not limited to, women's non-earned income and their wage rate in the labor market. There are other factors in the household's environment that may influence women's bargaining power as well. Some examples are employability (number of jobs available), sex ratios in the marriage market, parental wealth, and the legal structure.¹¹ Because of data availability on non-labor income (as an exogenous source of variation in women's bargaining power) in household surveys, many studies have looked at the effect of an increase in women's non-labor income on the allocation of resources, despite its small effect on total household budget.

As discussed by Pollak (2005, 2011), the well-being of a household member at the threat point, and therefore her bargaining power within the household that affects her utility in marriage, is (partially) determined by her "wage rate" and not "earnings".¹² Thinking of earnings as an indicator of bargaining power is a mistake, since the observed earnings at the cooperative equilibrium (marriage) is not necessarily a good proxy for earnings at the threat point. An example, relevant to the context of this paper, is the case of wives who do not work and have no earned income. If a wife does not participate in the labor market when married, but she would work if that marriage dissolves, the fact that she has zero earnings at the cooperative equilibrium cannot predict her earnings if the equilibrium dissolves. In other words, the wage rate is exogenous and is a parameter of the model, while earnings are endogenous; they are equal to the product of the exogenous wage rate and the endogenous, optimal choice of, hours worked. As a result, a wife's earnings while married are not a good indicator of her bargaining power, because her hours worked could change at the threat point. However, the wage rate is an indicator of the bargaining power. For women who do work when married, the wage rate is a determinant of their bargaining power, not because their earnings at the cooperative equilibrium (marriage) go up, but because it positively affects their well being at the threat point.

In this paper I focus on demand for older female labor, which affects both their employa-

¹¹In the wording of McElroy (1990) these are called extrahousehold environmental parameters and include every variable that affects how well each family member could do in the next best alternative outside of the family. These are variables that change the distribution of power within marriage without affecting the preferences or the budget constraint.

¹²Chiappori and Donni (2006) shows that any efficient outcome of the collective approach to modeling decision making in households can be constructed as a bargaining solution and if some distribution factors are known to be positively correlated with a member's threat point, then her power in the collective model should be increasing in that distribution factor.

bility and wage rate, as a determinant of married women’s bargaining power. In the section on empirical analysis, I show that the labor market for women in the Mexican manufacturing sector is segregated for older (mostly married) and younger (mostly single) women in the sense that a demand shock for older (younger) women raises the wage rate and employment only for that group of women and not the other.

As demand for older women (who are mostly married) in the labor market goes up, women’s well being at the threat point and, as a result, their bargaining power within the household improves. For working women, as the employability of women goes up, their chance of staying employed (with a possibly higher wage rate) at the threat point increases and it positively affects their bargaining power. Non-working women will also have more opportunities to participate in the labor market with a higher wage rate at their threat point. This raises their bargaining power within households as well.

The theoretical model predicts that spending on a public consumption good (e.g. daughters’ health) is increasing in women’s (men’s) bargaining power if and only if women’s (men’s) marginal willingness to pay for that public good is larger than that of men (women). Evidence from across developing countries suggests that mothers value daughters relatively more than fathers do, and I will show some evidence that it holds in my sample of households. In this case, an increase in labor demand for older women will increase their bargaining power within households and could lead to more investment in daughters’ health.

3 Empirical Implementation

3.1 Data

This paper combines two different datasets to examine how changes in demand for different gender-age categories within the Mexican export manufacturing sector affect households’ investment in children’s health. The household level data come from the Mexican Family Life Survey (MxFLS). MxFLS is a multi-thematic and longitudinal database that collects a wide range of information on socioeconomic, demographic and health indicators of the Mexican population. I use two waves of the data collected in 2002 and 2005. The dataset is nationally representative, covers more than 100 municipalities in Mexico, and gathers information from more than 8000 households.

A unique feature of MxFLS is that it asks the household respondents who makes the decision regarding 12 different categories of decisions made in the households. Examples

are the food that is eaten in the house, children’s clothing, health services and medicine of children, children’s education, strong expenditures, etc. A decision could be made by one of the spouses, jointly, or someone else (like children). Using these answers, I am able to construct a direct measure of decision making power for each spouse within households. The dataset also reports some of the health variables like number of vaccinations received, and overall health condition individually for each child, making it easy to separately analyze investment on girls and boys.

Table 1 shows some of the household characteristics in MxFLS. The data used in the paper (and presented in Table 1) does not include the extended households. Also, children are limited to the children of the parents in the household who are 18 years old or younger.

Labor market (municipality-level) data come from the Mexican Social Security Institute (IMSS). It includes monthly employment data from all formal private-sector establishments and reports data on each employee’s age, gender, and salary. It also reports the employer’s id, the 2-digit, 3-digit, and 4-digit industry of activity, as well as the state and municipality of the firm.¹³ The universal coverage of this dataset originates from the fact that IMSS provides health insurance and pension coverage and all employees must enroll.

Since this paper looks at the effects of changes in demand for different gender and age categories within the export manufacturing sector (controlling for labor demand in other sectors), I need to identify this sector in my labor market data. I define a 3-digit manufacturing sector as an export sector if more than 50 percent of output was exported in year 2000. The export and output data come from the Trade, Production and Protection 1976-2004 database (Nicita and Olarreaga 2007).¹⁴ The characteristics of the export sector in the IMSS data (for the municipalities represented in MxFLS) are summarized in Table 2.

3.2 Empirical Strategy

My empirical strategy takes advantage of the segregated nature of the labor market for older versus younger women in the Mexican manufacturing sector. I exploit the geographic heterogeneity in demand across municipalities for younger versus older female labor within the Mexican export manufacturing sector between 2002-2005. In this section, I first explain how I measure women’s bargaining power and what I expect to observe as the effect of changes

¹³The aggregations from the firm to industry-municipality level were carried out at the central office of IMSS in Mexico city where the data is held securely.

¹⁴The industry categories used by IMSS and the 3-digit ISIC classification (Rev. 2) were matched by hand.

in labor demand on women's bargaining power. Next, I explain how I measure investment in children's health and then, based on the predictions of the theoretical framework, I discuss the general econometric model used to do the empirical analysis. Finally, I introduce the two different methodologies I use to estimate changes in labor demand for different gender-age categories.

3.2.1 Change in Women's Bargaining Power

When trying to measure changes in women's bargaining power within households or estimate the effect of an increase in the bargaining power of women on household decisions using household level data, researchers usually face two sorts of challenges. The first challenge is that one doesn't observe spouses' bargaining power directly. Because of that, the literature usually examines the changes in household outcomes over which spouses might have different preferences. Examples of these outcomes are spending on men's, women's, and children's clothing (Lundberg et al. 1997; Phipps and Burton 1998; Bobonis 2009), on alcohol and tobacco (Phipps and Burton; Bobonis; Hoddinott and Haddad 1995), on food (Duflo and Udry 2004; Bobonis), and children's health and education (Schultz 1990; Thomas 1990, 1994; Haddad and Hoddinott; Duflo 2003; Duflo and Udry).

The other challenge is that the variables used as the determinants of women's bargaining power, such as the relative earned or un-earned income, could be correlated with unobserved household characteristics that directly affect household outcomes over which spouses have different preferences. Using these household outcomes as indicative of women's bargaining power would lead to biased estimates. For example, if a woman earns more because she has a certain type of job that requires more spending on clothing, that increases spending on women's clothing without really changing the woman's bargaining power. Also, as has been argued in Lundberg et al. (1997), differences in earned or unearned income of spouses are likely to be correlated with differences in wage rates and differences in preferences that are not observable and affect the bargaining power of spouses.

