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Department of Economics
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Demand for Low-Skilled Labor and Parental Investment in Children's Education: Evidence from Mexico

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Demand for Low-Skilled Labor and Parental Investment in Children's Education: Evidence from Mexico

Kaveh Majlesi *

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Abstract

Previous research has shown that school enrollment in developing countries responds to the changes in demand for low-skilled and high-skilled labor in the market. Using data from Mexico, I show that the negative effects of increases in relative demand for low-skilled labor are not limited to lower rates of school enrollment. Parents respond to the increases in labor market opportunities for low-skilled labor in the manufacturing sector by spending less time helping children with their studies and spending less on children's education while they are enrolled at school. This suggests that households respond along the intensive margin as well as on the extensive margin.

JEL-Code: I21, I25, J23, J24, 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.

Parents could invest material resources as well as their time into children.² There is a large literature on how parental characteristics and household environment affect investment in children's human capital. A number of studies have focused on the relationship between parental education and children's health or education (Behrman and Wolfe 1987; Thomas, Strauss, and Henriques 1991; Desai and Alva 1998; Brown 2006), while other papers have looked into the role of parents' financial resources (Duflo 2003; De Carvalho Filho 2008). Sibling composition and birth order have also been studied as determinants of investment in children (Parish and Willis 1993; Butcher and Case 1994; Morduch 2000; Sawada and Lokshin 2009; Vogl 2013).

Previous research also shows that features of the household affect parental time investments in children. Brown (2006), Guryan et al. (2008), and Ramey and Ramey (2010) investigate the relationship between parental characteristics and their time investments in children and Price (2008) looks at how these investments vary by child's birth-order.

Unlike the effect of household characteristics, much less is known about the role of the state of the labor market—especially the labor market for adults—on investment in children's education.³ School enrollment decisions in a variety of developing countries have recently been shown to be affected by the skill-composition of

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

²Although it is difficult to establish a causal link between parental time inputs and children's outcomes (because of the non-randomness of time spent on children), parents' time is generally thought to be an important input to children's human capital development, including their educational outcomes (Zick et al. 2001; Guryan et al. 2008; Price 2008)

³There is a literature on how changes in the labor markets that employ children as workers affect children's enrollment at school (e.g. Kruger 2007; Edmonds et al. 2009)

the new jobs for adults.⁴ However, we do not know much about the potential effects of changes in relative demand for low-skilled versus high-skilled labor on parental investment in children's education while they are enrolled at school. These could be spending on children's education, the time that parents spend helping children with their studies, etc.

This paper examines the effect of relative increases in labor demand for low-skilled labor in the Mexican manufacturing sector on investing in children's education while they are enrolled at school. Parents might spend less time and money on children's education if they anticipate learning at school to be a less significant determinant of children's labor market outcomes. This, in turn, could affect the quality of education received by children.

This is important because, similar to the quantity of education, the quality of education could affect the labor market outcomes and the future productivity of children should the low-skill high-paying manufacturing jobs disappear (that happens quite often). School quality has been shown to be associated with higher labor income as well as the probability of finishing high school (Card and Krueger 1992; Betts 1995) and starting college (Evans and Schwab 1995). There is also more recent evidence suggesting that quality of education, measured by test scores and cognitive skills, may be at least as (or more) important than quantity as a determinant of wages (Nickell 2004; Blau and Kahn 2005; Hanushek and Woessmann 2008).

Using data on the time parents spend helping children with their studies and also expenditure on different components of each child's education and the differential changes in labor demand in different industries across municipalities between 2002-2005, this paper identifies the effects of relative changes in opportunities for

⁴Oster and Millet (2013) shows that the creation of high-skill jobs in the IT Service Centers in India causes an increase in the number of children enrolled in primary school. Jensen (2012) shows that providing jobs in the business process outsourcing industry that has higher educational requirements and greater returns compared to other sectors across rural Indian villages led to significantly higher probability of enrollment in computer or English language courses for 15 to 21 year-old women from treatment villages and also increased school enrollment for younger, school-aged girls, reflecting better investments by parents. Shastry (2012) presents evidence that Indian districts that attracted more IT jobs experienced greater growth in school enrollment. Atkin (2012) shows that drop-out rates after the compulsory schooling rise in Mexico as the result of an increase in the number of low-skill jobs in the export manufacturing sector.

low-skilled and high-skilled labor on parental investment in school-going children's education.