In this paper, I am able to address these concerns in a variety of ways. First I use panel data at the household level. This enables me to control for fixed unobserved household characteristics that could affect households' decisions. I also look at who makes the different decisions within households, that is the most direct way to observe spouses' bargaining power. The literature has not looked at this measure of bargaining power though, since household surveys rarely ask these kinds of questions.¹⁵ MxFLS has data on whether a husband or

¹⁵An exception is Friedberg and Webb (2006) which looks at the data on whether a husband or wife in

wife (or both) makes the decision in 12 different categories. In this paper, I make use of this data to construct a qualitative measure of both spouses' bargaining power; the share of decisions made by each partner. I use this (along with the expenditure share of different goods) to reveal whose preferences are reflected to a greater degree in household decisions and interpret an increase in this variable for each spouse as an increase in her/his bargaining power.

Finally, I utilize the segmented nature of the labor market for older versus younger women in the Mexican manufacturing sector to construct an exogenous determinant of the bargaining power of women within households. A feature of many export industries across developing countries, including Mexico, has been the employment of female labor. However, in the Mexican manufacturing sector, there is a segregated labor market, not only for men and women, but also for younger women, who are mostly single, and older women, who are mostly married. There are sizeable and persistent differences in the share of older female labor across different industries. In some female-intensive export manufacturing industries, such as manufacturing of apparel older, female labor (25 and older) constitutes around 90 percent of the total female labor, and in others, such as manufacturing of automobile electric systems, this ratio decreases to almost 50 percent. The same pattern is observed in male-intensive export manufacturing industries such as manufacturing of electric batteries and manufacturing of cars and vessels. Across 4-digit manufacturing industries in Mexico, the average difference between the share of older labor out of total female labor between 2002-2005 is only 0.03 with the standard deviation being 0.03.

An increase in labor demand in industries with strong preferences for hiring young single women hardly affects the employability and the wage rate of older, married, women, and therefore their bargaining power. I utilize differential demand shocks to different industries to estimate changes in labor demand for younger females (15-24), composed primarily of single women, and women 25 and older, who are primarily married.¹⁶ Consistent with the

the Health and Retirement Study has the final say when making major decisions in a household.

¹⁶The age cutoff could be anything as long as it takes into account some industries' preference for hiring younger workers who are physically able to do the work (electronics) and also the fact that jobs in some industries are more suited for single women because of the nature of the jobs (long hours, night shifts, etc). Given that the aggregated IMSS data reports the employment data for 5-year age-categories (15-19, 20-24, 25-29, etc) I picked the age cutoff at 25 for the following reasons. According to the MxFLS 2002, among women 25 years and older only a small minority (10 percent) are single and among those in the age category of 15-24, the majority (75 percent) are single. Having the age cutoff at 29 is problematic since 45 percent of women younger than age of 30 are not single. This generates an identification problem (although I get similar results with less statistical significance using this cutoff). The age cutoff at 19 also does not work for two reasons. Compared to the number of workers older than the age of 19, there are very few workers

segmented labor market hypothesis, I show that an increase in demand for older women is associated with higher wage rate and employment only for that group of women and not the younger women. Similarly, a demand shock for younger women does not affect older women's wage and employment. Everything else being fixed, I would expect a positive demand shock for older women to raise the relative bargaining power of women within households.

3.2.2 Investment in Children's Health

The evidence from many developing countries supports the idea that mothers are more willing to allocate resources to health services than fathers are. They are also, relative to fathers, more supportive of daughters. As a result, I would expect an increase in the relative bargaining power of the mother to increase investment in daughters' health.

As mentioned earlier, a threat to the validity of interpretation, that it is mother's bargaining power that drives a change in investment in girls when demand for older women goes up, is that increase in investment in girls' health happens because of an improvement in the prospect of labor market participation for girls when they grow up. In other words, parents invest more in their daughters because there is a higher return to that investment. As explained before, since different industries have different preferences for hiring younger workers, there is a segmented labor market for younger vs. older female labor in the Mexican manufacturing sector and I am able to separately measure shocks to younger vs. older female labor. If that is the case that parents respond to more labor market opportunities for their daughters in the labor market by investing more in their health, one would expect to see that households react to the changes in demand for younger women as well; this is not what I find in the data.

Along with the expenditure share of health services within households, I separately look at two measures of health investment for girls and boys. The first variable is "health condition of the child". The questionnaire in MxFLS asks about the health condition of each child and the answer could be very good, good, regular, bad, and very bad. Based on these categories, I create a binary variable that is equal to 1 if the child's health is good or very good and 0 otherwise.¹⁷ Using this binary variable, I construct the fractions of girls or boys in good health in a given household. For example, if a household has three girls and two of them

younger than 19. This makes it difficult to infer from changes in demand in this age category. Also it is very unlikely that industries that look for young labor because of physical fitness (electronics) to have a preference for workers younger than age of 19.

¹⁷The results are not sensitive to the cutoff; results are similar if 1 includes regular, good, or very good.

are in good health and one of them is not, then $\frac{2}{3}$ of the girls are in good health in this household.

The second variable that I use to proxy for investment in children’s health is whether a child older than the age of 4 has completed the vaccination course. As reported in the MxFLS, there are a total of 8 different preventive vaccinations that any child could receive before the age of 4: tuberculosis, sabin polio, diphtheria, pentavalent, triple virus, measles, hepatitis B, and TD.

3.2.3 Empirical Specification

As discussed in Section II, households have demand functions for private and public goods as functions of the Pareto weight, aggregate household resources (total expenditure), and individual and household characteristics. For household i , the basic regression specification is:

$$q_{jimt} = \sum_a \beta_{f,a} D_{fem,a,m,t}^E + \sum_a \beta_{m,a} D_{male,a,m,t}^E + \beta D_{m,t} + \alpha_w y_{i,m,t}^w + \alpha_h y_{i,m,t}^h + \zeta x_{i,m,t} + \gamma_{i,m,t} + \delta_i + \epsilon_{jimt} \quad (1)$$

where q_{jimt} is outcome variable j , representing the natural logarithm of the expenditure share of a household item, share of household decisions made by one of the spouses, or a proxy for investment in children’s health in household i in year t .¹⁸ $D_{fem,a,m,t}^E$ and $D_{male,a,m,t}^E$ are demand for female and male labor belonging to age-category a in municipality m in export manufacturing sector (superscript E represents the export sector) and $D_{m,t}$ is demand for labor in all other sectors of the economy in municipality m . The argument in this paper is that, when a identifies older women who are mostly married, $D_{fem,a,m,t}^E$ is a determinant of women’s bargaining power in the marriage.¹⁹ $y_{i,m,t}^w$ and $y_{i,m,t}^h$ represent the wife’s and husband’s non-labor income, respectively, and are included in the specification since the theoretical framework considers spouses’ non-labor income as a potential source of bargaining power. $x_{i,m,t}$ is total household expenditures. $\gamma_{i,m,t}$ is a set of controls for household characteristics, including the number of children by gender and age (0-5, 6-10, and 11-15

¹⁸Having natural logarithm of the outcome variables as dependent variables allows easy interpretation of the empirical model coefficient estimates. However, the empirical results are robust to the choice of the form for dependent variables.

¹⁹Other than being consistent across genders, there is no specific reason for dividing demand for male labor within the export sector into demand for younger versus older male. Not doing that does not change the results.

years) and each parent's age and education. δ_i represents the household fixed effect. By including household fixed effects in the reduced form regression I am able to control for the unobservable fixed household characteristics that could affect the household decisions. ϵ_{jimt} are unobservable determinants of the outcome variables.

One concern about the specification above could be that the households' earned income is excluded from the regression. If changes in labor demand for women affect the dependent variables through changes in earned income, the coefficient estimates for the changes in labor demand for women would be biased. However, in my estimation, the earned income is controlled for, by using total household income as an instrument for total expenditures. Usually it is the case that in datasets that report expenditures on high-frequency basis (e.g., monthly), one would observe unusually high or low expenditures on a consumption good. For example, if a household spends money on clothing for one of the household members in a given month, the same expenditure might not happen again for the next few months. When the dependent variable is an expenditure share of a certain good, this could induce a correlation between the error term and total expenditures. To deal with this, Browning and Chiappori (1998), among others, uses total household income as an instrument for total expenditures because it is correlated with aggregate household expenditures, but conditioning on it should have no effect on the distribution of expenditures. Therefore, in this paper, I exploit variation in total household income as an instrumental variable for variation in total expenditures.

Also, when I estimate the effect of changes in labor demand on women's bargaining power, I do the empirical analysis separately for the full sample of households and the households that the wife does not work (and generates no earned income as a result). One should note that, according to the theory of women's bargaining power, for women who do not work, similar to women who do work, bargaining power should go up as the value of their outside option increases. This happens when there are more opportunities for them to participate in the labor market and when their wage rate increases.

Given the panel nature of my dataset and the fact that there are two rounds of data available, the empirical specification that is actually estimated is the difference version of equation (1).

3.2.4 Estimating Demand

The problem with using the change in total employment as a proxy for demand shift is that the employment growth in a local labor market can be driven by shifts in local labor supply (through population growth, migration, etc.) as well as demand. As it is not obvious how

to best measure labor market demand shocks, and to check the robustness of my results, I use two different methodologies to estimate changes in demand for different gender-age categories within each municipality:

Methodology I: Nationwide change in employment

The first methodology was originally developed by Bartik (1991) and was used by Blanchard and Katz (1992), Bound and Holzer (2000), and Autor and Duggan (2003), among others. It involves creating a demand index for each gender-age-municipality cell based on the nationwide changes in employment of that gender-age category in different industries, weighted by the local labor market-specific shares of employment in each industry. In other words, I exploit the fact that municipalities have different industrial composition and different gender-age groups play different roles in various export industries.

Predicted growth of labor employment within the export sector in the period 2002-2005 for gender g in age-category a residing in municipality m is given by:

$$\begin{aligned} \hat{D}_{g,a,m,t}^E &= (D_{g,a,m,2005}^E - D_{g,a,m,2002}^E) \\ &= \sum_{k=1}^K \gamma_{k,m} \eta_{-m,k}^{g,a} \end{aligned} \quad (2)$$

K is the number of three-digit industries within export manufacturing sector and $\gamma_{k,m}$ is the fraction of workers in municipality m in year 2002 employed in industry k $\left(\frac{e_{m,k,2002}}{e_{m,2002}}\right)$. $\eta_{-m,k}^{g,a}$ is the log change in national employment of gender g -age category a labor in industry k between 2002 and 2005. The subscript $-m$ in $\eta_{-m,k}^{g,a}$ indicates that each municipality's industry k -gender g -age category a employment is excluded in calculating the national employment change.

This index is a weighted average of the growth in employment in the export manufacturing sector for each gender-age category in each municipality, where the weights represent the different distributions of employment across industries in each municipality. This is built to capture exogenous shifts in local labor demand that are predicted by the municipality-specific industry mix, while avoiding the endogeneity associated with local employment changes. In other words, this methodology predicts what each municipality's change in employment for

a gender-age category in the export manufacturing sector would be if municipality-level industrial composition was fixed in the short term and changes in industry-level employment happened uniformly across municipalities.

In demand index (2), the second term, the log change in national employment of gender g -age category a labor in industry k , excludes employment in municipality m to avoid the endogeneity associated with local employment growth rates. This addresses the concern that the observed change in national employment is driven by the concentration of an industry in a specific municipality. Of course, if a large share of people employed in an industry live in a specific municipality, then one might think that the change in employment in other municipalities does not predict the change in demand in the industry. Looking at the share of each municipality in the employment mix of different industries reveals that, excluding Mexico City from the analysis, no municipality has a share bigger than 11 percent (followed by 8 percent) in the employment of any industry.²⁰

Similarly, the predicted growth of demand for labor in all other sectors in municipality m in the period 2002-2005, is given by:

$$\begin{aligned}\hat{D}_{m,t} &= (D_{m,2005} - D_{m,2002}) \\ &= \sum_{l=1}^L \gamma_{l,m} \eta_{-m,l}\end{aligned}\tag{3}$$

L is the number of all three-digit industries of the economy outside export manufacturing sector, $\gamma_{l,m}$ is the fraction of workers in municipality m in year 2002 employed in industry l $\left(\frac{e_{m,l,2002}}{e_{m,2002}}\right)$, and $\eta_{-m,l}$ is the log change in national employment in industry l .

Methodology II: China's entry into the WTO as a source of change in labor demand

As a robustness check, I test the sensitivity of my results to an alternative measure of labor market demand shocks: the effects of increases in Chinese exports to the U.S. following China's admission to the WTO in 2001 on Mexican export industries. More than 80 percent of Mexican exports go to the United States and evidence suggests that, among Latin

²⁰Even including Mexico City, which has the biggest share of employment in 7 industries among all municipalities, gives us a maximum of 19 percent.

American countries, Mexico has the largest number of common products with China in the U.S. market, meaning that the increases in Chinese exports to the U.S. had a significant negative effect on demand for exports from Mexico (Shafaeddin 2002).²¹ Increases in Chinese exports, however, had differential effects by industry.²²

For estimation, I use the same specification as previously described but replace the measures of demand for different gender-age categories with the corresponding measures of employment:

$$q_{jimt} = \sum_a \beta_{f,a} Emp_{fem,a,m,t}^E + \sum_a \beta_{m,a} Emp_{male,a,m,t}^E + \beta Emp_{m,t} + \alpha_w y_{i,m,t}^w + \alpha_h y_{i,m,t}^h + \zeta x_{i,m,t} + \gamma_{i,m,t} + \delta_i + \epsilon_{jimt} \quad (4)$$

where Emp represents the natural logarithm of employment. However, using the change in employment as a proxy for a demand shift is problematic, in that employment growth in a local labor market can be driven by both shifts in supply as well as demand. To deal with this problem, I use the changes in demand that result from China's entry to the WTO as an instrument for overall employment changes.

My instrument is similar in spirit to the earlier measure of demand shocks I was using, except in this case, I am using the variation induced by China's entry into the WTO. I first classify export industries as "negatively affected" by China. I, then, look at the employment composition within a municipality to determine the employment share of an industry negatively affected by increasing Chinese competition when China joined the WTO. I then weight this by the share of each gender-age cell in that industry. Municipalities with a large share of exports in affected industries will be disproportionately hurt by the China's entry to the WTO, and if older female workers constitute a large share of employees in those industries, then this would represent a negative demand shock for older female in those municipalities.

Industries are classified as "negatively affected" by China as follows. I examine two time periods: 1995-2000 and 2000-2005. If in the second period the growth in exports from Mexico

²¹In addition, Hanson and Robertson (2008) explores the impact of China's increased export capacity on Latin American countries' exports of the top manufacturing industries and finds that without the increase in Chinese supply of these products, export growth in these products could have been 3 percentage points higher in Mexico. Gallagher et al. (2008) finds that in recent years Mexico's main non-oil exports' relative share in the US market is either declining or growing slower than China's. They observe that this is a new trend and begins after China's entry into the WTO.