To do this, first, I follow Bartik (1991), Blanchard and Katz (1992), Bound and Holzer (2000), and Autor and Duggan (2003), using data from the Social Security Institute of Mexico (IMSS), to construct demand indices that capture exogenous shifts in local labor demand for different manufacturing industries. The demand index for each industry-municipality cell is constructed based on the nationwide changes in employment, weighted by the local labor market-specific shares of employment for that industry.

Depending on the initial employment structure in different municipalities, a change in labor demand in a specific industry could increase relative number of high-skilled jobs in one municipality and weaken it in another. If, initially, a municipality is specialized in manufacturing industries with primarily high-skilled labor, an increase in labor demand in an industry with some low-skilled workers increases the relative number of jobs available for low-skilled labor. If investment in a child's education within household is affected by the skill composition of available jobs in the labor market, and returns to investment in education as the result, increases in labor demand in this industry lower investment in children's education. The exact change in labor demand would have opposite effects on the prospect of getting employed as a low-skilled worker, and investment in children's education, in a municipality specialized in industries with primarily low-skilled workers. In each municipality, a manufacturing industry is categorized as low-skill if an increase (decrease) in labor demand in that industry raises (lowers) low-skilled labor's chance of employment compared to that of high-skilled labor. Otherwise, the industry would be categorized as high-skill.⁵

Finally, using two panel waves of the Mexican Family Life Survey, I identify the effect of changes in demand for low-skill and high-skill industries on parental investment in children's education, proxied by the number of hours each parent spends in a week helping children with their studies and also spending on different components of each child's education.

⁵IMSS does not report the education level or the occupation of the workers and therefore that information cannot be used to estimate labor demand for high-skilled versus low-skilled labor.

I find that households reduce spending on education-related expenses of children while they are enrolled at school in response to a relative increase in labor demand in low-skill industries. However, the results are mainly driven by spending less on boys' education. I also find that increases in labor demand in low-skill industries negatively affect the time spent by mothers helping children with their studies. To shed more light into why spending on boys' education goes down, I look at the changes in spending on three components of educational expenses; school tuition fees, the cost of school materials, and other costs. I find that increases in labor demand in low-skill industries reduce spending on boy's education mostly through spending less on school materials.

In recent decades, many developing countries have relied on manufacturing for growth and, since education is considered a major determinant of long run growth for countries (Lucas 1988) and also an important determinant of labor market success at the individual level, it is important to understand how different forms of investment in education responds to the growth in the manufacturing sector. The results of this paper imply that the negative effects of proliferation of low-skill jobs is not limited to higher dropout rates and, even if governments design policies to ensure students' school enrollment decisions remain unchanged by the arrival of new low-skill jobs (as suggested in Atkin 2012), the quality of education gained by children who remain enrolled at school could be compromised as the result of lower investments by parents.

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

2 Empirical Implementation

2.1 Data

This paper combines two datasets to examine how changes in relative labor demand for low-skilled versus high-skilled labor within the Mexican manufacturing sector

affect households' investment in children's education. The household level data come from the Mexican Family Life Survey (MxFLS). MxFLS is a longitudinal database that collects a wide range of information on socioeconomic, demographic, and health indicators of the Mexican population. I use two available 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. Some of the household characteristics in MxFLS are reported in Table 1. MxFLS defines a child as someone younger than 15 years of age (before the compulsory age of schooling). Because of that, individual-level observations for children (the components of spending on their education) are only available for children younger than 15. Hence, child-level analysis in this study is limited to school-age children in 2002 who were younger than 15 years of age in year 2005 (so that there are two rounds of data available for them).

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.⁶ The characteristics of the manufacturing sector in the IMSS data (for the municipalities represented in MxFLS and used in my analysis) are summarized in Table 2.

2.2 Empirical Strategy

In this paper, controlling for employment opportunities in other sectors of the economy, the number of jobs available for low-skilled relative to high-skilled labor in the manufacturing sector is considered to be a potential determinant of investment in children's education within households. As relative demand for the low-skilled workers goes up in the labor market, there are less incentives to invest in children's education.