²²Bloom, Draca, and Van Reenen (2011) argues that increases in Chinese exports following joining WTO have had differential effects by industry in the destination market depending on whether the industry is one in which China has a comparative advantage.

to the U.S. in a particular industry was lower than the earlier period growth while the growth in exports from China to the U.S. increased relative to their earlier period growth rate, an industry is classified as "negatively affected". I end up with 5 out of 11 export industries being classified as negatively affected by Chinese competition. These are textile, machinery, basic metals, clothing, and other manufacturing. While this is clearly a noisy measure of the industries affected by China's increased exports, it is comforting to see that the industries I find to be affected are the same industries classified as such in earlier research.²³

Given this classification, I then construct the instrument for $\Delta Emp_{g,a,m}^E$:

$$D^C_{g,a,m} = \sum_{k=1}^N \left(\frac{e_{-m,k,2002}^{g,a}}{e_{-m,k,2002}} \right) \left(\frac{e_{m,k,2002}}{e_{m,2002}} \right) \quad (5)$$

where N is the number of three-digit industries within the export manufacturing sector that were negatively affected by China's entry into the WTO. The methodology assumes that, everything else being the same across municipalities, industries that were negatively affected by Chinese competition were affected with the same magnitude that, of course, does not match the reality. What I am trying to do is to make a separation between municipalities that concentrate in industries that were negatively affected by Chinese exports to the U.S. and the ones that were not.

The idea can be illustrated using a simple example. For simplicity, assume that there is only one age category. Suppose there are two municipalities, A and B, and two industries, 1 and 2. Industry 1 is negatively affected by China's entry into the WTO and only employs female labor. Industry 2 is not negatively affected by China's entry into the WTO and employs both male and female labor. Municipality A employs all of its employees in industry 1 and municipality B employs all of its employees in industry 2. When the shock (increased Chinese competition) happens, demand for female labor in municipality A goes down. However, one does not observe any changes in employment of female (or male) labor in municipality B.²⁴

The first stage is strong: in each municipality, the share of employment in industries that were negatively affected by China's entry into the WTO combined with the role of a

²³Lopez-Cordova et al. (2008) shows that during the 2000-2003 period, Chinese exports of apparel and textiles to US grew at 7.3 percent annual rate, while Mexican exports declined 8 percent a year. In machinery and equipment, while China's exports grew by 15 percent a year, exports from Central America went down at almost 18 percent per year.

²⁴I am assuming that industries respond to lower level of production by demanding less labor force.

gender-age category in those industries has a negative and significant impact on changes in employment for that gender-age category in the export manufacturing sector (F statistic 12.61).

4 Results

Before presenting the results of the empirical analysis, first I provide more evidence that there is a segmented labor market for older vs. younger women in the Mexican manufacturing sector and, therefore, we should expect a positive demand shock for older female labor to increase married women's bargaining power within households. Next, separately for the two methodologies used for estimating changes in labor demand, I present the effects of changes in demand for different gender-age categories on women's bargaining power within households and investment in children's health. Finally, using just the household level data and the measures of spouses' bargaining power, I argue that, consistent with evidence from other developing countries, it is indeed the case that an increase in mothers' bargaining power within households is associated with more investment in daughters' health.

4.1 Segmented Labor Market for Younger vs. Older Female Labor

As discussed earlier, various industries in the Mexican manufacturing sector have different preferences over hiring younger vs. older female labor. If this is the case, women in different age categories could face differential shocks to their labor market opportunities as the result of shocks to different industries. Hence, one would expect that an increase in demand for older women to be associated with higher wage rate and employment only for that group of women and not the younger women or men. Similarly, a demand shock for younger women should not affect older women's wage and employment. Column (1) in Table 3 shows the results from running a regression in which the dependent variable is the logarithm of the average wage of working women in the age-category of 25 years and older in each municipality (represented in IMSS data) that women participate in export manufacturing sector. The explanatory variables are changes in demand for different gender-age categories of labor in the export manufacturing sector, controlling for changes in demand in other sectors of the economy and the state specific time trend.

The results indicate that a 1 percent increase in demand for older women, caused by a demand shock to the export manufacturing sector, is associated with 1.1 percent increase

in the average wage of older women. Changes in demand for other groups do not seem to be significantly associated with the average wage of older women. In column (2) I do the same analysis with the dependent variable being the average wage of working women in the age-category of 15-24 years old. Changes in demand for older women do not affect younger women’s average wage and the effect of an increase in demand for younger women in the export sector is positive but not statistically significant. Columns (3) and (4) report the results when the dependent variable is the number of employment for the two groups. Results are consistent with the segmented labor market hypothesis.

Next I present the results of the empirical analysis separately for the two methodologies used for estimating changes in demand.

4.2 Demand Estimation Methodology I

4.2.1 Changes in Labor Demand and Women’s Bargaining Power

In this section I show that an increase in demand for older female labor (who are mostly married) in the export sector raises women’s bargaining power within households.

If q_{jit} in equation (1) represents a proxy for women’s bargaining power or the expenditure share of a commodity that is assumed to be valued more by women, and the gender-specific demand is calculated for two age-groups (a); 15 – 24 and 25– (25 years and older), what I expect to see as the result of estimating the effect of changes in demand for different gender-age categories is that $\beta_{f,25-}$ is positive and significant, increasing demand for older women increases the bargaining power of women within households. I also expect the estimate for the effect of other gender-age categories not to be statistically significant; controlling for demand for older women, bargaining power of women in households is not affected by a change in demand for other gender-age categories in the labor market.

Table 4 shows the effect of changes in labor demand for different gender-age categories on the expenditure share of five different items that have been discussed in the literature as indicative of women’s bargaining power within households. To show that it is actually demand for older women that affects married women’s bargaining power, for each dependant variable, the first column reports the results of specification (1) when demand for female labor is aggregated and the second column reports the results when demand for female labor is disaggregated into demand for younger and older female labor. It is important to note that, for the analysis in this section, the sample consists of only families with both wife and husband present in the household, since I am interested in the change in the relative power

of women versus men in the household.

The five consumption goods, whose expenditure share could be indicative of women's bargaining power, are women's clothing, child's clothing, tobacco and gambling, health services, and food.²⁵ The coefficient estimates indicate that a 1 percent increase in demand for women 25 years and older, caused by a demand shock to the export manufacturing sector, leads to a 6.2 percent increase in the expenditure share of women's clothing and a 4 percent increase in health services expenditure share.²⁶ It also leads to a 4 percent decrease in the expenditure share of tobacco and gambling, consistent with an increase in women's bargaining power within households.²⁷ When the dependent variables are child's clothing and food, the sign of coefficient estimates for changes in labor demand for older women are consistent with an increase in women's bargaining power, although they are not statistically significant.²⁸

Table 12 in appendix A shows the effect of changes in demand for different gender-age groups on other expenditures reported in MxFLS that are not necessarily expected to change in a specific direction with a change in the bargaining power of women.

As explained earlier, I use another variable, the share of decisions made by each spouse within the household, to observe whose preferences are reflected to a greater degree in household decisions.²⁹ I use this variable to reveal whose preferences are reflected to a greater degree in household decisions and interpret an increase in this variable for each spouse as an increase in her/his bargaining power.

The first two columns of Table 5 show that, although increase in aggregate demand for female labor has a positive effect on the share of decisions made by wives, it is an increase in demand for older women that drives the result. The magnitude of coefficient estimate on demand for older women implies that a 1 percent growth in demand for older women, caused

²⁵Food includes meat, fruit, vegetable, and grains and does not include spending on meals outside household, which could complicate the interpretation of the results since if women start working, as the result of the new opportunities in the labor market, and spend less time at home, the household spending on meals could go up.

²⁶Note that these are the effects of a 1 percent increase in demand in the labor market, generated solely by demand shocks to the export sector. Given that in a typical Mexican municipality export manufacturing sector employs around 20 percent of workers, the effects are equivalent to the effect of a 5 percent increase in demand within the export sector.

²⁷It is usually assumed that tobacco and gambling are commodities favored more by men, and one should expect an increase in women's bargaining power to lead to a smaller expenditure share for those commodities.

²⁸Note that households who receive some kind of non-labor income constitute only about one eighth of my sample and I cannot get any significant estimate for parents' non-labor income.

²⁹I assume a decision is made by a specific partner if it is made either solely by that partner or is made jointly.

by a demand shock to the export sector, translates into 1.3 percent increase in the share of decisions made by women, all else fixed. In column (3) the dependent variable is the share of decisions made by man in the household. The results imply that, men's bargaining power does not change by more labor market opportunities for them.