My empirical strategy takes advantage of the fact that different industries have different preferences for hiring low-skilled versus high-skilled labor and the in-

⁶The 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.

dustrial composition of employment within manufacturing sector in Mexico (and therefore the initial job opportunities available for low-skilled versus high-skilled labor) differ across municipalities.

Although most of the jobs in the Mexican manufacturing sector are low-skill, there is a considerable variation in different industries' preferences for hiring low-skilled versus high-skilled labor (Table 2). While the share of skilled labor is around 10 percent in the wood and leather industries, it is more around 50 percent in the chemical and refinery industries.

Depending on where a household lives, changes in labor demand in a specific industry could strengthen or weaken relative chance of employment for low-skilled labor and incentives to invest in children's education, as a result.⁷ To clarify this, let's compare two municipalities in Mexico; Santiago Papasquiario and Coatzacoalcos. In Santiago Papasquiario, out of 1163 manufacturing jobs in July 2002, 1113 belonged to the wood industry that is dominated by low-skilled labor. In this municipality, keeping labor demand in other industries fixed, an increase (decrease) in labor demand in the paper industry, in which around 70 percent of the labor force is low-skilled, weakens (strengthens) relative chance of employment for low-skilled labor in the manufacturing sector compared to high-skilled labor. Theoretically, it should increase (decrease) households' incentives to invest in children's education. On the other hand, in Coatzacoalcos, in which out of 5317 manufacturing jobs 2924 belonged to the chemical industry, and other high-skill industries are also represented in the municipality, an increase in labor demand in the paper industry relatively strengthens (weakens) low-skilled labor's opportunities to get employed in the manufacturing sector and should affect the incentives to invest in education accordingly.

In each municipality, a three-digit manufacturing industry is categorized as low-skill if, in the year 2002, the share of low-skilled workers —those with lower than 12 years of schooling —at the national level in that industry was larger than the share of low-skilled workers within the manufacturing sector in that municipality. In theory, changes in demand in such an industry would be positively associated

⁷The sample of households I use for the analysis in this paper are limited to those that stay in the same municipality in both rounds of MxFLS data.

with the relative number of jobs available for low-skilled workers. Other three-digit manufacturing industries would be categorized as high-skill. I exploit the geographic heterogeneity of labor demand in low-skill and high-skill industries across municipalities between 2002-2005 to measure the effect of changes in labor demand in different industries on parental investment in children's education.⁸

2.3 Empirical Specification

To investigate the effects of changes in demand in different categories of industries on investment in children's education, I use the following basic regression specification:

$$q_{imt} = \beta_{low}D_{low,m,t} + \beta_{high}D_{high,m,t} + \beta D_{m,t} + \alpha x_{i,m,t} + \gamma_{i,t} + \delta_i + \varepsilon_{imt} \quad (1)$$

where q_{imt} represents spending on child i 's education (or clothing), total spending on education in household i , or the time spent by parent i . $D_{low,m,t}$ and $D_{high,m,t}$ are the aggregate labor demand in low-skill and high-skill industries within the manufacturing sector in municipality m , and $D_{m,t}$ is demand for labor in all other sectors of the economy in municipality m . $x_{i,m,t}$ is total household expenditures. $\gamma_{i,t}$ is a set of controls for individual and household characteristics, including the number of children or siblings in different age-categories, and mother's and father's education and age polynomials. δ_i represents the individual (or household) fixed effect. ε_{imt} are unobservable determinants of the outcome variables.

One concern about the specification above could be that households' income is excluded from the regression. If changes in labor demand affect the dependent variables through changes in household's earned income, the coefficient estimates for the changes in labor demand would be biased. However, in my estimation, the earned income is controlled for, by using total household income as an instrument for total expenditures.

The reason for considering total expenditure as endogenous here is that one could observe unusually high or low expenditures on a consumption good. For ex-

⁸An implied assumption is that the preference for hiring low-skill versus high-skill workers in an industry is more or less the same across municipalities.

ample, if a household spends money on children’s clothing in this period (I estimate the effect on children’s clothing as a robustness check), the same expenditure might not happen again for the next few periods. When the dependent variable is spending on children’s clothing, 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.

2.4 Demand Estimation

One 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. To isolate changes in labor demand in different industries within each municipality, I use a methodology that 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 industry-municipality cell based on the nationwide changes in employment of that industry, weighted by the local labor market-specific share of employment.

Predicted growth of labor employment in group g ($g=fem$ or $male$) of industries within the manufacturing sector in municipality m , in the period 2002-2005 is given by:

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

$K_{g,m}$ is the number of three-digit industries within group g of manufacturing industries in municipality m and $\gamma_{k,m}$ is the fraction of workers in municipality m in

year 2002 employed in industry k . $\eta_{-m,k}$ is the log change in national employment of industry k between 2002 and 2005. The subscript $-m$ in $\eta_{-m,k}$ indicates that each municipality's industry k employment is excluded in calculating the national employment change.

This index is a weighted average of the growth in employment for each category of manufacturing industries in a municipality, where the weights represent the distribution of employment across industries in the 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 an industry 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 (3), the second term, the log change in national employment of industry k between 2002 and 2005, 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 workers employed in an industry live in a specific municipality, one might think that the change in employment in other municipalities does not predict the change in demand in the local labor market. Looking at the share of each municipality in the employment mix of different industries reveals that, excluding Mexico City, no municipality has a share bigger than 11 percent (followed by 8 percent) in the employment of any three-digit manufacturing industry.⁹

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

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

⁹Even including Mexico City gives us a maximum of 19 percent.

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

3 Results

In this section I show if and how parents change investment in children's education, while they are enrolled at school, in response to the relative changes in demand for low-skilled labor in the manufacturing sector.

3.1 Total Educational Expenses

Besides disaggregated data on each child's educational expenses, MxFLS reports total annual spending on education at the household level. Using this variable as an outcome is interesting in itself since it takes into account spending on older children's education (those older than 15 who are not considered a "child" in MxFLS) as well as on those below the age of compulsory schooling. In the first step, I estimate the effect of changes in labor demand in different industries on total educational expenses at the household level.

Table 3 summarizes the results. The results in column (1) indicate that a 1 percent increase in labor demand in low-skilled industries is associated with spending 98 pesos (0.02 standard deviation) less on total educational expenses at the household level. The coefficient estimates for labor demand in high-skill industries are positive, although not statistically significant.¹⁰ One should note that the sample in this regression is composed of households with school-age children in both periods.

In column (2) I also add a control for the total number of children within households and in column (3) I also control for the number of school-age children. These

¹⁰One reason why the effect is only seen for low-skill industries could be that there is a much larger variation in labor demand in low-skill industries compared to that in high-skill industries (Table 2). This might be explained by China joining the WTO in 2001 and its differential effects on Mexican manufacturing industries (Majlesi 2013). The majority of Mexican industries that were negatively affected by Chinese competition in the US market (the most important export market for Mexican industries) were low-skill and female-intensive.

two changes have almost no effect on the coefficient estimates for labor demand in low-skill industries.

A threat to identification here is that municipalities that experienced shocks to labor demand in low-skilled labor went through other uncontrolled changes that affected households' spending on education. To address this, in the fourth column, I control for the state-specific time trend. This does not change the coefficient estimates.

The results indicate that the total expenditure on education reacts to the changes in labor demand in low-skill industries and households spend less on education as relative demand for skill in the labor market goes down.

However, doing this analysis separately for total spending on girls' and boys' education in columns (5) and (6) suggests that it is only spending on boys' education that goes down as the result of increases in labor demand in low-skill industries. The results in column (6) indicate that a 1 percent increase in labor demand in low-skilled industries is associated with spending 108 pesos less on total educational expenses of boys at the household level.

3.2 Spending on A Child's Education

In addition to the aggregate household spending on education, MxFLS reports annual spending on each child's education. This includes tuition fees, cost of school materials and special courses, school uniform, exams, school maintenance, celebrations, transportation to school, and other costs. Using this data, I estimate the effect of changes in labor demand in different categories of industries on spending on each child who is enrolled at school in both periods.

The first column of Table 4 shows the results when the sample of analysis includes both boys and girls. The coefficient estimate for labor demand in low-skill industries indicate that, on average, a 1 percent increase in labor demand in low-skill industries is associated with spending 49 Pesos less on a child's education.