If in the analysis above demand for older women is a determinant of women's bargaining power within households, one would expect that the pattern in Table 4 not to be repeated, and measures of women's bargaining power not to change, if the sample of households is limited to the ones with single women who live by themselves or with their children. Table 6 summarizes the results for that group of households. Unlike Table 5, here I cannot use the share of decisions made by the wife as a measure of women's bargaining power, since there is no husband in the household and the woman takes all the decisions. The estimates show that changes in demand for women in the labor market do not affect bargaining power of single mothers and women who live alone.

The Case of Non-Working Women

The theoretical framework and, as the result, the empirical specification, takes into account the possibility of changes in the earned income for both partners by controlling for total household expenditures instrumented by total household income. However, for women who do not work, similar to women who do work, bargaining power changes with no associated changes in family income and I should be able to identify the changes in women's bargaining power when I look at the subsample of non-working women. For this group of women, like other women, bargaining power goes up as the value of their outside option increases. This happens when there are more opportunities for them to participate in the labor market and when the wage rate increases. Table 7 summarizes the results of the same estimations as in Tables 4 and 5 among households in which the wife does not work in the period of my analysis.

I find the same patterns as in Tables 4 and 5. Although some of the coefficient estimates of changes in demand for older women are less significant when the dependent variable is a household expenditure share. Importantly, the share of decisions made by the wife (that is the best measure of women's bargaining power in this analysis) goes up significantly as the result of changes in demand for older female labor. The coefficient estimates imply that, all else fixed, a 1 percent increase in demand for older women, caused by a shock to the export sector, translates into 1.1 percent increase in the share of decisions made by women who do

not work in the period of my analysis.

4.2.2 Changes in Labor Demand and Health Investment

As explained earlier, in addition to the expenditure share of health services, I separately look at two measures of health investment for girls and boys; the reported health condition of the child, and whether a child, older than the age of 4, has completed the preventive vaccination course. What I am interested to see is how changes in demand for different gender-age categories of labor affect investment in children's health. I estimate equation (1) with the dependent variables being the indicators of investment in children's health and the gender-specific demand is constructed for two age-groups (a); 15 – 24 and 25– (25 years and older).

The first column of Table 8 replicates column (8) in Table 4, when the dependent variable is the logarithm of the expenditure share of health services within households. The estimates indicate that a 1 percent increase in demand for older women, caused by a shock to the export sector, translates into a 4 percent increase in health services expenditure share within households. Increases in demand for other gender-age groups do not seem to significantly affect the expenditure share of health services.

The next columns in Table 8 report the coefficient estimates for the regression analysis (1) when the dependent variables are the logarithm of the average health condition of children, and the chance of a child older than the age of 4 completing the vaccination course. The results are reported separately for girls and boys. The results imply that an increase in demand for older women positively affects the girls' reported health condition and does not affect that of boys. Controlling for other factors, a 1 percent increase in demand for older women raises the chance of a daughter to be characterized as in good health by 1.1 percent.

The same increase in demand for older women raises the chance of a girl completing the vaccination course by 1.4 percent. Column (5) reports the estimates when the dependent variable is the chance of a boy older than the age of 4 completing the vaccination course. An increase in labor demand for older women does not have a significant effect and increase in demand for younger men has a positive effect.

The results, in general, seem to show that an increase in labor demand for older women in the labor market raises investment in daughters' health with no significant effect on boys' health. Also, an increase in labor demand for younger women in the labor market does not affect investment in daughters' health, ruling out the scenario that households invest more in their daughters' health as the prospect of labor market participation for them improves.

If households invested in daughters' health as the result of better employment prospects for them (as opposed to increased bargaining power of mothers), one would expect a positive demand shock for younger women to result in a positive and significant effect on investment in girls' health as well. It is harder to argue the same for boys, since as demand for younger men goes up in the labor market we observe that there is a higher chance that boys complete the vaccination course.

4.3 Demand Estimation Methodology II

Next I present the effects of changes in labor demand for different gender-age categories on women's bargaining power and investment in health using the demand estimation methodology that utilizes China's entry into the WTO as an exogenous shock to different Mexican export industries.

Table 9 uses the dependent variables as in Tables 4 and 5 to estimate the effect of changes in labor demand on women's bargaining power within households. The results follow the pattern observed using the other demand estimation methodology, although the coefficient estimates for changes in demand for older women are generally smaller and less significant. However, when the dependent variable is the share of decisions made by women within households, the coefficient estimate for changes in demand for older women is statistically significant and implies that, a 1 percent increase in demand for older women, caused by a demand shock to the export sector, translates into 0.9 percent increase in the share of decisions made by women within households.

Table 10 replicates Table 8, on the effects of changes in labor demand for different gender-age categories on investment in health. The results are consistent with what has been argued in the paper and what is reported in Table 8. The magnitudes I find suggest that, a 1 percent increase in demand for older women, caused by a demand shock to the export manufacturing sector, raises the expenditure share of health services by 3.4 percent and the chance of a daughter being characterized as in "good health" by 0.8 percent. The probability of a son being characterized as in "good health" does not change. The effect of an increase in labor demand for older women on the chance of a girl older than the age of 4 completing the vaccination course is positive but not statistically significant.

4.4 Women's Bargaining Power and Investment in Children's Health

Given that increase in labor demand for older women raises women's bargaining power within households, if women display a relatively greater altruism for girls than for boys compared to men or discriminate less against their daughters than their husbands do, one would expect to see that increases in labor demand for older women to result in greater investments in girls' health relative to boys', as observed here in this analysis.

Evidence from different developing countries suggests that it is actually the case that mothers value daughters relatively more than fathers do (Behrman (1997) surveys the evidence for this observation). Among others, Thomas (1990) shows that in Brazil mothers prefer to devote resources to improve the nutritional status of their daughters and Thomas (1994) demonstrates that women's non-labor income has a positive effect on daughters' health but not on sons' health. Dufflo (2000) finds that in South Africa pensions received by women had a large impact on the anthropometric status of girls but little effect on that of boys.

Table 11 shows the results from a regression analysis, using data from my sample of Mexican households (MxFLS), in which the dependent variables are the measures of investment in children's health I have used throughout the empirical analysis. I use the logarithm of the share of decisions made by women and men in the household as measures of their bargaining power to explain changes in investment in children's health, controlling for other household attributes. The results suggest that mothers' bargaining power is positively and significantly associated with investment in girls' health. The evidence is consistent with what other studies have found in other developing countries. The magnitudes I find imply that, a one percent increase in the share of decisions made by the mother is associated with 0.65 percent increase in the chance of a girl being characterized as in "good health" and 1.08 percent increase in the chance of a girl older than the age of 4 completing the vaccination course. More decision making power for women does not affect investment in boys' health.

The results presented here, are consistent with the hypothesis that an increase in mother's bargaining power, which results from an increase in demand for older women in the labor market, raises investment in girls' health relative to boys. Increase in demand for younger women does not positively affect investment in girls' health, ruling out that the observed increase in investment in girls' health is because of an improvement in the prospect of employment for girls.

On the other hand, changes in demand for older women, and mother's bargaining power as the result, does not appear to change boys' health status. It is consistent with the previous

literature that, across many developing countries, an increase in women's bargaining power only affects girls' health without any significant effect on boy's health.

5 Conclusion

This paper finds that increases in demand for older women in the labor market, who are mostly married, raise women's bargaining power within households, as proxied by the share of decisions made by wife in the household as well as the expenditure share of goods that are assumed to be favored more/(less) by women. Increases in demand for older women also positively affect investment in girls' health without affecting that of boys. I find no evidence that increases in labor demand for younger women, who are mostly single, have the same effect, ruling out the possibility that households invest more in their daughters' health as the prospect of labor market participation for them improves. Consistent with evidence from other developing countries, I also find that an increase in women's decision making power within households is associated with more investment in girls' health. The results, in general, suggest that an increase in the wage rate and employability of older women in the labor market raises women's bargaining power within households and, ultimately, investment in the health of girls relative to that of boys.

This is particularly important since despite our understanding of the effect of different parental characteristics and household environment on parental decisions to invest in children's human capital, we know much less about the role of the state of the labor market. My results suggest that different patterns of a country's job market opportunities could have different effects on the decisions made within households about investment in children's health. More specifically, specialization in industries with preference for hiring older female labor results in more investment in girls' health. My findings have implications for designing industrial policies in developing countries. When the gender gap in health is a concern, as it is in many developing countries, my results suggest that specialization in industries in which older (married) women have comparative advantage could induce parents to invest more in their girls.

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Table 1: Household Characteristics in MxFLS

Panel A: Year 2002			
	mean	sd	observations
Wife's education*	3.79	1.79	5467
Husband's education*	4.07	2.03	5291
Wife's age	38.18	9.075	5537
Husband's age	41.63	10.406	5487
Woman working**	0.29	0.45	5522
Man working**	0.89	0.40	5493
Number of boys***	1.32	1.37	4100
Number of girls***	1.49	1.96	4100

Panel B: Year 2005			
	mean	sd	observations
Wife's education*	3.82	1.84	5443
Husband's education*	4.09	2.03	4911
Wife working**	0.26	0.44	5479
Husband working**	0.87	0.47	5406
Number of boys***	1.35	1.48	4021
Number of girls***	1.53	2.14	4021

* Education data is divided into 10 categories. 1.No education, 2.Preschool, 3.Elementary , 4. Secondary, 5.Open secondary 6.High school, 7.Open high school, 8.Normal Basic, 9. College, and 10.Graduate.

** This variable is 1 if the person works outside home and 0 if not

*** Number of boys and girls is conditioned on families having children.

Note: The data does not include the extended households. Children are limited to the children of the parents in the household who are 15 years old or younger.

Table 2: Export Sector Characteristics in IMSS

Panel A: Year 2002					
	mean	min	max	sd	observations
Share of export manufacturing sector in municipality's composition of employment	0.20	0.003	0.945	0.20	108 municipalities
Share of female labor in the export sector	0.37	0.0	0.869	0.21	108 municipalities
Share of female labor across different manufacturing export sectors	0.33	0.14	0.19	0.60	11 sectors
Share of younger female labor (15-24) out of total female labor across different export sectors	0.30	0.05	0.20	0.39	11 sectors
Panel B: Year 2005					
Share of export manufacturing sector in municipality's composition of employment	0.18	0.0	0.910	0.18	108 municipalities
Share of female labor in the export sector	0.34	0.0	0.875	0.19	108 municipalities
Share of female labor across different manufacturing export sectors	0.32	0.16	0.17	0.60	11 sectors
Share of younger female labor (15-24) out of total female labor across different export sectors	0.31	0.06	0.19	0.41	11 sectors
Growth in labor Demand for Women in Different Age Categories Across Municipalities in The Export Sector: $\Delta D_{fem,a,m,t}^E$					
Younger female labor (15-24)	-0.19	-0.28	-0.10	0.04	108 municipalities
Older female labor (25 and older)	0.03	-0.09	0.20	0.05	108 municipalities

Note: This table only covers the municipalities that are represented in the MxFLS.

Table 3: The Effect of Labor Demand on Women's Wage and Employment

	Dependent variable: Ln(...)			
	Average wage of women in the age category of...		Women's employment in the age category of...	
	25 and older	15-24	25 and older	15-24
	(1)	(2)	(3)	(4)
Demand for ... labor				
15-24 female	-0.897 (1.298)	0.546 (0.413)	-3.128 (2.538)	6.915*** (2.599)
25 and older female	1.154** (0.551)	0.392 (0.501)	4.117* (2.213)	-3.308 (2.646)
15-24 male	3.223 (2.229)	-1.214 (0.931)	6.163 (5.401)	-4.991 (5.472)
25 and older male	-0.716 (0.632)	0.194 (0.272)	0.984 (1.235)	3.175* (1.679)
Demand in other sectors	-0.542 (1.463)	0.351 (0.918)	-5.513* (3.248)	-1.042 (3.365)
Observations	932	914	932	914

Notes: Standard errors are reported in parentheses. Controls include state specific time trend. Sample in the regression is composed of all municipalities in IMSS data in which women participate in the export sector.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 4: The Effect of Labor Demand on The Expenditure Share of Items That Are Indicative of Women's Bargaining Power

	Dependent Variable: Ln (Expenditure share of ...)									
	Women clothing	Child clothing	Tobacco and gambling	Health services	Food	Women clothing	Child clothing	Tobacco and gambling	Health services	Food
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Demand for labor										
Female	0.796 (1.444)	-3.197 (2.202)	1.170 (0.735)	-1.103 (0.782)	0.808 (0.815)	0.769 (1.154)	3.168** (1.480)	-4.836 (4.870)	0.320 (0.622)	-0.449 (1.006)
15-24 female		6.204*** (1.988)		3.601 (2.578)		-3.946* (2.229)		3.981** (1.948)		1.765 (2.162)
25 and older female										
15-24 male	-2.188 (3.120)	-1.814 (1.336)	1.399 (2.892)	2.289 (2.911)	-0.965 (1.712)	-0.937 (0.685)	-2.994 (3.332)	-1.564 (3.568)	-0.926 (1.620)	-1.817 (2.166)
25 and older male	-1.063 (0.580)	-0.596 (1.003)	-1.091 (0.887)	-1.536* (0.790)	0.897 (0.709)	1.385* (0.774)	-2.143* (1.204)	-2.530 (1.300)	-0.324 (0.599)	-0.406 (0.608)
Demand in other sectors	1.552 (1.684)	3.574* (1.878)	-0.727 (1.258)	0.780 (2.164)	0.037 (0.882)	0.343 (0.394)	0.040 (1.715)	0.175 (1.537)	0.412 (0.844)	1.516 (1.676)
Wife's non-labor income	0.04 (0.046)	0.04 (0.046)	0.004 (0.080)	0.004 (0.080)	-0.089* (0.047)	-0.089* (0.047)	0.054 (0.059)	0.054 (0.059)	0.017 (0.011)	0.017 (0.011)
Husband's non-labor income	-0.006 (0.021)	-0.006 (0.021)	0.027 (0.046)	0.027 (0.046)	0.032* (0.017)	0.032* (0.017)	-0.043 (0.052)	-0.043 (0.052)	-0.01 (0.006)	-0.01 (0.006)
Total HH expenditures	-0.005 (0.009)	-0.005 (0.009)	-0.006*** (0.003)	-0.006*** (0.003)	-0.009** (0.004)	-0.009** (0.004)	0.083 (0.104)	0.083 (0.104)	-0.008** (0.004)	-0.008** (0.004)
Observations	4720	4720	4100	4100	4247	4247	4899	4899	4731	4731
Mean of Dep. Var.	0.024	0.024	0.039	0.039	0.012	0.012	0.037	0.037	0.112	0.112

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include wife's and husband's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all couples in union. Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 5: The Effect of Labor Demand on The Share of Decisions Made by Women and Men within Households

	Dependent Variable: Ln(...)		
	Share of decisions made by the wife		Share of decisions made by the husband
	(1)	(2)	(3)
Demand for ... labor			
Female	0.320** (0.135)		
15-24 female		-0.213 (0.367)	0.318 (0.359)
25 and older female		1.343* (0.746)	0.582 (0.801)
15-24 male	-0.629 (0.632)	-0.878 (0.635)	-0.975 (0.760)
25 and older male	-0.211** (0.106)	-0.484 (0.209)	0.232 (0.201)
Demand in other sectors	0.370 (0.398)	0.887* (0.528)	0.497 (0.639)
Mother's non-labor income	0.004 (0.015)	0.003 (0.015)	-0.004 (0.015)
Father's non-labor income	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)
Observations	4518	4518	4518
Mean of Dep. Var.	0.716	0.716	0.672