Limiting the sample of analysis to girls in column (2), the results suggest that changes in labor demand do not affect spending on girls' education. On the other hand, the results in column (4) indicate that changes in spending on children in

column (1) is explained by reducing spending on boys' education as labor demand in low-skill industries goes up. On average, a 1 percent increase in labor demand in low-skill industries is associated with spending 84 Pesos (0.05 standard deviation) less on a boy's education.

As discussed before, the previous research shows that increases in low-skill job market opportunities in the manufacturing sector negatively affects school enrollment in Mexico after the age of compulsory schooling (Atkin 2012). One implication of this could be spending less on older children's education, anticipating that they will drop out of school soon and there is no need to spend as much on their education. In other words, it could be argued that the drop in spending on boys' education is driven by older students and changes in labor demand in low-skill industries do not necessarily affect spending on younger children's education.

To address this, in columns (3) and (5) I add the interaction of labor demand in low-skill industries and a dummy variable representing students in grades 4 to 6 in year 2012 - those who will be closer to (or at) the compulsory schooling age in 2005. The coefficient estimates suggest that the effect of increases in labor demand in low-skill industries on younger boys is still negative and significant and the effects on younger and older children are not significantly different.

Whether the observed changes in spending on children's education come from the changes in tuition fees, spending on school materials, or other forms of spending in a child's education could imply different reactions to the labor market opportunities. In order to figure out where the changes in spending on education come from, next, I separately analyze spending on these categories (controlling for spending on other educational costs) for each child.

3.2.1 Tuition Fees

Table 5 summarizes the results when the dependent variable is spending on tuition fees. Although the coefficient estimate for labor demand in low-skill industries is negative when the sample of analysis is limited to boys, it is not statistically significant. It suggests that parents do not necessarily change their children's school as the result of more low-skilled jobs in the labor market. It could also suggest that schools do not change tuition fees when the skill-intensity of the labor market

changes.

3.2.2 School Materials

Table 6 repeats the same analysis using another component of spending on children's education, cost of school materials (including special courses), as dependent variable. The coefficient estimates imply that a 1 percent increase in labor demand in low-skill industries leads to 40 Pesos less spending on school materials for children. However, dividing the sample of analysis into schoolboys and schoolgirls reveals that all the effect is driven by spending less on boys' school material.

3.2.3 Other Costs

Using other educational spending as the dependent variable does not show any effect of changes in labor demand (Table 7). The two most important items in this category are the cost of uniforms and the cost of maintenance. None of these two contribute to the lower spending on boys' education as the result of increases in labor demand in low-skill industries.

These results suggest that although parents do not react strongly enough to change their children's school as the result of more opportunities for low-skilled labor, they cut spending on their school materials and pay less for their special course, that could be indicative of how much they care about children's learning.

Also, an increase in the relative number of low-skilled jobs induce parents to only spend less on boys' education. One reason for this could be that labor market returns to education in Mexico is a more important determinant of investment in boys' education compared to that of girls.

An alternative explanation would be that low-skill industries are mostly male intensive and changes in labor demand in those industries mainly apply to the prospects of boys' labor market participation. However, as I have discussed in another paper (Majlesi 2013), most of low-skill industries are actually female-intensive. These include industries like textile and clothing.

3.3 Robustness Check: Spending on Children's Clothing

If parents spend less on children's education because of changes in the prospects of labor market participation in terms of getting a job in the low-skill versus high-skill industries, one would expect not to see the same kind of changes in other types of spending on children as relative demand for low-skilled labor goes up.

MxFLS reports the quarterly spending on boys' and girls' clothing. Using this data, I investigate the effect of changes in labor demand on spending on children's clothing. Column (1) in Table 8 reports the results when the dependent variable is the pooled expenditure on all children's clothing, controlling for the number of boys and girls. The coefficient estimates suggest that a 1 percent increase in labor demand in low-skilled industries is actually associated with an increase in spending on children's clothing.¹¹

Dividing the sample into spending on girls' and boys' clothing separately, indicates that spending on clothing increases for both genders as the result of increases in labor demand in low-skill industries. A reason for this could be increases in mothers' bargaining power as labor demand in female-intensive industries, that are mostly low-skill, goes up (Majlesi 2013).

3.4 Time Spent on Helping Children with Their Studies

MxFLS reports data on how much time each parent spends on helping children with their studies on a weekly basis. Using this as another measure of investment in children's education, I evaluate the effect of changes in relative demand for low-skilled versus high-skilled labor on parents' incentives to invest in their children's education. This data is reported at the household level and one cannot evaluate the effects separately for boys and girls.

Table 9 reports the results. The coefficient estimates in column (1), that includes the time spent by either a father or a mother, is negative but not statistically significant. In columns (2) and (5), I only look at the time spent by mothers or fathers, without controlling for their employment status and the time spent with children

¹¹For comparability, the sample of analysis here is limited to the households represented in table 3.

by their spouses. The results suggest that increases in labor demand in low-skill industries lower the time spent by mothers but do not affect that of fathers. One should note that the time spent by fathers is much less in the first place.

Changes in labor demand in different industries could affect the time spent by parents through their employment status. In other words, if changes in labor demand affect parents' employment status, they might not have as much time to spend with their children. In columns (3) and (6), I control for the employment status, but it does not affect the coefficient estimates.

The time spent by each parent could also be affected by the time spent by her/his spouse. In other words, parents could substitute the time spent with children when the labor demand changes in the market. In columns (4) and (7) a control for the time spent by the spouse is also added to the empirical specification. The results suggest that, on average, a 1 percent increase in labor demand in low-skill industries decreases the weekly hours mothers spend helping children with their studies by 0.15 hour (0.03 standard deviation). It does not affect the time spent by fathers.

4 Conclusion

Previous research has shown that school enrollment in developing countries responds to the relative changes in demand for low-skilled and high-skilled labor in the market. Using data from Mexico, this paper investigates the effects of changes in relative demand for low-skilled labor on investment in children's education, while they are enrolled at school.

The results suggest that a relative increase in demand for low-skilled labor leads to less spending on boys' education, mostly driven by reduction in spending on school materials. I do not find any effect on school tuition fees or other education-related expenses.

The time spent with children, especially the time spent helping them with their studies, is considered another important measure of investment in children's education. I also find that relative increases in demand for low-skilled labor negatively affects the time spent by mothers helping their children with their studies.

Research has shown that the quality of education affects the labor market out-

comes (at least) as much as the quantity of education. Less investment by parents in school-going children's education could result in a lower-quality of education received by children that could in turn negatively affect children's long-term labor outcomes.

It is important for developing countries that rely on manufacturing for growth to pay attention to the effects of the jobs created in this sector on incentives to invest in human capital, since human capital is considered an important determinant of long-run growth. The results in this paper are important because they provide evidence that increases in relative demand for low-skilled labor are not limited to lower rates of school enrollment and government policies to keep students at school cannot address all aspects of the problem.

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Table 1: Household Characteristics in MxFLS*

	mean	sd	observations
Mother's education**	3.65	1.74	4181
Father's education	3.93	2.05	4133
Mother's age in 2002	37.45	10.89	2604
Father's age in 2002	41.18	11.99	2588
Mother working in 2002***	0.28	0.45	2604
Mother working in 2005	0.26	0.44	2604
Father working 2002	0.74	0.44	2588
Father working 2005	0.70	0.47	2588
Number of Children 2002****	2.98	1.44	2682
Number of Children 2005	2.68	1.39	2682
Number of School-Age Children 2002*****	2.07	1.10	2682
Number of School-Age Children 2005	1.92	0.99	2682
Quarterly household expenditure on children's clothing 2002	95.11	175	2682
Household expenditure on education 2002*****	2231	4419	2682
Household expenditure on a girl's education 2002	816	1103	1861
Household expenditure on a boy's education 2002	919	1695	1782
Household expenditure on education 2005	2888	5218	2682
Household expenditure on a girl's education 2005	1083	2689	1861
Household expenditure on a boy's education 2005	1060	2226	1782
Time spent weekly by mothers helping children with their studies 2002	2.81	5.04	2448
Time spent weekly by mothers 2005	1.67	4.31	2448
Time spent weekly by fathers helping children with their studies 2002	1.38	3.53	1743
Time spent weekly by fathers helping 2005	0.72	2.38	1743

* These characteristics are only provided for the sample of analysis in this paper.