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include wife's and husband's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all couples in union. Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 6: The Effect of Labor Demand on The Measures of Bargaining Power for Women Who Live Alone or with Their Children

	Dependent Variable: Ln (Expenditure share of ...)				
	Women clothing	Child clothing	Tobacco and gambling	Health services	Food
	(1)	(2)	(3)	(4)	(5)
Demand for...labor					
15-24 female	1.958 (3.700)	-7.271 (7.034)	0.914 (2.108)	2.403 (5.110)	1.069 (2.254)
25 and older female	-0.846 (0.904)	3.083 (10.671)	-0.709 (0.873)	5.230 (16.054)	-0.685 (3.368)
15-24 male	2.589 (5.793)	3.333 (2.574)	2.339 (5.174)	-9.863 (15.434)	-2.780 (4.090)
25 and older male	1.957 (1.915)	-2.299 (4.054)	2.502* (1.355)	0.221 (2.549)	0.449 (1.341)
Demand in other sectors	-3.032 (7.388)	-1.064 (5.291)	-5.866 (4.873)	2.653 (11.728)	1.193 (2.749)
Mother's non-labor income	0.065 (0.019)	0.013 (0.034)	-0.036 (0.025)	-0.007 (0.129)	-0.006 (0.011)
Total HH expenditures	-0.048*** (0.007)	-0.021 (0.026)	-0.084*** (0.025)	-0.078*** (0.026)	-0.044 (0.031)
Observations	537	501	524	607	612

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include the woman's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all wome who live alone or with their children in the original sample of households. Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 7: The Effect of Labor Demand on Non-Working Women's Bargaining Power

	Dependent Variable					
	Ln (Expenditure share of ...)					
	Share of decisions made by the wife	Women clothing	Child clothing	Tobacco and gambling	Health services	Food
	(1)	(2)	(3)	(4)	(5)	(6)
Demand for...labor						
15-24 female	0.119 (0.289)	-2.418 (1.758)	-3.246** (1.365)	0.431 (1.268)	-1.243 (5.563)	-0.274 (0.826)
25 and older female	1.104* (0.606)	5.582** (2.608)	2.873 (2.227)	-5.129 (3.190)	2.047 (1.176)	1.543 (1.852)
15-24 male	-0.806 (1.254)	-5.771 (3.847)	1.968 (2.844)	-1.013 (0.717)	-0.152 (5.084)	-1.639 (1.928)
25 and older male	-0.548 (1.265)	-0.622 (0.893)	-1.440* (0.761)	1.216 (0.856)	0.477 (1.195)	-0.349 (0.530)
Demand in other sectors	-0.157 (0.489)	6.699* (3.815)	0.951 (1.947)	2.757 (2.206)	-1.127 (4.491)	1.231 (1.482)
Wife's non-labor income	0.006 (0.031)	-0.001 (0.96)	-0.086 (0.121)	-0.201** (0.085)	0.0004 (0.117)	0.042* (0.022)
Husband's non-labor income	-0.001 (0.012)	0.006 (0.028)	0.02 (0.054)	0.063** (0.026)	-0.078 (0.045)	-0.015* (0.009)
Observations	3056	3106	3458	3001	3459	3319
Mean of Dep. Var.	0.681	0.022	0.039	0.015	0.036	0.131

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include wife's and husband's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all couples in union. Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 8: The Effect of Labor Demand on Investment in Health

	Dependent Variable: Ln(...)				
	Expenditure share of health services	Chance of a ...being characterized "as in good health"		Chance of a ... completing the vaccination course	
		Girl	Boy	Girl	Boy
	(1)	(2)	(3)	(4)	(5)
Demand for...labor					
15-24 female	-4.836 (4.850)	0.458 (0.657)	0.384 (0.655)	-0.901* (0.533)	0.040 (0.099)
25 and older female	3.981** (1.948)	1.059** (0.476)	-0.593 (1.134)	1.449* (0.809)	-2.209 (2.573)
15-24 male	-1.564 (3.258)	0.025 (1.072)	0.374 (1.106)	0.773 (2.182)	3.844** (1.649)
25 and older male	-2.530 (1.300)	-0.001 (0.265)	0.163 (0.319)	-0.379* (0.210)	0.516 (0.475)
Demand in other sectors	0.175 (1.537)	0.597 (0.870)	-0.537 (0.823)	0.447 (1.539)	-4.115** (2.007)
Mother's non-labor income	0.054 (0.059)	0.011 (0.015)	-0.001 (0.020)	-0.033 (0.052)	0.006 (0.011)
Father's non-labor income	-0.043 (0.052)	-0.005 (0.006)	-0.004 (0.005)	-0.015 (0.021)	-0.012 (0.013)
Observations	4809	2947	2967	2113	2174
Mean of Dep. Var.	0.037	0.704	0.731	0.775	0.806

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include wife's and husband's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 9: The Effect of Labor Demand caused by China's entry into the WTO on Women's Bargaining Power

	Dependent Variable					
	Ln (Expenditure share of ...)					
	Share of decisions made by the wife	Women clothing	Child clothing	Tobacco and gambling	Health Services	Food
	(1)	(2)	(3)	(4)	(5)	(6)
Demand for...labor						
15-24 female	-0.546 (1.244)	-1.631 (2.320)	-0.527 (0.991)	3.989** (1.702)	-5.896 (4.183)	-3.136 (4.681)
25 and older female	0.919* (0.489)	3.088 (2.029)	1.307 (1.703)	-1.882 (1.153)	3.376* (2.009)	2.456 (2.327)
15-24 male	-1.059 (1.166)	1.124 (1.239)	3.049 (2.291)	-1.668 (2.125)	-1.672 (4.026)	-1.446 (2.741)
25 and older male	-0.513 (0.594)	-0.601 (1.195)	-0.790 (0.934)	0.645* (0.318)	-1.932 (2.899)	0.305 (0.552)
Demand in other sectors	0.181 (0.414)	-0.438 (0.844)	0.328 (0.953)	-0.019 (0.032)	0.269 (0.736)	0.101 (0.391)
Wife's non-labor income	0.025** (0.013)	0.04 (0.047)	0.004 (0.080)	-0.133 (0.254)	0.054 (0.059)	0.082 (0.148)
Husband's non-labor income	0.054 (0.072)	-0.006 (0.021)	0.027 (0.046)	-0.039 (0.119)	-0.043 (0.052)	-0.005 (0.045)
Total HH expenditures	0.11* (0.655)	-0.005 (0.009)	-0.006** (0.003)	-0.01** (0.004)	0.083 (0.104)	0.011 (0.374)
Observations	4518	4720	4100	4247	4899	4083
Mean of Dep. Var.	0.716	0.024	0.039	0.012	0.037	0.112

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Changes in employment for each gender-age labor category has been instrumented by the role of China's competition in affecting demand for that group in each municipality. Controls include mother's and father's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all couples in union. Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 10: The Effect of Labor Demand caused by China's entry into the WTO on Investment in Health