** 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 participates in the labor market and 0 otherwise.

**** As in *, this is reported for families with school-age children in both periods

***** School-age children who are 15 years old or younger in 2005

***** Given that the household has had any expenditure

Table 2: Mexican Manufacturing Sector Characteristics in IMSS

	mean	min	max	sd	observations
Share of manufacturing sector in municipalities' composition of employment 2002	0.32	0.01	0.95	0.22	114 municipalities
Share of manufacturing sector in municipalities' composition of employment 2005	0.29	0.00	0.91	0.22	114 municipalities
Share of low-skilled labor within manufacturing sector across municipalities 2002	0.77	0.55	0.94	0.10	114 municipalities
Share of employment in low-skill industries within manufacturing sector across municipalities 2002	0.60	0.00	1.00	0.39	114 municipalities
National Share of low-skilled labor (less than high school) across three-digit manufacturing industries 2002	0.76	0.53	0.90	0.13	20 industries
Growth in labor Demand in Different Categories of Industries					
Change in labor demand in low-skill manufacturing industries	-0.01	-0.11	0.03	0.02	114 municipalities
Change in labor demand in high-skill manufacturing industries	-0.00	-0.07	0.01	0.01	114 municipalities
Change in labor demand in other sectors of the economy	0.04	0.00	0.06	0.02	114 municipalities

Note: This table only covers the municipalities that are represented in the MxFLS and featured in my sample of analysis.

Table 3: Labor Demand Shocks and Total Household Spending on Education

	Dependent Variable: Total Household Spending on The Education of					
	All Household Members				Girls	Boys
	(1)	(2)	(3)	(4)	(5)	(6)
Labor demand in low-skill industries	-9821* (5218)	-9828* (5211)	-9981* (5210)	-9980* (5214)	957 (6137)	-10801* (6169)
Labor demand in high-skill industries	654 (1510)	853 (1510)	1460 (1518)	1460 (1499)	3911 (4748)	-2052 (4934)
Labor demand in other sectors	-9343 (13064)	-9223 (13029)	-8842 (13007)	-9014 (13141)	-5572 (8949)	-3437 (6905)
Control for the number of children	No	Yes	Yes	Yes	Yes	Yes
Control for the number of school-age children	No	No	Yes	Yes	Yes	Yes
Control for state time trend	No	No	No	Yes	Yes	Yes
Observations (Household)	2682	2682	2682	2682	1813	1822
Mean of Dep. Var.	2231	2231	2231	2231	1227	1316

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include wife's and husband's education and age polynomials and household total expenditure. Sample in the regression is composed of households with school age children in both periods. Monetary values are reported in Pesos.

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

*** Significance at the 99 percent confidence level.

Table 4: Labor Demand Shocks and Spending on School-age Children's Education

	Dependent Variable: Spending on a Child's Education				
	All Children (1)	Girls (2)	Girls (3)	Boys (4)	Boys (5)
Labor demand in low-skill industries	-4927* (2847)	1350 (4418)	1358 (4421)	-8425* (4435)	-7566* (4373)
Labor demand in high-skill industries	3565 (4704)	2412 (5249)	1120 (5252)	5056 (5243)	5043 (5246)
Labor demand in other sectors	4698 (6122)	-1949 (3847)	-1978 (3861)	9472 (6604)	9501 (6609)
Labor demand in low-skill industries* Age			-977 (10831)		-2716 (9077)
Observations (child)	3643	1861	1861	1782	1782
Mean of Dep. Var.	866	816	816	919	919

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include mother's and father's education and age polynomials, household total expenditures, number of siblings, and number of school-age siblings. Sample in the regression is composed of households with school age children in both periods. Monetary values are reported in Pesos.

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

*** Significance at the 99 percent confidence level.

Table 5: Labor Demand Shocks and Spending on Tuition Fees

	Dependent Variable: Spending on a Child's Tuition Fees		
	All Children	Girls	Boys
Labor demand in low-skill industries	-1976 (2315)	1212 (2793)	-3440 (2688)
Labor demand in high-skill industries	997 (1665)	1211 (1908)	1364 (3705)
Labor demand in other sectors	951 (2600)	-6582 (4245)	2372 (4720)
Observations	3643	1861	1782
Mean of Dep. Var.	179	189	169

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include mother's and father's education and age polynomials, household total expenditures, number of siblings, number of school-age siblings, and other education-related expenditures. Sample in the regression is composed of households with school age children in both periods. Monetary values are reported in Pesos.

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

*** Significance at the 99 percent confidence level.

Table 6: Labor Demand Shocks and Spending on School Materials

	Dependent Variable: Spending on a Child's School Materials (and Special Courses)		
	All Children	Girls	Boys
Labor demand in low-skill industries	-39.96* (21.95)	-12.59 (57.28)	-58.67* (31.20)
Labor demand in high-skill industries	9.64 (7.44)	9.20 (9.38)	41.31 (59.24)
Labor demand in other sectors	-18.19 (27.43)	33.83 (92.09)	-15.29 (17.33)
Observations	3643	1861	1782
Mean of Dep. Var.	263	261	265

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include mother's and father's education and age polynomials, household total expenditures, number of siblings, number of school-age siblings, and other education-related expenditures. Sample in the regression is composed of households with school age children in both periods. Monetary values are reported in Pesos.

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

*** Significance at the 99 percent confidence level.

Table 7: Labor Demand Shocks and Spending on Other School Expenditures

	Dependent Variable: Spending on a Child's Other School Expenditures		
	All Children	Girls	Boys
Labor demand in low-skill industries	-3102 (2434)	2393 (3120)	-2432 (1520)
Labor demand in high-skill industries	3693 (2231)	-600 (413)	1948 (2940)
Labor demand in other sectors	2639 (2810)	771 (543)	-2780 (4386)
Observations	3643	1861	1782
Mean of Dep. Var.	424	366	485

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include mother's and father's education and age polynomials, household total expenditures, number of siblings, number of school-age siblings, and other education-related expenditures. Sample in the regression is composed of households with school age children in both periods. Monetary values are reported in Pesos.

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

Table 8: Labor Demand Shocks and Spending on Children's Clothing

	Dependent Variable: Average Monthly Spending on Children's Clothing		
	All Children	Girls	Boys
Labor demand in low-skill industries	580** (252)	356* (187)	464* (246)
Labor demand in high-skill industries	360 (410)	62 (303)	498 (392)
Labor demand in other sectors	-948** (378)	-301 (276)	-939* (357)
Observations	2682	1861	1782
Mean of Dep. Var.	95	66	73

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include mother's and father's education and age polynomials, household total expenditures, number of boys and girls. Sample in the regression in column (1) is composed of households with school age children in both periods. Monetary values are reported in Pesos.

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

*** Significance at the 99 percent confidence level.

Table 9: Labor Demand Shocks and the Time Adults Spend Weekly on Helping Children with Their Studies

	Dependent Variable: Time Spent on Helping Children with Their Studies						
	Parents (1)	Mothers (2)	Mothers (3)	Mothers (4)	Fathers (5)	Fathers (6)	Fathers (7)
Labor demand in low-skill industries	-6.83 (5.49)	-11.82* (6.60)	-11.94* (6.44)	-15.48* (8.06)	-1.72 (7.04)	-1.98 (8.34)	0.23 (9.12)
Labor demand in high-skill industries	3.73 (5.26)	6.04 (7.74)	6.14 (7.72)	8.22 (17.86)	1.26 (5.32)	1.85 (5.91)	-2.04 (7.31)
Labor demand in other sectors	5.28 (6.18)	12.53 (8.84)	12.50 (8.84)	14.68* (8.20)	-7.61 (7.04)	-7.43 (7.06)	-10.08 (9.01)
Control for being employed	No	No	Yes	Yes	No	Yes	Yes
Control for the time spent by the spouse	No	No	No	Yes	No	No	Yes
Observations	4191	2448	2448	1740	1743	1743	1740
Mean of Dep. Var.	2.20	2.81	2.81	2.94	1.38	1.38	1.38

Notes: Standard errors are clustered at the municipality level and reported in parentheses. Controls include mother's and father's education and age polynomials, household total expenditures, number of children, and number of school-age children. Sample in the regression is composed of households with school age children in both periods.

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

*** Significance at the 99 percent confidence level.