	Dependent Variable: Ln(...)				
	(1)	(2)	(3)	(4)	(5)
Demand for...labor					
15-24 female	-5.896 (4.183)	-0.456 (0.635)	-0.103 (0.461)	-0.739 (1.592)	-0.376 (0.780)
25 and older female	3.377* (2.010)	0.836* (0.490)	0.238 (0.331)	1.822 (2.402)	-2.229 (2.422)
15-24 male	-1.672 (4.033)	-0.544 (1.128)	0.268 (0.473)	0.906 (1.612)	3.794 (3.492)
25 and older male	-1.932 (2.899)	0.542 (0.754)	-0.039 (0.071)	-0.689 (0.673)	0.969 (0.785)
Demand in other sectors	0.270 (0.700)	-0.053 (0.173)	0.001 (0.004)	1.198 (2.787)	-3.440** (1.445)
Mother's non-labor income	0.054 (0.059)	0.011 (0.015)	-0.001 (0.020)	-0.033 (0.052)	0.006 (0.011)
Father's non-labor income	-0.043 (0.052)	-0.005 (0.006)	-0.004 (0.005)	-0.015 (0.021)	-0.012 (0.013)
Observations	4320	964	940	964	940
Mean of Dep. Var.	0.037	0.704	0.731	0.775	0.806

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Changes in employment for each gender-age labor category has been instrumented by the role of China's competition in affecting demand for that group in each municipality. Controls include mother's and father's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all couples in union. Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Table 11: Spouses' Bargaining Power and Investment in Children's Health

	Dependent Variable: Ln(...)			
	Chance of abeing characterized "as in good health"		Chance of a ... completing the vaccination course	
	Girl	Boy	Girl	Boy
	(1)	(2)	(3)	(4)
Share of the decisions made by the mother	0.651** (0.321)	0.355 (0.331)	1.082* (0.616)	-0.460 (0.792)
Share of the decisions made by the father	0.237 (0.214)	-0.159 (0.187)	-0.373 (0.319)	-0.649 (0.547)
Observation	2912	2933	2082	2114

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include total household expenditure, mother's and father's non-labor income, education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all households with a positive number of children in 2002 and 2005.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Appendix A

Table 12: The Effect of Labor Demand on The Expenditure Share of Items That Are Not Indicative of Women's Bargaining Power

	Dependent Variable		
	Ln (Expenditure share of ...)		
	Transportation	Men Clothing	Other items
15-24 female	-0.788 (1.950)	-1.524 (3.141)	1.888*** (0.287)
25 and older female	-2.764 (3.224)	2.990 (2.452)	-2.593* (1.415)
15-24 male	4.593* (2.597)	-4.400 (5.227)	-0.581 (1.163)
25 and older male	-0.097 (1.074)	-2.137 (1.825)	0.765** (0.306)
Demand in other sectors	-3.864** (1.874)	4.481 (3.569)	-0.750 (1.014)
Mother's non-labor income	0.02 (0.021)	0.009* (0.005)	-0.042*** (0.012)
Father's non-labor income	-0.008 (0.013)	-0.04*** (0.01)	0.026*** (0.008)
Total HH expenditures	-0.020*** (0.006)	-0.006*** (0.001)	-0.002 (0.002)
Observations	4352	4634	4838

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include wife's and husband's education, age, and number of children by gender and age group categories (0-5 years, 6-10 years, 11-15 years). Sample in the regression is composed of all couples in union. Monetary values are reported in thousands of pesos.

* Significance at the 90 percent confidence level. ** Significance at the 95 percent confidence level. *** Significance at the 99 percent confidence level.

Appendix B: Household Decision Making Model

The household solves the following static maximization problem:

$$\begin{aligned}
 & \max_{c^w, l^w, c^h, l^h, H_g, H_b, E} \lambda U^w(c^w, l^w, H_g, H_b; \mu, \Theta) + (1 - \lambda) U^h(c^h, l^h, H_g, H_b; \mu, \Theta) \\
 \text{s.t.} \quad & c^w + c^h + w^w l^w + w^h l^h + H_g + H_b = w^w + w^h + y^w + y^h \\
 & \lambda = \lambda(z, y^w, y^h, w^w, w^h; \mu, \Theta)
 \end{aligned} \tag{6}$$

In which, superscripts w and h represent wife and husband respectively. c is the private good, l represents the fraction of time spent on leisure and H is a public good. Here, H_g and H_b represent investment in girls and boys (e.g. amount spent on their health), accordingly. w^w and w^h are the wage rates in the labor market. Extrahousehold environmental parameters have been denoted by z . The vectors μ and Θ represent, respectively, observed and unobserved heterogeneity in individual and household characteristics and preferences that affect utilities.

λ is the weight assigned to wife's utility in the household. In this paper I focus on demand for older female labor, which affects both their employability (\bar{E}^w from now on) and wage rate, as an environmental variable affecting married women's bargaining power.

The solution to the household problem can be thought of as a two stage process. In the first stage, parents agree on public expenditures, as well as on the distribution of the residual non labor income between them. At stage two, each parent chooses his/her level of consumption and labor supply, conditional on the level of public expenditures and budget constraint resulting from the decision made at stage one.

Let c^{i*} and l^{i*} , $i = w, h$, be the solution to (7), and define ρ^i as

$$\rho^i(w^w, w^h, y^w, y^h, \bar{E}^w; \mu, \Theta) = c^{i*}(w^w, w^h, y^w, y^h, \bar{E}^w; \mu, \Theta) + w^i l^{i*}(w^w, w^h, y^w, y^h, \bar{E}^w; \mu, \Theta) - w^i$$

In words, ρ^i is the fraction of residual non labor income allocated to member i to spend on private consumption and leisure after purchasing the public goods. Therefore,

$$\rho^w + \rho^h = y^w + y^h - H_g^*(w^w, w^h, y^w, y^h, \bar{E}^w; \mu, \Theta) - H_b^*(w^w, w^h, y^w, y^h, \bar{E}^w; \mu, \Theta)$$

Assuming that $V^i(w^i, \rho^i, H_g, H_b)$ is the attained level of utility of individual i when the level of the public goods are fixed at H_g and H_b , then in the first stage of households problem (7) the family chooses the level of H_g and H_b , and ρ^i :

$$\begin{aligned}
& \max_{\rho^w, \rho^h, H_g, H_b} \lambda V^w(w^w, \rho^w, H_g, H_b; \mu, \Theta) + (1 - \lambda) V^h(w^h, \rho^h, H_g, H_b; \mu, \Theta) \\
& \text{s.t. } \rho^w + \rho^h + H_g + H_b = y^w + y^h \\
& \lambda = \lambda(\bar{E}^w, y^w, y^h, w^w, w^h; \mu, \Theta)
\end{aligned} \tag{7}$$

Assuming an interior solution, the first order conditions result in

$$\lambda \frac{\partial V^w}{\partial \rho^w} = (1 - \lambda) \frac{\partial V^h}{\partial \rho^h} = \lambda \frac{\partial V^w}{\partial H_g} + (1 - \lambda) \frac{\partial V^h}{\partial H_g} = \lambda \frac{\partial V^w}{\partial H_b} + (1 - \lambda) \frac{\partial V^h}{\partial H_b}$$

and therefore,

$$\begin{aligned}
\frac{\partial V^w / \partial H_g}{\partial V^w / \partial \rho^w} + \frac{\partial V^h / \partial H_g}{\partial V^h / \partial \rho^h} &= 1 \\
\frac{\partial V^w / \partial H_b}{\partial V^w / \partial \rho^w} + \frac{\partial V^h / \partial H_b}{\partial V^h / \partial \rho^h} &= 1
\end{aligned} \tag{8}$$

$\frac{\partial V^i / \partial H}{\partial V^i / \partial \rho^i}$ is marginal willingness to pay of partner i for the public good and condition (9) states that the individuals' marginal willingness to pay must add up to the price of the public good. Using these conditions, Blundell, Chiappori, and Meghir (2005) show that H is increasing in λ if and only if

$$\frac{\partial V^w / \partial H}{\partial V^w / \partial \rho^w} > \frac{\partial V^h / \partial H}{\partial V^h / \partial \rho^h} \tag{9}$$

Which means that expenditure on the public good is increasing in λ if and only if the wife's marginal willingness to pay for H is bigger than that of husband. Blundell, Chiappori, and Meghir (2005) proves this result for one public good, but the proof can be easily generalized to as many public goods as desired.